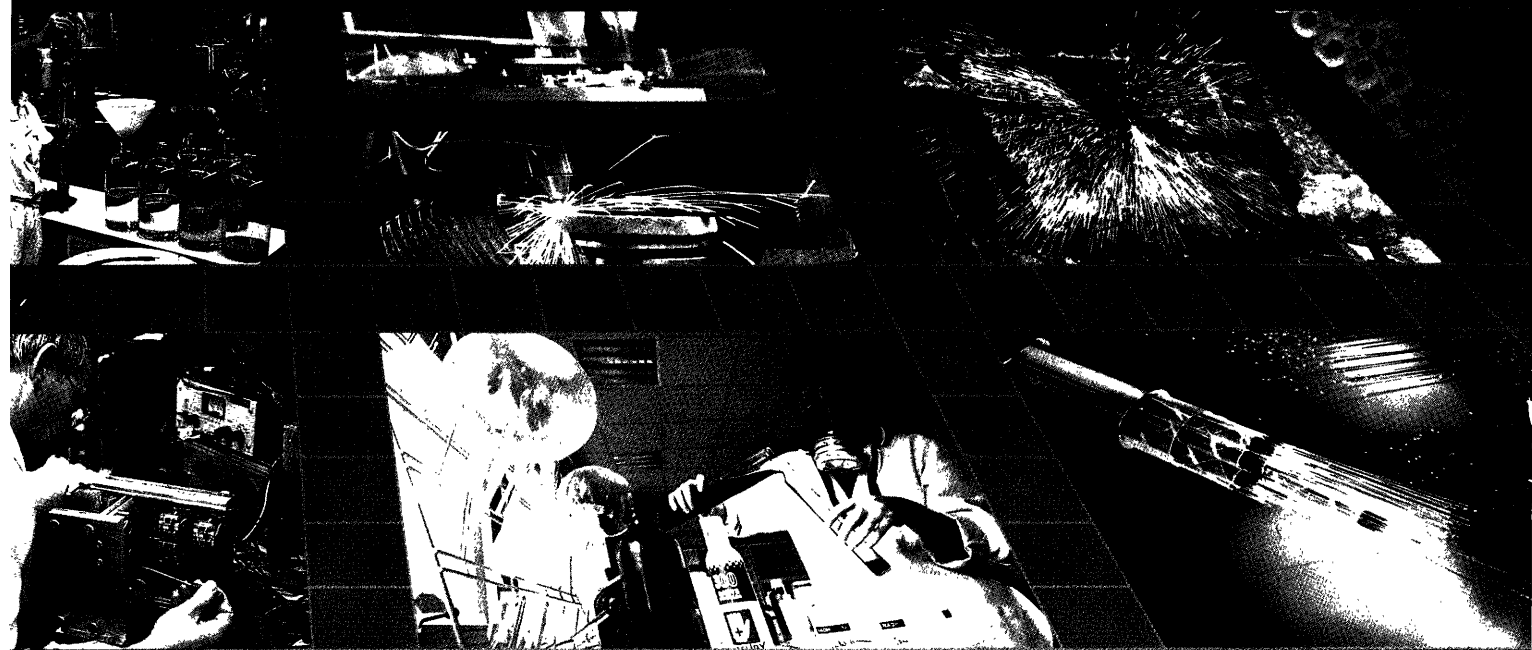


PANORAMA OF EC INDUSTRY

OVER 165 SECTORS OF MANUFACTURING
AND SERVICE INDUSTRIES
IN THE EUROPEAN COMMUNITY IN FOCUS

1990



WORLD

PANORAMA OF EC INDUSTRY 1990

describing over 165 sectors of the European Community's industry,
including both manufacturing and services

Message from Jacques Delors
Preface by Martin Bangemann
Introduction by Fernand Braun

COMMISSION OF THE
EUROPEAN COMMUNITIES

The opinions expressed in this publication are those of the authors alone; in no circumstances should they be taken as an authoritative statement of the views of the Commission.

The production of the book has been coordinated by the Industrial Economy Service of the Directorate-General for the Internal Market and Industrial Affairs of the Commission of the European Communities, with the cooperation of the trade and professional associations of the European Community and the assistance of the consultancy firm DRI Europe, 1, rue Camille Lemonnier, B-1060 Brussels, Tel. (32 2) 346 23 25.

All professional associations/organizations known to the Commission which represent industry at a European level have been asked to provide a chapter on their sector or sectors. Consultants were engaged to ensure the technical coherence of the work and to complete gaps in the information received.

For each sector covered, the name, address and telephone number of the professional association concerned are indicated. Questions about the content of the *Panorama of EC industry* should be directed to the associations concerned or to the Commission services with major responsibility for this publication:

**Industrial Economy Service
(Brussels)**

**Tel. (32 2) 235 79 65 / 235 92 81 / 235 90 71
Telefax (32 2) 236 30 28**

**Industrial Statistics Service of the Statistical Office of the European Communities
(Luxembourg)**

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COMMISSION
OF THE EUROPEAN
COMMUNITIES

Brussels, le 29 Juin 1990.

Directorate-General
Internal market and Industrial Affairs

INFORMATION NOTE

Subject: **Panorama of EC Industry 1990**

I am sending you, with great pleasure, a copy of the **PANORAMA OF EC INDUSTRY 1990** - the second edition of the annual report on the state of the Community industry. This report has been prepared with the professional and industrial associations who represent industry at the European level and covers 168 sectors of manufacturing and service industries.

The English and German versions are currently available. The French will be available in July and Italian and Spanish shortly thereafter.

Work on the 1991 edition has already started and we would be grateful for your suggestions and improvements.

I hope that you will find this Panorama useful.

R. Perissich

The English, French and German versions are currently available. The other languages (Italian and Spanish) will be published shortly. All versions can be ordered from the Office for Official Publications of the European Communities or from its sales offices in your country.

PANORAMA OF EC INDUSTRY 1990

PANORAMA OF EC INDUSTRY 1990 — ERRATA

- Page 27, Table 1A should read as follows:

Table 1A
Ranking of major EC sectors by output and employment, 1988 (1)

NACE Code		Output		Employment	
		(million ECU)	Rank	(1 000)	Rank
50	Building and civil engineering	412 600 (2)	1	8 447	1
41	Food and drink	331 232	2	2 208	4
25	Chemicals	263 983 (3)	3	1 678	7
35	Motor vehicles, parts and accessories	206 714	4	1 815	6
32	Mechanical engineering	190 977	5	2 344	3
34	Electrical engineering	187 816	6	2 391	2
31	Manufacture of metal articles	145 511	7	2 123	5
22	Production and preliminary processing of metals	125 814	8	920	11
43	Textile industry	84 300	9	1 548	8
48	Processing of rubber and plastics	80 710	10	981	9
24	Manufacture of non-metallic mineral products	80 140	11	977	10
36	Other means of transport	59 715	12	784	12
33	Computer and office equipment	39 878 (4)	13	239 (4)	15
75	Air transport	24 725	14	259	14
13	Crude oil and natural gas	22 700	15	95	17
37	Instrument engineering	20 381	16	309	13
23	Extraction of other than metalliferous and energy-producing minerals	9 761	17	128	16

(1) The rankings are based principally on Panorama sectoral data; wherever this was not possible, Eurostat (Inde data base) estimates were used to complete the table.

(2) Estimated 1987; excluding Greece.

(3) Turnover; excluding Greece.

(4) Excluding Greece and Portugal.

Source: Industry Associations, Eurostat (Inde, Sec1).

- Page 58, 'million' should read 'billion'.
- Page 76, Table 6, '1980' should read '1980 with SWTS' and '1987' should read '1987 SWTS and VWTS'.
- Page 96, Table 17, 'billion USD' should read 'billion ECU'.
- Page 138, Table 7, '10 million USD' should read 'in million USD'.
- Page 143, below the attribution it should read: 'Paper originally prepared for the Task Force on the Environment and the Internal Market — DG XI'.
- Page 1-32, Table 7, 'fixed' should read 'refined'.
- Page 1-62, Table 2, last column, '112.5' should read '1 125.0'.
- Page 3-14, right-hand column, '406.6 mm' should read '406.4 mm'.
- Page 8-3, Table 3, under '1982', 'Exports extra-EC Index' should read '125'.
- Pages 8-4 and 8-10, The photo credit should read 'AKZO'.
- Page 8-31, below the attribution, the telefax number should read '(32 2) 230 14 09'.
- Page 8-42, Table 1, for 'The Netherlands' the figures should read, left to right, '142', '148', '9' and '10'.

- Page 8-43, Table 2, for 'The Netherlands' the figures should read, left to right, '109', '114', '7' and '8'.
- Page 10-45, right-hand column, third paragraph 'Gunfas' should read 'Grundfos'.
- Page 11-18, last paragraph, fifth line 'power supply' should read 'power transformers supply'.
- Page 11-27, Figure 2, the legends to the symbols are reversed and the line beneath should read 'The production share is not available for Greece and Portugal'.
- Page 11-38, the attribution should read
'Eurobat: Association of European Accumulator Manufacturers
and
Europile: Association of European Dry Battery Manufacturers
Address: Waisenhausplatz 25, PO Box 5032, CH-3001 Bern
Tel: (41) 031 22 87 81; Telex: 911 407; Telefax: (41) 031 21 19 58'.
- Page 11-43, first paragraph, fifth line 'the acquisition of Whirlpool (US) by Philips.' should read 'the acquisition of Philips Major Appliance Operations by Whirlpool.'
- Page 15-2, Table 2, under '1988' for 'Production in constant prices EC' the figure should read '335 578' and for 'Index' '109.9'.
- Page 16-22, the NACE code should read '442.2'.
- Page 17-7, right-hand column, first paragraph, '5.2 million' should read '5.2 billion'.
- Page 18-6, Table 3, for 'USA' in 1991, and 'Japan', from 1989 to 1991, the index of production in current prices is not available.
- Page 19-7, right-hand column, second paragraph, third line, '1995' should read '95'.
- Page 19-17, The attribution should read
CEPAC: The European Confederation of Pulp, Paper and Board Industries
Address: 1, Rue Defacqz, B-1050 Brussels
Tel: (32 2) 534 10 10; Telefax: (32 2) 534 14 24'.
- Page 20-13, second line, '41 billion' should read '47 billion'.
- Page 25-8, last paragraph, eighth line, '191' should read '1191' and, thirteenth line, '10' should read '70'.
- Page 26-19, Figure 1, 'Turnover (million USD)' should read 'Assets (billion USD), 1988'.
- Page 27-17, the attribution should read
'Union Internationale du Notariat Latin
Address: Buenos Aires, Callao 1542, Argentina'.
- Page 27-23, the attribution should include 'Telefax: (32 2) 646 05 41'.
- Page 28-27, the attribution should read
'ESIF: European Services Industries Forum
Address: Zeepestraat 55, B-2850 Keerbergen
Tel: (32 15) 51 70 80; Telex: 65525'.
- Page 30-14, right-hand column, eighth paragraph, last line, 'Geisco' should read 'GSIECO'.



Message from Jacques Delors

**President of the Commission
of the European Communities**

The completion of the internal market by 1992 will have a profound effect on Europe's industrial activity, in particular by improving efficiency and productivity throughout. Community policies contribute to this process by removing numerous unnecessary barriers. Business contributes by grasping the resulting new market opportunities, by adapting to the changed environment and by constantly improving quality and service.

In order to evaluate how each industrial sector is affected by the integration process, the basic facts relating to them must be available.

With this need in mind, the Commission published the first edition of the **Panorama of EC Industry** at the end of 1988. The success of that first edition and the many positive reactions it received, convince me that it was not only an extremely useful document but that it answered a real and urgent demand. It is clear that with the **Panorama** we have succeeded in setting down the basic facts of European industry and in providing the comprehensive up-to-date picture so much needed.

In addition to its fundamental role of presenting information, the **Panorama** has played a part in increasing awareness of the existence of the Community market in industrial and labour circles and in the mind of the general public. Many representatives of industries involved in the production of the **Panorama** admitted that this had led them for the first time to 'think European', in terms of the Community market as a whole, not yet fully integrated but progressing surely and rapidly in that direction.

Our attitudes towards the impact of human activity on the environment are undergoing radical change as concern about the future state of the earth is mounting. The issue demonstrates perhaps better than anything else the way in which nations depend on one another and their common interest in cooperative effort. I am therefore particularly pleased to note the attention given to the inter-relationship between environmental issues and industrial production in this **Panorama**.

Looking at this updated and extended edition, I am confident in predicting that the **Panorama of EC Industry** will fast become the key yearly reference on industrial activity in the Community.

Jacques Delors



Preface by Martin Bangemann

**Vice-President of the Commission
of the European Communities**

The completion of the internal market means that European industry will at last have the large domestic market which it urgently needs to be able to perform successfully all over the world.

The internal market will increase competition both between European operators and with new competitors from third countries, as the internal market, rather than resembling a fortress, will in fact be open to everyone.

European firms will benefit: uniform technical standards and the abolition of costly border controls will result in substantial reductions in costs. Even more important,

however, is the fact that the internal market will generate new forms of growth, the presence of which is already noticeable.

Firms in all Member States are busy preparing for the 1992 deadline by increasing investments and establishing forms of transnational cooperation.

The **Panorama of EC Industry** is designed to make analysis of future market trends easier for many branches of industry by providing detailed, up-to-date information. It is thus a great pleasure for me to present an enlarged second edition portraying an industry which can look to the future with confidence. Awareness of the new opportunities for growth means that there are good grounds for such optimism, but it is impossible to make the right decisions without correct information. This is where the new edition of the **Panorama of EC Industry** can make a major contribution.

Martin Bangemann



Introduction by Fernand Braun

**Director-General for the
Internal Market and Industrial Affairs**

When my services embarked on the project to produce a **Panorama of EC Industry** we of course believed that there was a pressing need for such a document. I am pleased to say that the interest expressed in the publication by professionals and the general public has exceeded our most optimistic expectations. Ten thousand copies were sold and the positive reaction received from all sides confirms our belief that the **Panorama** is a useful source of information on European industry.

Industry has evolved and conditions changed since that first edition, so we are faced with the need to modify the presentation and add new information. In conse-

quence, industry and many Commission services have collaborated closely in producing this 1990 edition which is not only revised and updated but is also more comprehensive and complete than the previous one.

I have no doubt that this new edition will, like the previous one, prove useful for all those interested in the structure and the development of economic activity within the Community. I am particularly happy to note that this second edition is, in response to widespread demand, available in more Community languages. In addition to the English edition, there are French, German, Italian and Spanish versions. As a result, a much wider public will gain access to the information, benefiting in particular small and medium-scale enterprises.

Among the additions to last year's edition is a section dealing with the implications for industry of environmental concerns, a more systematic comparison of the Community's position with that of the USA and Japan, forecasts for the 30 sector aggregates represented in the book and additional data on major companies. The number of industry sectors covered has gone up from 140 to 165. Particular improvement has been achieved in the area of transport services where, despite the difficulties in gathering information, five sectors have been added, thanks to the help of the Commission services concerned.

This edition was produced in basically the same manner as the first. The European professional associations were asked to update, adapt and expand last year's analysis of their sector under their own responsibility. Their contributions often express their views and opinions which do not necessarily correspond to those of the Commission services. As previously, every effort has been made to ensure that the information provided is essentially of an economic or statistical nature and is presented in an appropriately balanced form. Each sectoral contribution should be read independently of the rest, giving information on the state of that sector. The reader should be aware that figures cannot be cumulated across sectors.

The Industrial Economy Unit of my Directorate-General was charged with the coordination of the work and carried final responsibility for editing and preparing the publication. Consultants were employed to ensure the technical coherence of the whole and to fill in gaps where necessary in the information received.

The work was carried out in close cooperation with the sectoral services of a number of Directorates-General (Internal Market and Industrial Affairs; Transport; Telecommunications, Information Industries and Innovation; Financial Institutions and Company Law; Energy). In a number of cases these services coordinated the production of the monographs on their sectors.

The Community's Statistical Office has provided invaluable support by taking full responsibility for all the statistical data. In due time this information will be available from a database. The Office for Official Publications assisted us, as before, in editing the book and preparing it for publication.

The number and scope of the chapters on general topics have been expanded. In addition to the chapters which give the general economic setting and those which highlight sectors, this edition includes chapters putting into focus respectively the problems and challenges posed by the environmental issue, direct foreign investment, the EC's biggest corporations and the Community's internal and external pattern of trade. The first of these chapters was written with the support of the Directorate-General for Environment, Consumer Protection and Nuclear Safety.

We hope in future to be in a position to be able to disseminate through the **Panorama** summaries of the results of studies that are undertaken from time to time by my services and which may be of interest to a wider public.

We also intend in future editions to pay more attention to the dynamic aspects of industry. These would deal with, for instance, changes in the corporate structure of sectors, the expected impact of new or forthcoming legislation, such as environmental and trade regulations, changes in the cost structures and trade forecasts among others.

The picture that emerges from this **Panorama** confirms last year's pattern. Having gone through a period of considerable restructuring and adaptation, most sectors of EC industry express confidence in the future. The favourable international climate of recent years has, of course, contributed to this optimism. On the other hand, it is the opportunities and prospects offered by the internal market which, to an increasing degree, impinge on business expectations and strategies. As global conditions become less promising, sustained growth in the EC should be pursued further by exploiting fully the benefits of the internal market. The integration process must therefore be reinforced and accelerated in order to become a motor for growth.

I would like to thank here all the professional associations who worked with us on the project; the circumstances under which they made their contributions were not always easy. I would also like to thank the staff in the many Commission services who were involved in the production of this **Panorama**. Their active participation was of vital importance in preparing this new edition which will, without doubt, be greatly valued by all its users.

Fernand Braun

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SPECIAL FEATURES

HOW TO USE THIS BOOK

The purpose of this publication is to provide a description of industry across the European Community. The book is intended for all those interested in the present situation and likely future developments of manufacturing and service industries in the EC, both in terms of specific sectors and via a more global approach, looking at the implications of topical issues on European industry.

The following section sets out the methodology, terminology and conceptual basis underlying the analysis, with a view to assisting interpretation of the data and information.

This year's exercise constitutes the second attempt to collect information and data on a Community-wide basis for presentation in this kind of published format. Its scope is broader, both because a large number of additional sectors have been covered (about 30% more), and because the number of themes addressed in the publication has increased.

General methodology

The view that it is the industries themselves which are able to provide a rich source of information and assessments of future prospects is reflected in the basic methodology used in compiling the material presented here. Contributions to the publication have been sought from a wide range of industry associations represented at Community level. This methodology has raised attendant problems of sectoral definitions and in some cases lack of comprehensive data. A substantial effort was made to assemble up-to-date and relevant statistics on European industry. Eurostat (the Statistical Office of the European Communities) worked with the industry associations to define, seek out and collect the statistical material presented in this publication. Not all of what is needed to give a fair picture at the Community level is currently available, in spite of much progress over recent years. Inevitably, in an exercise of this nature the goal of providing absolute figures is unrealistic. Thus, the figures provided here are often hedged with qualifications, and are in such cases best interpreted as indicators of trends and developments within the sectors covered.

Time frame

The sectoral analyses were written during the second and third quarters of 1989. Each analysis consists of qualitative discussion with respect to the main trends and developments in the industry, in most cases accompanied by statistical material. In line with the achievement of the single market by the end of 1992, the general intention is to provide aggregate information and data at the Community level.

The statistics used were those that were available in June 1989. Time series run from 1980 onwards. The latest data is limited to 1988, and in some cases an earlier year. Gaps in the data were filled by estimates wherever suitable advance information was available. Estimates for data up to 1988 are footnoted in the tables. For many sectors, forecasts have been provided for 1989 along with a qualitative assessment of the medium-term outlook for the industry. All figures for 1989 and after are forecasts and are not specially footnoted as such in the tables. The forecasts are derived from those made by the associations or consultants involved in the compilation of individual reports if available. Otherwise they have been constructed by Eurostat on the basis of sectoral forecasts of EC industry growth prepared by the consultancy firm DRI Europe.

Industry classification system

The industrial classification which forms the basis of the selection of industries included in the book is the NACE coding system. This system classifies economic activity in terms of the nature of goods and services produced or by the nature of the production process employed. It is arranged on the decimal system and is subdivided into divisions (1-digit codes), classes (2-digit codes), groups (3-digit codes), sub-groups (4-digit codes) and items (5-digit codes). The EC Panorama is primarily focused at the '3-digit' and '4-digit' level. More detailed information on the NACE is contained in the General Industrial Classification of Economic Activities within the European Community published by Eurostat, 1985 reprint of the 1970 edition. This publication is available from the usual outlets for Community publications.

Although most chapters are headed by the appropriate NACE code, some do not have a NACE code

indicated as the sector represents too small a fraction of the total NACE group. This often happens for the service sectors. Revisions to the NACE classification are currently being prepared, one of the objectives of this revision being to break down further some service and even industrial categories. Even when a NACE code is published beneath the sector titles this should be regarded with caution; indeed, in some cases the NACE classification does not entirely coincide with the industrial sector or sub-sector under discussion. Hence, each chapter contains a preliminary section dealing with sectoral coverage in the particular chapter and indicating the extent to which this deviates from the NACE classification. Similarly, in some cases an overlap occurs between sectors and therefore data cannot be cumulated.

Statistical data

The statistical data should be regarded with caution particularly for the more recent years where data have often been estimated. The two main sources of data are Eurostat and industry associations; data sources are indicated for each statistical table. Data from the separate sources have generally not been mixed since their respective sectoral definitions frequently differ. However, in some cases the Eurostat figures have been extended forwards using forecast changes prepared by industry associations. Where the data comes from Eurostat, the particular database consulted is indicated in parentheses.

Eurostat's data for production and employment come from annual enquiries conducted by Member States to all firms with 20 or more employees. Figures are generally available at the NACE 3-digit level. The production data exclude VAT, and the employment data relate to persons employed excluding home workers. The definitions are standardized, and so the figures are comparable across industries and countries. The exception is for Spanish and Portuguese data, where the coverage is for firms of all sizes.

Estimates are not supplied to Eurostat by Member States for the firms not covered by the enquiries, and so the figures under-report actual employment and production. Where this is significant, either industry association sources are used or note is made of it in the commentary. Derived statistics which are calculated from both production and trade statistics will also be affected. Apparent consumption will be understated, and import penetration ratios and export rates will be overstated.

For manufacturing industries each chapter includes a summary table containing the main indicators for the industry. These cover apparent consumption (defined as production + imports - exports), net exports (the trade balance for the Community with the rest of the world), production and employment.

Data in the tables are in current ECU unless otherwise stated. Indices (reference year: 1985 = 100) have been calculated for production and trade data providing easier reference to trend changes. Production series in constant 1985 prices are given to provide an indication of real volume change by removing the effects of inflation.

Every effort has been made to include data for all 12 Member States. However, where data are not available for EC 12, country coverage is clearly indicated in the footnotes appearing below each table. Production figures for the USA and Japan derived from their respective censuses of manufactures have also been included.

Gaps in Eurostat's data for production and employment have where possible been filled by estimation, and are footnoted in the tables. The estimates are derived from short-term indicators such as indices of production, producer prices and employment. If the industry associations have not prepared forecasts, those for 1989 are based on indicators for the early months of the year, but also take into account independent sectoral forecasts. Eurostat's estimates are only made for the NACE 2- and 3-digit level. Gaps in industry association figures at the 4- or 5-digit level have normally not been able to be filled due to the scarcity of statistics at this level.

Exchange rate conversion and deflators

All data are reported in ECU, and national currencies have been converted at the average exchange rate prevailing for the year in question. The exchange rates that were used to do the conversions are reported in the 'Annex' section at the end of the 'Highlights' chapter. Producer prices indices have been used to deflate production data. In cases where the corresponding NACE 3-digit index has not been available, the NACE 2-digit index has been used. For Portugal, where such indicators are not yet available, the corresponding retail price indices have been taken.

Trade data

The trade data are reported in terms of Community trade flows with the rest of the world. In most cases these data are based on Eurostat figures. Export valuations are generally fob (free on board, i.e. excluding freight and insurance costs) whereas import data are cif (i.e. inclusive of carriage, insurance and freight). Import statistics may be generally regarded as slightly more accurate than export statistics due to greater ease of data collection in the former case.

All trade data are in current ECU. For comparative purposes, the trade ratio of exports to imports (X/M) has been calculated for each set of trade data. In some sectors, figures are also given for the import penetration ratio (defined as the ratio of imports from third countries to apparent consumption) and the export rate (exports to third countries as a fraction of production).

The entry into the Community of Greece in 1981 and Spain and Portugal in 1986 caused breaks in the available trade series, which are footnoted in the tables. Indices given in the tables are chained so that annual changes reflect the movement for a fixed group of countries. Because the definition of the zone extra-EC changed twice during the period, the net exports in the main indicators have been calculated from the figures for imports and exports to and from all partners.

Sources

Where an industry association has provided information or is the author of the monograph on the particular industry or sector, the name and details appear at the end of the section. In some cases, sectoral profiles have been written by industry experts or departments of the European Commission and where relevant this has been indicated.

At the horizontal level, the spokesman for European business and industry is the Union of Industrial and Employers' Confederations of Europe, whose objective is to promote the common professional interests of the firms represented by its 33 national member

federations. (UNICE, Rue Joseph II 40, B-1040 Brussels; Tel: (32 2) 237 6511; Telex 26613; Fax: (32 2) 231 1445.)

Signs and abbreviations

EC	European Community
EC 9	European Community excluding Greece, Spain and Portugal
EC 10	European Community excluding Spain and Portugal
EC 12	European Community
EFTA	European Free Trade Association (Austria, Switzerland, Sweden, Norway, Finland, Iceland)
B	Belgium
B-L	Belgium and Luxembourg
DK	Denmark
D	Federal Republic of Germany
GR	Greece
E	Spain
F	France
IRL	Ireland
I	Italy
L	Luxembourg
NL	Netherlands
P	Portugal
UK	United Kingdom
AAGR	annual average growth rate
billion	one thousand million
cc	cubic centimetre
cm	centimetre
ECU	European currency unit
GWe	gigawatt of electrical power
kWh	kilowatt hour
m	metre
N/A	not available
TJ	terajoule
USD	United States dollar
VAT	value-added tax
X/M	exports divided by imports

HIGHLIGHTS: EUROPEAN INDUSTRY FACING NEW CHALLENGES

Introduction

European industry has been regaining confidence these last few years, emerging from a period marred by pessimism, doubt and apprehension about not being able to confront new competitors or the improved performance of more traditional competitors such as the United States and Japan. This period seems to be far behind us at present — thanks to the great stimulus provided by the creation of the single European market and the major restructuring that industry underwent these last few years. This opens the way for new growth prospects.

This *Panorama of European Industry 1990* is an inventory of sorts of the current situation of industry; it reviews problems which the latter had to face and shows how companies managed to confront these problems. This analysis is made both on a case-by-case basis, through a detailed description of 165 sectors of activities as defined by the general classification of industrial activities in the EC (NACE), and in a more global manner by focusing on certain issues that have an impact on the whole of European industry.

Thus, having described in the first chapter of the book the general situation of European industry and drawn initial conclusions, the results and strategies of the 70 biggest European corporations are analysed in the second chapter.

The third chapter describes the structure of the EC's foreign trade and the changes which have taken place therein since the beginning of the 1980s. The factors which have influenced the competitiveness of EC companies on world markets are identified, so as to give a better indication of the likely development of foreign trade in the next 10 to 15 years.

To complete this picture of European industry, a fourth chapter describes and tries to explain the exceptional growth of foreign investments in Europe these last few years, by distinguishing these investments in terms of both their origin and their destination.

Finally, the increasing importance of environmental protection problems in the modern world justify two separate chapters. The first deals with the influence of environmental policies on industrial competitiveness, and the second describes the environment

industry itself and identifies its most dynamic sub-sectors. The first part of this *Panorama of European Industry 1990* concludes with a description of the macroeconomic environment in which we live, and the changes that are expected to take place in the coming years.

The second part of the book describes the current situation and the economic prospects from an angle that is totally different from that usually encountered in sectoral reviews of economic activity in the EC: first, individual sectors are described at a markedly more detailed level than usual (nearly 170 sectors are considered separately), and, secondly, most monographs were written by the professional associations themselves. This approach not only provides a view of how the specialists of each sector assess their situation and envisage the future, but also makes it possible to document fundamental structural changes usually very difficult to identify by a 'purely' statistical analysis. More specifically, it is usually extremely difficult to gather precise information on production and employment, and especially on average hourly wage rates, investment, prices, and even value-added at a very disaggregated level, so that sectoral data available are usually quite poor and often incomplete.

The sectoral monographs contained in the second part of the book are the result of considerable efforts waged by professional associations, Eurostat and the coordinating consultant (DRI Europe) to present information as detailed as possible, and to provide a microeconomic description of the sector, its structure, changes it has had to face and the way in which companies in the sector reacted to such problems.

The problems which the European economy has had to face since the mid-1970s were in fact as rich in number as in variety, and likely to have different effects on different sectors of activity: the rise, then sharp drop in the price of oil, inflation, important fluctuations in exchange and interest rates, the arrival of new competitors on international and domestic markets as a result of the rapid industrialization of certain countries in the Far East and in Latin America, and at times considerable changes in the orientation of economic policies; the latter were indeed initially aimed at a better distribution of the losses in purchasing power caused by the rise in oil prices, then at restoring the equilibrium of public-

sector accounts, which deteriorated considerably in the 1970s and the early 1980s.

Even if the direction of fluctuations such as variations in the price of oil and the dollar are still difficult to forecast with precision, numerous challenges are already confronting European industry for the years to come, including the creation of the single market, the rapid development and increased use of new technologies in the production process, and greater awareness about environment-related problems leading to new regulations and the need for some companies to make often heavy investments.

The way in which European companies have reacted to problems in the past and are preparing to face future problems is not, as already pointed out in last year's *Panorama*, very well reflected in the industrial statistics that are usually available; examples of structural change difficult to identify in 'traditional' sectoral data are: restructuring, disappearance and absorption of family-type businesses or small companies, greater specialization of companies seeking to be better equipped to face competition or to take advantage of economies of scale, modifications in the line of products, changes in the methods of pro-

duction and the increasing use of new technologies, and finally the increasing externalization of certain activities such as cleaning, accounting services, or even advertising, consultancy, and in certain cases, product design.

The value of the very microeconomic approach used here, and the fact of having afforded specialists in each sector the opportunity to describe the development of their industries lies precisely in being able to take into account these phenomena and to see to what extent they turned out to be important for one sector of activity or another.

Before going into the different topics listed above, it is worth obtaining a better idea of the changes that have affected European industry as a whole during the last two decades.

Indeed, by creating a more competitive environment and abolishing trade barriers, the creation of a single European market will probably lead to a greater specialization of production in certain sectors. It is therefore vital to understand how we have come to the type of distribution of sectoral production of today, in order to be able to foresee future changes and to prepare accordingly.

Figure 1

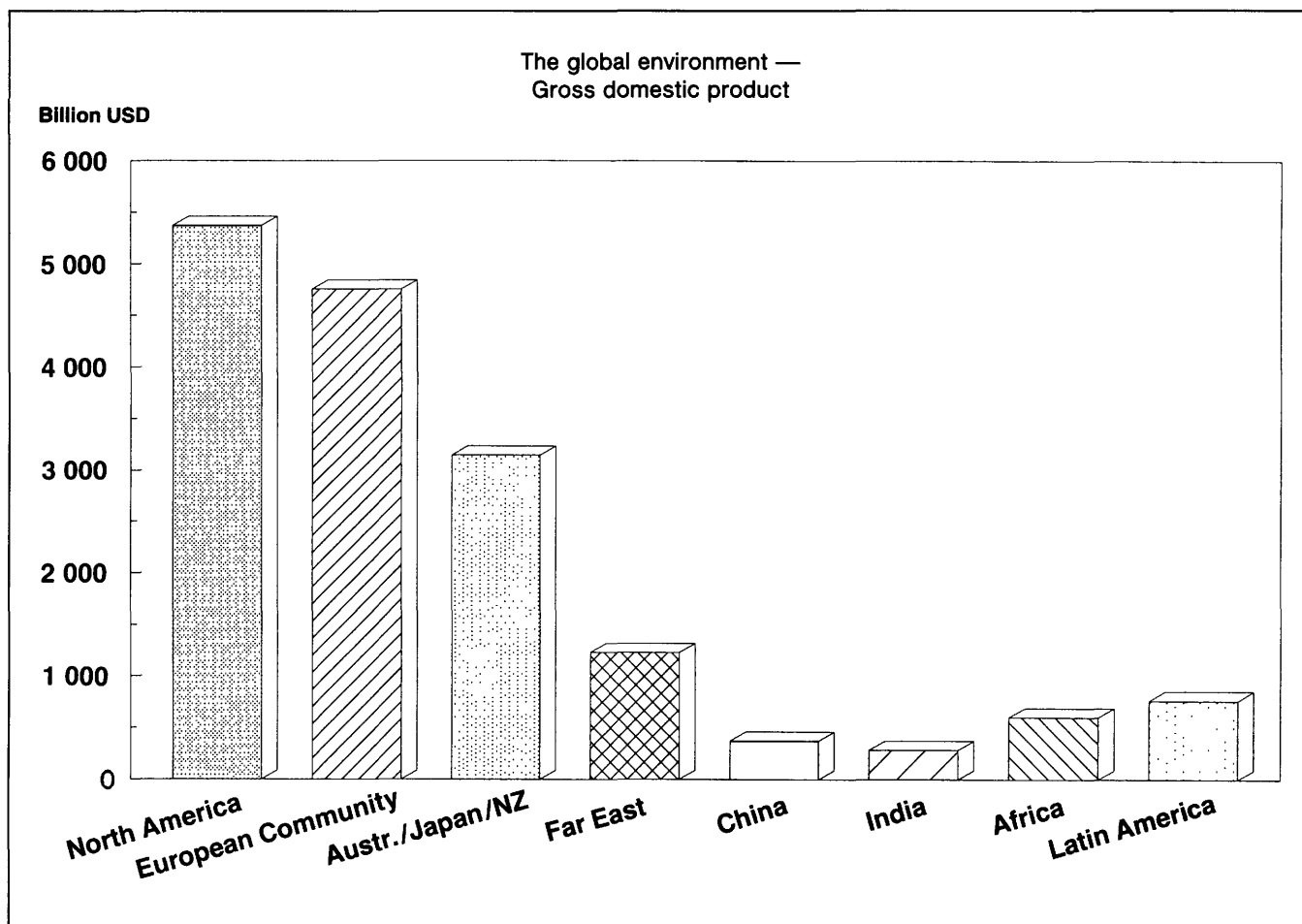


Figure 2

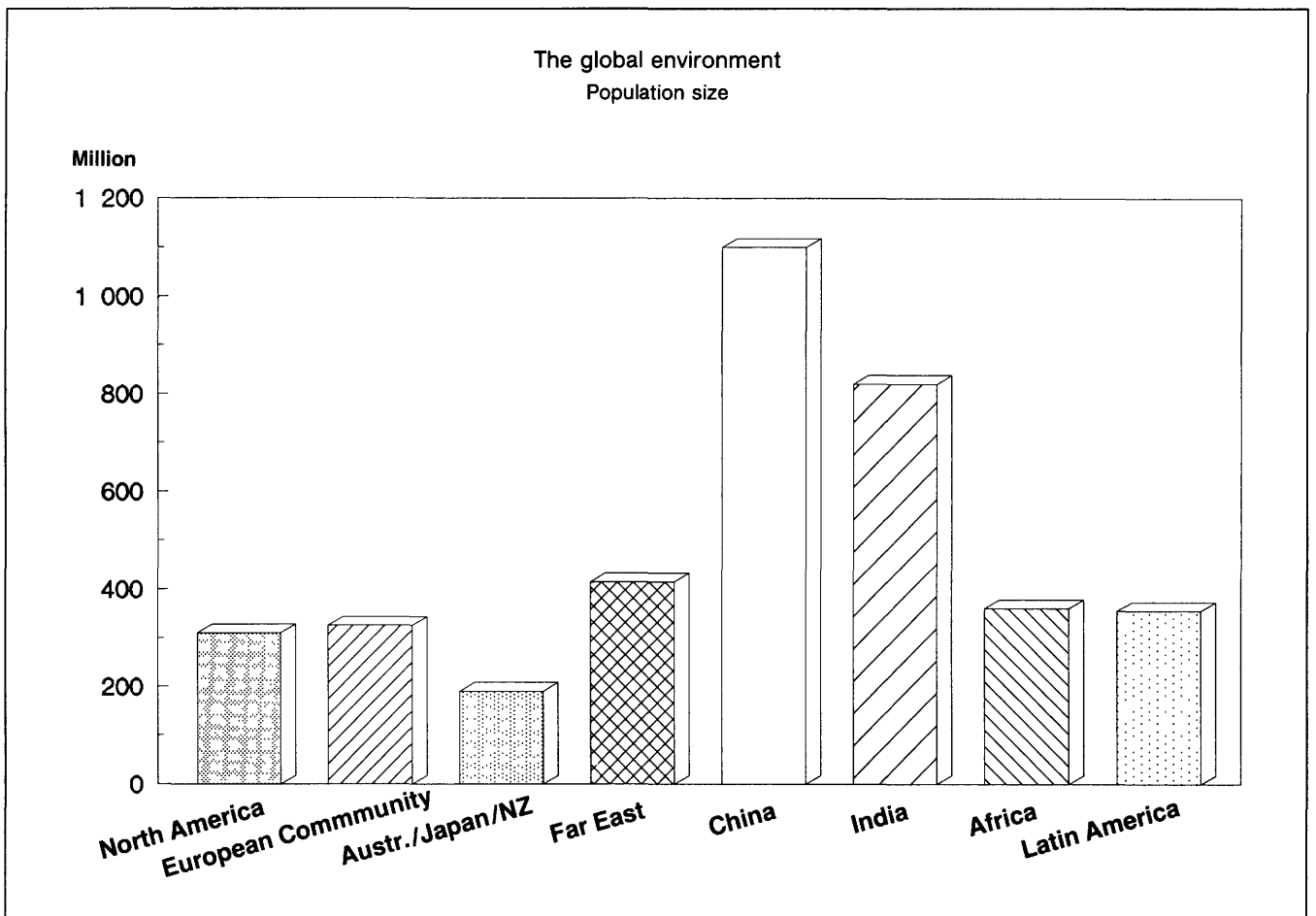
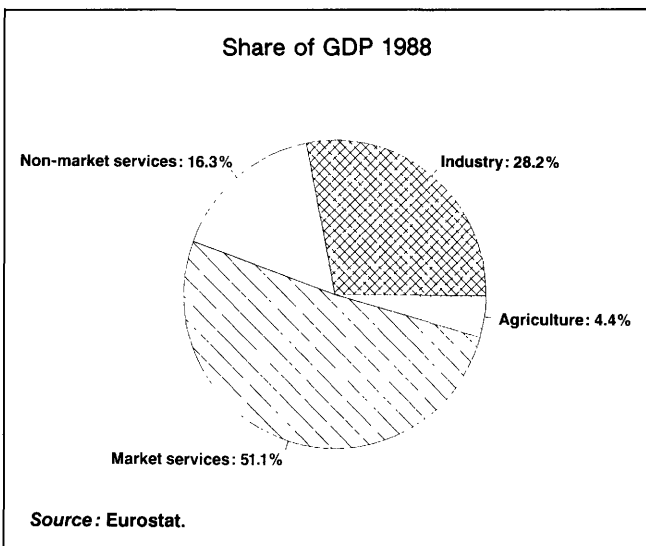


Figure 3



Description of structural changes that have taken place in the EC industry

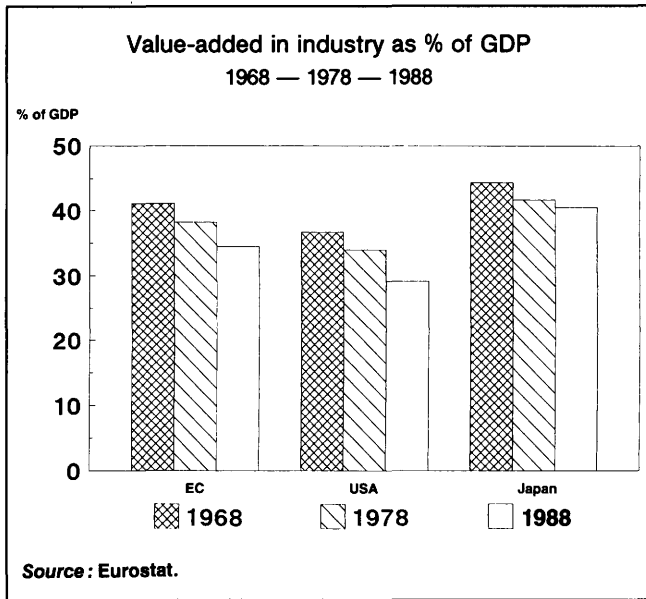
Whereas in terms of gross domestic product, Europe as a whole is the second economic power in the world, in terms of population it is only fourth, after

China, India and Far Eastern countries (including Japan). An immediate consequence of this phenomenon is that it enjoys a very high per capita income, even if the European average conceals considerable differences between the various countries. In Western Europe, the EC accounts for more than 86% of GDP, and 71% of the population. Figure 1 compares gross domestic product in US dollars in the following regions: North America; the European Community; the Pacific Rim (Australia, Japan and New Zealand); Far East Asia; China; India; the Middle East and Africa; and Latin America.

Since 1970, the economy of the EC has undergone profound changes; the share of industry has fallen from nearly 32% to only 28.2% in 1988, and that of agriculture from about 5% to only 4.4% during the same period, whereas the share of market and non-market services went up by 4.3%, from 63.1% in 1970 to 67.4% in 1988.

A similar development was taking place in the United States and Japan, with the share of industry diminishing by 9 and 3 percentage points respectively between 1968 and 1988, to stand at 28% and 41% respectively in 1988. This trend however

Figure 4

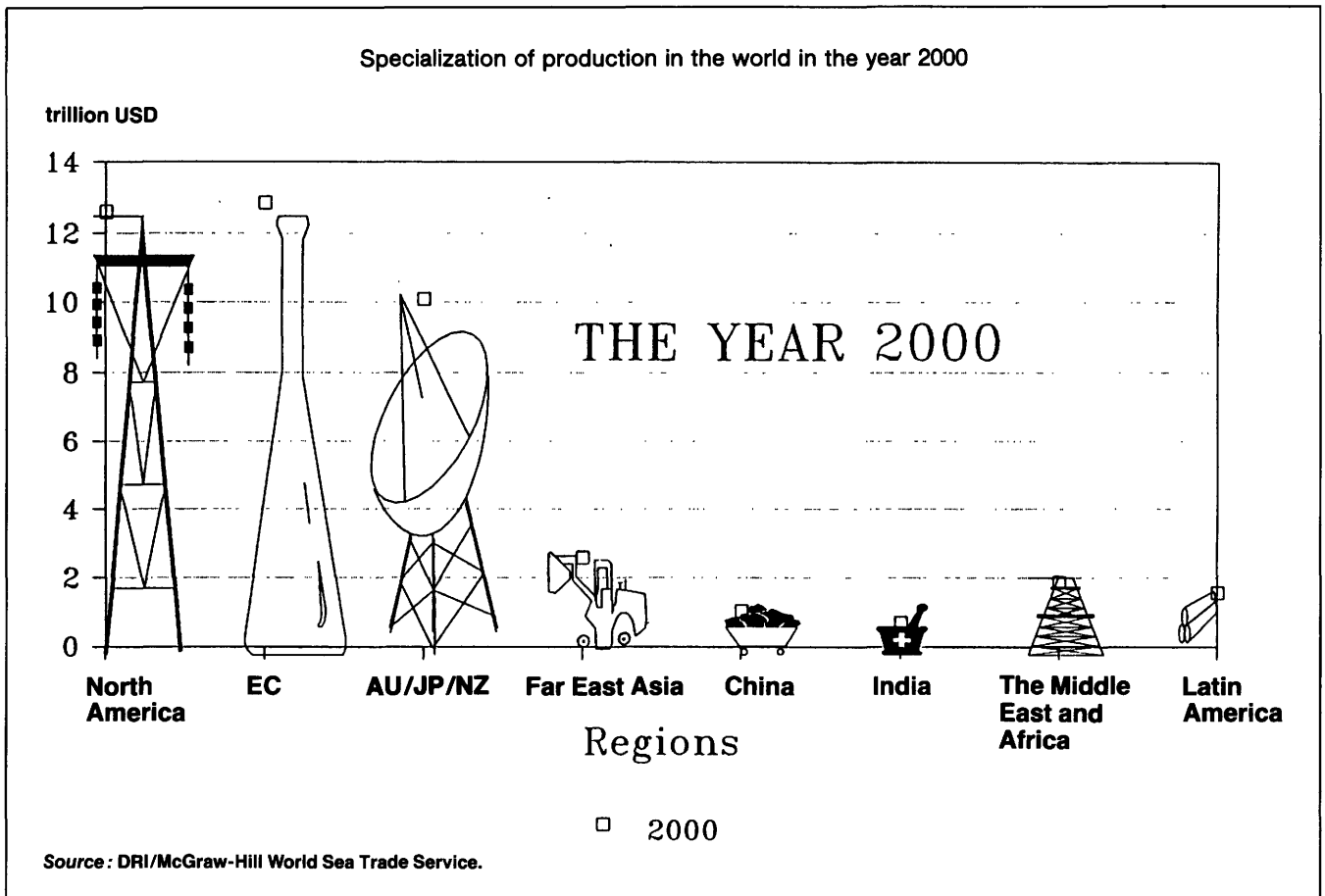


occurred within the framework of generally more sustained growth than that registered in the EC during the period under review: between 1980 and 1988, the average annual growth rate in the EC amounted to 2%, compared with 2.9% in the United States and 4.1% in Japan.

As we shall see further, economic development in the main industrialized zones occurred by preference around certain products, which in turn led to greater specialization in production (and especially trade) on a world scale. Figure 5 illustrates this phenomenon, and the relative specialization of the European economy in the chemical industry, that of North America in industrial products in general, that of Japan in electronic equipment and telecommunications, that of Africa and the Middle East in oil extraction, and the growing specialization of Latin America in lumber.

The global trend of employment in the EC was not much more favourable than that of production — quite the contrary. Whereas in the United States employment continued to increase or stabilized, entailing thus a near stagnation of productivity, in Europe the average level of employment in the economy in 1985 was 1.5% below the 1980 level. Thanks to a recovery in employment of 0.9% and 1.2% in 1986 and 1987 respectively, the 1987 level just exceeded the 1979 employment level (+0.6%). A new rise in employment of 1.6% in 1988 meant a drop in the average unemployment rate in the EC (with the exception of Ireland, Greece, Luxembourg

Figure 5



and Denmark) from 10.9% in 1985 to 10.0% in 1988. This rate is still clearly above the 1980 figure of 6.4% (according to the OECD's harmonized unemployment rate figures). The most rapid drop in employment occurred in the agricultural sector, where the total number of persons employed in the 12 Member States is today 20% lower than the 1979 level. In industry, employment in 1987 was 13.7% below the 1979 level, whereas in the services sector it went up by 15.1% during the same period.

Concurrently, the end of the 1970s and the beginning of the 1980s were characterized by a relatively serious investment crisis, entailing both an ageing of the existing capital stock and a clear drop of production capacity in certain sectors. These trends are depicted in Figure 6, which for that matter shows that the share of investment in value-added is lower in industry in the strict sense of the word, while the development of new technologies, and above all the increasing automation of production processes combined with a more intensive use of computers and PCs in all aspects of economic and social life lead to an average rate of investment in the services sector which is higher than that in industry.

The trend in industrial investment was however not much more favourable in the other large industrial regions; the average rate of investment in industry in the United States for instance has been lower than the European average for a number of years, and lower than in Japan. In terms of volume change, the investment crisis in the USA was however less serious than in Europe, and investment started recovering sooner (starting in 1976, even if the investment level fell again in 1981-83), whereas one had to wait until 1984 to see any significant investment recovery in Europe.

In 1988, the level of investments in the private, non-residential sector in the six major industrialized countries was 84.6% greater in Japan and 28.4% greater in the United States than the 1980 level, while in Europe this rate was 24.1% in the Federal Republic of Germany, 14.8% in France and 10.6% in the United Kingdom. GDP on the other hand had grown by 37.7% in Japan, 25.5% in the United States, 14.3% in the Federal Republic of Germany, 21.1% in France and 23.5% in the United Kingdom.

A comparison of the average rate of capital productivity in the main industrialized countries reveals

Table 1
EC employment by sector

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	AAGR
NACE-CLIO description									
Agriculture, forestry and fishing	11 887	11 551	11 093	11 067	10 843	10 666	10 351	10 249	- 1.8
Fuel and power	1 942	1 946	1 947	1 919	1 869	1 837	1 777	1 751	- 1.3
Manufacturing	34 112	32 559	31 413	30 276	29 540	29 352	29 330	29 196	- 1.9
Ferrous and non-ferrous ores and metals	1 516	1 395	1 312	1 239	1 174	1 134	1 088	1 066	- 4.3
Non-metallic minerals and mineral products	1 775	1 691	1 625	1 544	1 491	1 437	1 441	1 447	- 2.5
Chemical products	1 934	1 859	1 812	1 772	1 749	1 761	1 780	1 776	- 1.1
Metal products, except machinery and transport equipment	3 234	3 068	2 962	2 821	2 743	2 693	2 686	2 665	- 2.4
Agricultural and industrial machinery	3 453	3 320	3 186	3 011	2 900	2 929	2 951	2 931	- 2.0
Office and data-processing machines, precision and optical instruments	790	767	733	713	719	744	757	758	- 0.5
Electrical goods	3 162	3 003	2 863	2 793	2 746	2 779	2 791	2 795	- 1.5
Transport equipment	3 327	3 148	3 049	2 936	2 836	2 766	2 735	2 706	- 2.5
Food, beverages and tobacco	3 545	3 460	3 380	3 297	3 245	3 229	3 181	3 151	- 1.5
Textiles and clothing, leather and footwear	4 653	4 325	4 140	3 984	3 871	3 825	3 811	3 780	- 2.6
Paper and printing products	2 083	2 025	1 987	1 938	1 913	1 905	1 929	1 941	- 0.9
Rubber and plastic products	1 230	1 173	1 138	1 104	1 107	1 118	1 146	1 172	- 0.6
Other manufacturing products	3 410	3 325	3 026	3 124	3 046	3 032	3 034	3 008	- 1.8
Building and construction	9 795	9 496	9 175	8 955	8 628	8 432	8 387	8 447	- 1.8
Market services	44 442	44 702	45 106	45 255	46 282	47 223	48 291	49 434	1.3
Recovery and repair services, wholesale and retail trade services	18 487	18 391	18 353	18 298	18 561	18 714	18 967	19 191	0.5
Lodging and catering services	4 209	4 259	4 314	4 292	4 444	4 549	4 685	4 758	1.5
Inland transport services	201	199	200	205	205	206	205	205	0.2
Communication transport services	1 942	1 968	1 994	2 020	2 023	2 042	2 060	2 064	0.8
Services of credit and insurance institutions	3 144	3 202	3 225	3 274	3 337	3 387	3 422	3 473	1.3
Other market services	16 459	16 683	17 020	17 166	17 712	18 325	18 952	19 743	2.6
Non-market services	22 309	22 656	22 949	23 243	23 523	23 934	24 298	24 539	1.2

Source: Eurostat (Sec2).

Figure 6

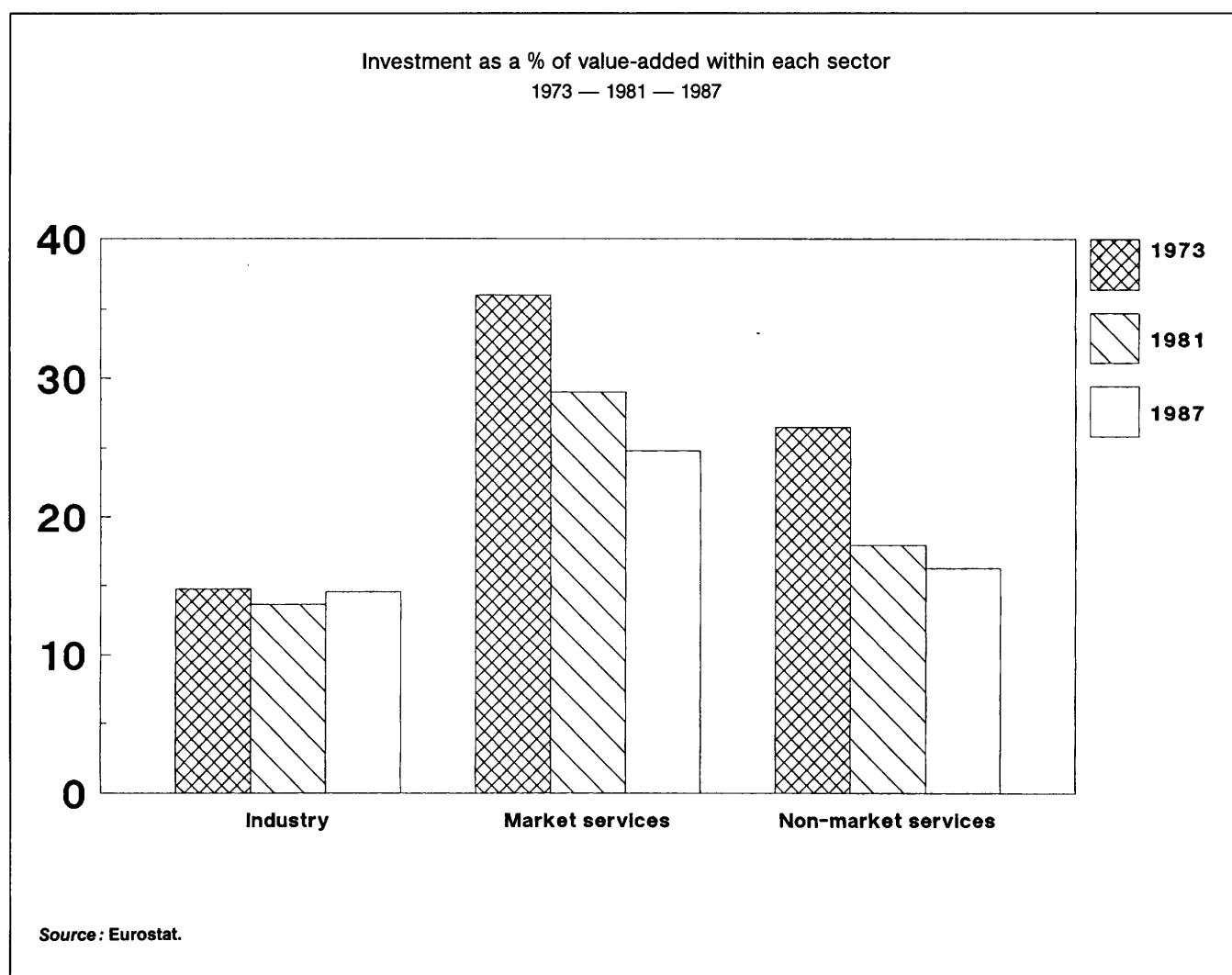


Table 2
Productivity growth (1)
Average annual percentage change in industry

(%)	USA	Canada	Japan	FR of Germany	France	Italy	United Kingdom
Preceding 1973 (2)							
Total factor productivity	1.5	2.2	6.3	2.8	4.4	4.8	2.1
Capital productivity	.3	1.1	-2.3	-1.1	0.9	0.5	-0.5
1973-79							
Total factor productivity	-0.1	1.1	1.8	1.8	2.1	1.6	0.3
Capital productivity	-0.9	-0.3	-3.1	-1.1	-1.1	-0.4	-1.8
1979-85							
Total factor productivity	0.0	-0.3	2.0	0.8	1.3	0.6	1.0
Capital productivity	-1.2	-2.8	-1.7	-1.5	-1.5	-0.9	-1.0

(1) Output is value-added (GDP at factor cost excluding value-added in general government) at constant prices. Total factor productivity growth is equal to either:

- (i) output growth minus factor input growth (a weighted index of capital and labour inputs), or
- (ii) a weighted average of the growth of labour and capital productivity.

In both cases, 1985 capital shares are used as weightings.

(2) The starting years are: USA 1960, Canada 1962, Japan 1966, Germany 1961, France 1964, Italy 1960, UK 1960.

Source: OECD Economic Outlook 42, Paris 1987.

that the big European countries are not in as unfavourable a situation as usually believed, as in Italy and the United Kingdom the average capital productivity dropped relatively less during the period from 1979 to 1985 than in the United States and Japan.

A comparison of growth rates of total factor productivity (capital and employment combined) underscores even more the advantage enjoyed by the main European countries in relation to the United States, while the situation *vis-à-vis* Japan is deteriorating slightly (see Table 2).

Not every sector of activity benefited to the same extent from the recovery of investments which occurred since 1984, nor felt the effects of the economic recession of the early 1980s as profoundly, as is made evident by Table 3.

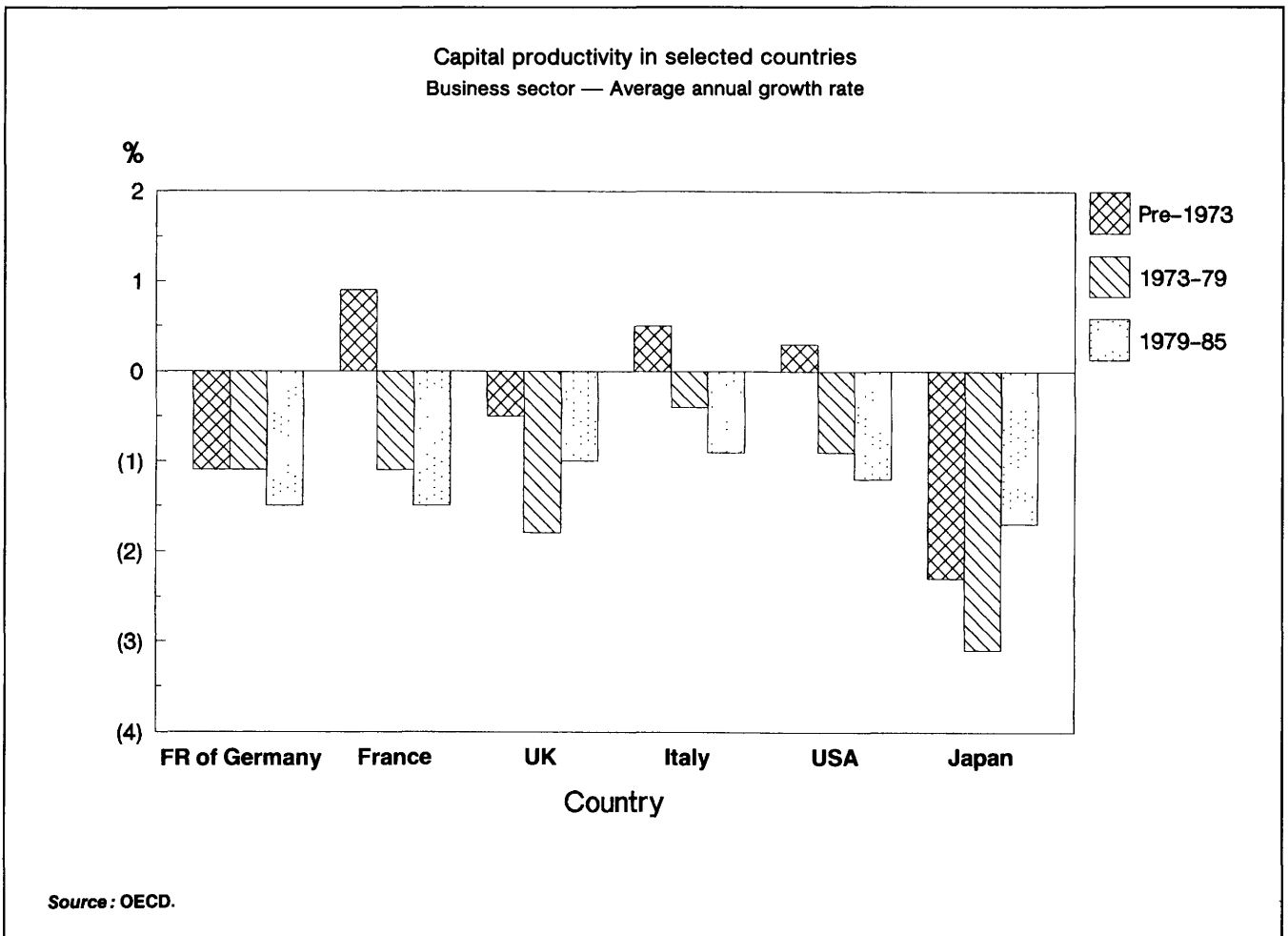
Only three sectors registered an annual rate of growth higher than 4% during the period from 1980 to 1986: communication services (+ 5.1%), office and EDP equipment (+ 4.6%) and insurance (+ 4.4%). Other, relatively dynamic sectors (with an

annual growth rate of more than 2.5% in the 1980-86 period) are the chemicals sector (+ 3.6%), market and non-market services, wholesale and retail trade and electrical engineering. In 1986, six sectors had not yet recovered their 1980 value-added level: metallic and non-metallic minerals, metal products, agricultural and industrial machinery, textiles and footwear, other manufactured products (the most important of these being furniture) and construction. The latter experienced a boom in the following years, however.

Overall, we may say that the sectors with the highest growth rate during the 1980-1986 period were export-related and services sectors. Tables 4 and 5 show the export intensity of various sectors, measured by the ratio export value over production, and the measure of import penetration in the different sectors, measured by the ratio of imports in domestic production.

A significant change occurred during this period however, as the balance of trade of the EC, which was negative in the early 1980s due chiefly to high oil prices and the unfavourable exchange rate of Euro-

Figure 7



pean currencies with the dollar, has become positive again following the collapse in oil prices in 1986. That year, the trade surplus amounted to ECU 7 371 million, but the recovered growth and investments which followed led to a new deficit in the balance of trade of ECU - 22 464 million in 1988 (see Table 5). The distribution by country of this deficit is equally interesting, as on the whole there is a negative balance of trade with Eastern European and ACP countries, overseas departments and territories and others, with the only surplus registered in trade with EFTA countries, the USA, Canada, and other industrialized countries (see Table 6).

The development of the foreign trade structure of the EC with the rest of the world is analysed more in depth in another chapter.

Strategies of European firms

After a global summary of the economic trends in Europe at a rather aggregated sectoral level, it would

be interesting to draw conclusions from the lessons contained in the second part of the book, which describes the individual performance of the different sectors.

In the manufacturing sector, two phenomena are usually cited as the cause for the restructuring of European industry:

- (i) deregulation, one of the consequences of which being keener competition in the internal market,
- (ii) greater competition from third countries, especially NICs or low-salary countries, both on the internal and external markets.

Another equally important phenomenon is the creation of the single European market, which means more intensive deregulation in certain sectors, such as financial or transport services, but also keener competition on domestic markets, due particularly to the elimination of trade barriers.

Table 3
Trend of EC value-added growth by sector at constant 1980 prices, 1980-86 (1)

(annual % change)	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	AAGR
NACE-CLIO description							
Agricultural, forestry and fishery products	- 8.7	17.7	- 1.4	5.7	- 0.7	1.4	2.0
Fuel and power products	1.7	.9	3.4	- 1.2	4.3	2.7	2.0
Manufactured products	- 1.8	- 0.7	1.4	2.2	2.3	1.5	0.8
Ferrous and non-ferrous ores and metals (2)	3.3	- 6.5	0.2	6.4	0.1	3.1	1.0
Non-metallic minerals and mineral products (2)	- 5.2	- 2.4	- 1.4	1.5	- 2.5	3.6	- 1.1
Chemical products	2.3	0.1	9.3	5.4	2.4	2.2	3.6
Metal products, except machinery and transport equipment (2)	- 6.3	- 4.1	- .5	0.4	1.3	0.2	- 1.6
Agricultural and industrial machinery (3)	- 3.5	- 3.3	- 3.0	2.7	6.0	- 2.0	- 0.6
Office and data-processing machines, precision and optical instruments (4)	- 1.6	- 4.2	5.9	12.5	14.5	2.1	4.6
Electrical goods (5)	- 1.0	1.2	3.8	6.3	3.8	3.1	2.9
Transport equipment	0.6	2.4	2.5	- 3.9	2.5	2.4	1.1
Food, beverages and tobacco	0.0	2.2	- 0.5	0.5	0.9	0.2	0.6
Textiles and clothing, leather and footwear (2)	- 2.2	- 1.4	0.5	- 1.1	1.0	0.4	- 0.5
Paper and printing products	- 2.0	0.3	1.8	4.7	1.3	3.4	1.6
Rubber and plastic products	- 4.1	1.9	3.2	5.5	3.8	3.7	2.3
Other manufacturing products (2)	- 4.7	- 1.6	0.1	- 0.3	- 1.7	0.6	- 1.3
Building and construction	- 4.6	- 2.0	- 0.2	- 1.1	- 0.7	2.2	- 1.1
Market services	1.5	1.6	2.1	4.0	3.5	3.9	2.8
Recovery and repair services, wholesale and retail trade services	- 0.3	0.7	1.9	3.2	2.2	3.8	1.9
Lodging and catering services (2)	0.6	1.7	0.7	2.8	2.5	2.7	1.8
Transport (6)	- 0.3	- 1.1	0.4	3.4	2.3	1.3	1.0
Communication services (6)	6.3	3.9	3.9	6.3	5.6	4.8	5.1
Services of credit and insurance institutions	2.7	3.3	2.9	4.8	8.2	4.3	4.4
Other market services	2.9	2.6	2.7	4.7	4.2	2.6	3.3
Non-market services	1.9	1.5	1.2	1.4	1.5	1.5	1.5
General government services (7)	1.8	0.5	0.7	1.0	0.9	1.1	1.0
Other non-market services (8)	1.7	3.2	3.0	3.6	4.8	4.4	3.5
Total	0.3	0.9	1.6	2.4	2.5	2.7	1.7

(1) Excluding Ireland.

(2) Excluding Greece.

(3) Excluding Greece and Portugal.

(4) Excluding Greece, Luxembourg and Portugal.

(5) Excluding Greece and Luxembourg.

(6) Netherlands: estimated for 1985, 1986.

(7) Excluding France, Greece, Netherlands and Spain.

(8) Excluding France, Greece, Netherlands, Spain and United Kingdom.

Source: Eurostat (Sec2).

Table 4
Ratio of extra-EC exports and imports to total production, by sector (1)

(%)	NACE title	Ratio of extra-EC trade to production (2)					
		Exports			Imports		
		1980	1984	1988	1980	1984	1988
221	Iron and steel	13.8	18.2	12.8	6.7	7.6	6.6
222	Steel tubes	32.5	38.0	30.7	10.5	10.4	11.9
223	Drawing, cold rolling and cold folding of steel	16.4	19.3	16.9	6.3	7.5	8.2
224	Production and preliminary processing of non-ferrous metals	22.9	24.2	21.6	41.2	41.2	45.7
231	Extraction of building materials and refractory clays	8.0	12.4	8.1	9.0	12.5	9.7
232	Mining of potassium and natural phosphates	0.1	0.1	0.0	22.4	18.2	13.7
241	Clay products for constructional purposes	1.8	2.8	4.1	0.3	0.3	0.2
242	Manufacture of cement, lime and plaster	2.8	5.0	2.5	0.2	0.4	0.9
243	Manufacture of concrete, cement or plaster products for construction	1.6	2.8	1.5	0.3	0.3	0.2
244	Manufacture of articles of asbestos (except articles of asbestos-cement)	14.1	14.5	9.6	4.9	5.8	3.3
245	Working of stone and of non-metallic mineral products	10.8	18.2	15.7	5.3	5.8	4.3
246	Production of grindstones and other abrasive products	18.3	23.7	23.3	9.8	11.7	13.3
247	Manufacture of glass and glassware	12.4	16.1	12.3	6.1	8.1	7.1
248	Ceramic goods	20.2	23.6	20.0	8.5	9.6	6.9
255	Paint, painters' fittings, varnish and printing ink	7.1	8.0	6.7	1.4	1.8	1.9
256	Manufacture of other chemical products	21.0	19.7	14.4	10.5	10.5	9.0
257	Pharmaceutical products	19.3	17.1	15.3	7.3	7.1	7.0
258	Soaps, synthetic detergents, perfume and toilet preparations	9.0	10.1	9.2	1.2	1.6	1.7
259	Manufacture of other chemical products, chiefly for household and office use	22.6	22.8	20.5	21.4	24.9	25.6
260	Man-made fibres industry	37.1	43.0	25.4	48.0	25.3	24.6
311	Foundries	6.6	6.7	5.2	2.7	2.8	2.5
312	Forging: drop forging, closed die-forging, pressing and stamping	10.4	10.9	3.5	4.2	4.8	1.5
313	Secondary transformation, treatment and coating of metals	4.6	4.9	6.3	3.7	3.7	4.5
314	Manufacture of structural metal products	16.3	20.4	9.0	1.9	2.6	2.5
315	Boilermaking	13.2	14.5	5.4	1.4	1.1	1.0
316	Tools and finished metal goods, except electrical equipment	11.3	13.5	11.8	6.4	7.2	7.7
321	Manufacture of agricultural machinery and tractors	28.7	24.5	18.0	7.1	6.5	7.7
322	Machine tools for working metal & other tools & equipment for use with the machines	34.3	37.7	26.4	17.6	19.5	15.5
323	Textile machinery and accessories; sewing machines	55.7	59.2	50.5	24.4	29.4	26.0
324	Machinery for the food, chemical and related industries	39.4	42.0	31.4	12.2	14.0	12.4
325	Machinery for the mining, iron & steel, metallurgical and construction industries	29.4	33.8	23.2	9.2	11.2	11.5
326	Transmission equipment for motive power	21.4	27.3	24.5	12.7	17.8	15.4
327	Machinery for use in paper, wood, graphic arts, cleaning and tanning industries	34.5	40.7	34.8	15.5	16.8	20.3
330	Office and data-processing machines	20.5	24.1	20.5	23.4	36.5	37.4
341	Insulated wires and cables	6.3	8.4	4.1	1.8	4.3	3.0
342	Power transformers	14.6	16.9	15.5	5.4	8.9	10.8
343	Manufacture of electrical apparatus and appliances for industrial use	27.7	29.1	15.4	16.0	22.4	14.6
345	Consumer electronics; manufacture of records and tapes	15.4	14.6	19.9	23.4	24.2	38.7
346	Household appliances	14.3	14.2	13.2	6.3	9.4	11.0
347	Electric lighting	20.7	26.0	16.5	11.1	13.6	10.8
351	Motor vehicles (including road tractors)	18.5	22.2	15.6	8.0	11.4	9.4
352	Manufacture of bodies for motor vehicles and of motor-drawn trailers and caravans	8.8	9.0	6.1	1.4	1.8	1.4
353	Manufacture of parts and accessories for motor vehicles	29.4	32.8	13.1	7.0	9.5	5.3
361	Shipbuilding, repair and shipbreaking	19.5	27.4	20.5	6.8	14.4	12.3
362	Railway and tramway rolling stock	16.6	28.4	12.8	2.3	3.8	3.0
363	Cycles, motorcycles and parts and accessories thereof	16.9	18.3	14.2	22.4	24.6	29.0
364	Aerospace equipment	15.2	24.8	25.8	16.8	17.9	25.2
371	Measuring, checking and precision instruments and apparatus	22.8	25.6	28.8	11.2	15.5	22.9
372	Medical and surgical equipment and orthopaedic appliances	24.7	33.8	32.3	18.8	27.1	30.0
373	Optical instruments and photographic equipment	51.7	71.1	52.8	54.6	73.8	61.8
374	Clocks and watches	28.4	54.9	52.2	44.2	68.2	71.3
411	Vegetable and animal oils and fats	8.9	10.2	6.4	28.3	30.2	18.9
412	Slaughtering, preparing and preserving of meat	6.1	6.7	5.2	8.9	7.7	6.4
413	Dairy products	9.8	7.9	6.0	1.7	1.3	1.3
414	Processing and preserving of fruit and vegetables	5.3	8.4	10.2	24.6	21.5	19.3
415	Processing and preserving of fish and other seafoods	9.5	6.6	9.4	27.1	15.7	25.1
416	Grain milling	13.9	12.9	5.5	6.9	6.4	2.4

(continued overleaf)

Table 4 (cont.)

(%)	NACE title (cont.)	Ratio of extra-EC trade to production (2)					
		Exports			Imports		
		1980	1984	1988	1980	1984	1988
417	Manufacture of pasta	1.2	2.6	2.9	0.1	0.3	0.3
418	Manufacture of starch and starch products	4.0	3.7	3.0	17.3	16.4	12.3
419	Bread and flour confectionery	2.4	3.6	2.6	0.5	0.6	0.8
421	Cocoa, chocolate and sugar confectionery	5.1	7.7	6.0	3.5	4.0	2.6
422	Animal and poultry foods (including fish meal and flour)	2.9	4.1	2.8	1.9	1.9	2.2
424	Alcohol and spirits	13.9	16.8	16.5	1.6	1.5	1.5
425	Manufacture of wine of fresh grapes and of beverages based thereon	10.0	13.1	8.4	8.5	5.7	0.1
427	Brewing and malting	3.7	5.3	3.5	0.4	0.6	0.2
428	Soft drinks including bottling of natural spa waters	2.3	3.1	2.1	0.2	0.3	0.4
429	Tobacco products	2.3	2.2	1.7	0.3	0.6	0.8
430	Textiles industry	14.6	17.2	16.4	16.7	17.5	17.1
436	Knitting industry	15.7	19.1	19.5	23.8	24.7	26.2
438	Manufacture of carpets, linoleum and other floor coverings	18.4	23.4	18.9	22.9	21.3	20.8
441	Leather tanning and finishing	15.4	19.1	19.9	27.0	25.5	22.6
442	Manufacture of products from leather and leather substitutes	23.2	36.1	40.9	31.7	37.6	43.3
451	Mass-produced footwear (excluding footwear made of wood and rubber)	17.3	24.5	20.2	16.1	19.7	68.1
453	Clothing	9.2	14.1	13.1	18.3	22.9	23.6
456	Manufacture of furs and of fur goods	89.8	92.9	64.2	93.8	92.9	56.4
461	Sawing, planing, drying and seasoning of wood	4.9	6.9	5.3	60.4	61.2	54.0
462	Semi-finished wood products	5.6	6.3	5.6	24.3	26.2	22.3
463	Carpentry, joinery components and parquet flooring	3.7	5.7	4.1	3.3	4.2	7.4
464	Wooden containers	0.9	1.7	2.2	1.7	1.5	0.8
465	Other wood manufactures	10.2	11.0	11.7	14.8	14.8	16.3
466	Articles of cork, straw and plaiting materials; brushes	17.5	20.4	19.9	38.4	39.1	20.2
467	Furniture	7.4	12.7	10.6	4.6	6.1	6.0
471	Pulp, paper and board	6.0	9.0	8.4	33.4	37.5	36.7
472	Paper and board conversion	6.2	7.6	7.1	5.0	5.5	6.0
473	Printing	5.6	7.0	6.1	2.4	3.2	2.6
481	Rubber products	13.7	15.7	13.4	7.0	8.8	59.4
482	Retreading and repairing of rubber tyres	8.1	10.8	5.1	4.8	4.2	2.0
483	Plastics processing	11.6	12.8	11.1	5.3	6.9	7.5
491	Jewellery	208.7	255.8	205.7	208.6	925.9	915.5
492	Musical instruments	31.3	34.8	28.6	42.6	44.8	50.5
493	Photographic and cinematographic laboratories	8.1	6.8	5.0	6.7	5.7	4.8
494	Manufacture of toys and sports goods	17.7	25.3	25.7	30.0	39.6	47.4

(1) The ratios in this table are based on data which follow the NACE classification. Therefore ratios may differ from similar ones made in later chapters, where industry definitions follow the needs of the professional associations.

(2) 1980 EC 9; 1984 EC 10; 1988 EC 12.

Source: Eurostat (Inde, Bise).

Table 5
EC trade balance, 1960-88 (1)

(million ECU)	Total	X/M	Balance by country group (2)		
			Class 1	Class 2	Class 3
1960	- 3 445	0.88	- 1 791	- 1 790	- 14
1970	- 7 645	0.88	- 1 585	- 6 722	312
1980	- 65 862	0.77	- 22 745	- 39 936	- 3 181
1981	- 52 911	0.83	- 21 741	- 26 016	- 5 154
1982	- 51 296	0.85	- 21 254	- 20 349	- 9 693
1983	- 41 078	0.88	- 17 780	- 15 017	- 8 281
1984	- 39 781	0.90	- 6 149	- 20 633	- 12 998
1985	- 27 767	0.93	5 938	- 27 032	- 6 674
1986	7 371	1.02	9 357	- 61	- 1 925
1987	- 719	1.00	7 838	- 3 817	- 4 739
1988	- 22 464	0.94	- 15 487	- 2 258	- 4 720

(1) Exports (fob) — Imports (cif)

(2) Class 1: Western industrialized third countries.

Class 2: Developing countries.

Class 3: State-trading countries.

Source: Eurostat (Comext).

Table 6
EC external trade, 1980, 1988 (1)
Breakdown by product

(billion ECU)	Imports (2)		Exports (3)		Trade balance	
	1980	1988	1980	1988	1980	1988
Food	24.8	32.2	14.2	56.1	- 10.5	23.9
Beverages and tobacco	1.7	2.2	3.7	6.2	2.0	4.0
Crude materials	29.9	35.7	3.9	7.6	- 26.0	- 28.2
Fuel products	97.2	47.7	9.8	8.3	- 87.4	- 39.5
Oils, fats and waxes	1.6	1.5	9.9	1.2	8.3	- 0.3
Chemicals	11.8	25.1	22.4	44.4	10.5	19.4
Manufactured goods classified by material	35.8	59.0	47.1	65.6	11.3	6.6
Machinery and transport equipment	38.3	106.5	80.4	141.2	42.1	34.7
Miscellaneous manufactured articles	21.0	49.7	21.5	48.5	0.5	- 1.3

(1) 1988 Greece estimated.

(2) cif.

(3) fob.

Source: Eurostat (Comext).

Not all sectors have reacted in the same way to the changes in the economic environment, however, nor have they prepared for the challenges of the future in the same way. A certain number of 'typical' responses may none the less be identified, and are described hereunder and illustrated by a few examples. These 'typical' reactions include, *inter alia*:

- rationalization investment;
- greater concentration in industry through horizontal or vertical integration;
- a tendency to specialize (or, conversely, to expand the line of products);
- greater flexibility through:
 - the externalization of certain activities,
 - part-time employment,
 - automation of the production process,
- subcontracting, especially in third countries;
- operation in specific segments of the market where EC industry still enjoys comparative advantages in relation to outside competitors.

Rationalization investment

As mentioned above, and in part due to considerable real pay rises which weighed heavily on the profitability of European companies, investments made in Europe in the late 1970s and early 1980s were intended primarily to improve productivity; they consequently led at times to considerable job losses in certain sectors, particularly in manufacturing sectors involved in the production of capital

goods (where production automation accelerated), in the steel industry, and in the transport vehicles and metal products sectors. The average growth in employment in the EC per major sector of activity was given in Table 1.

On the whole, employment dropped by 4 916 000 jobs in the manufacturing sector between 1980 and 1987, for an average annual variation rate of -1.9%. Job losses were particularly severe in the steel industry (-4.3% a year on average) and the metal products sector (-2.5%), but also in textiles, clothing and footwear (-2.6% a year), where this drop does not reflect considerable gains of productivity. A better indicator of the phenomenon where employment is substituted by capital is the average rate of change of labour productivity by sector given in Table 7.

The figures in Table 7 must none the less be approached with caution, as they summarize the combined effect of several factors; more specifically:

- whereas the main objective of certain investments was to reduce the wage bill by substituting capital for employment,
- others resulted in a reduction of the amount of employment necessary in order to produce a given quantity of the final product, but the primary initial objective was to improve the quality of the product. The introduction of computers in the textiles sector for instance, both in pattern design and in fabric cutting, made it possible to improve productivity and the quality of up-market products, for which competition from low-wage countries on the internal markets is less keen.

Table 7
Average annual growth rate of productivity
by sector (1)

(%)	1980-86
Agricultural, forestry and fishery products	4.4
Fuel and power products	3.5
Manufactured products	3.4
Ferrous and non-ferrous ores and metals (2)	6.7
Non-metallic minerals and mineral products (2)	2.4
Chemical products	5.0
Metal products, except machinery and transport equipment (2)	1.5
Agricultural and industrial machinery (3)	2.0
Office and data-processing machines, precision and optical instruments (4)	5.4
Electrical goods (5)	5.1
Transport equipment	4.5
Food, beverages and tobacco	2.4
Textiles and clothing, leather and footwear (2)	3.9
Paper and printing products	2.9
Rubber and plastic products	3.5
Other manufacturing products (2)	1.4
Building and construction	1.5
Market services	1.4
Recovery and repair services, wholesale and retail trade services	1.5
Lodging and catering services (2)	0.0
Transport (6)	0.7
Communication services (6)	4.0
Services of credit and insurance institutions	2.9
Other market services	-0.1
Non-market services	0.1
General government services (7)	-0.2
Other non-market services (8)	0.3

(1) Excluding Ireland.

(2) Excluding Greece.

(3) Excluding Greece and Portugal.

(4) Excluding Greece, Luxembourg and Portugal.

(5) Excluding Greece and Luxembourg.

(6) Netherlands: estimated for 1985, 1986.

(7) Excluding France, Greece, Netherlands and Spain.

(8) Excluding France, Greece, Netherlands, Spain and United Kingdom.

Source: Eurostat (Sec2), DRI Europe calculations.

It is also worth pointing out that the productivity growth rates given in Table 7 are only an approximate reflection of the situation of different sectors, for statistical reasons.

In fact, employment statistics usually include only employment in companies with 20 workers or more. Consequently, in sectors where economic development meant the realignment of small, family-type (or other) production units, statistics show an increase in employment, although it may have actually dropped during this realignment process. Furthermore, production trends — both in terms of volume and value — given by statistics are also an approximate reflection of possible changes in the composition of products: a change in the structure of products brought about, e.g. by production of a smaller number of products with higher value-added, is statistically expressed by an increase in value and a drop

in volume. How is the corresponding development in productivity to be interpreted in such a case?

Greater concentration in industry

In numerous sectors, there is a very clear concentration trend, one which is reflected in the wave of mergers and acquisitions that we have seen these last few years, and which is likely to continue in the years to come. The most famous example is probably the tyre sector which accounts for a sizeable part of the rubber industry. In this sector, the top 10 tyre manufacturing corporations accounted for 84% of world production before Michelin acquired Uniroyal. In a little over a year, the No 2 world producer (Michelin) acquired No 7 (Uniroyal) thus becoming No 1, and No 3 (Bridgestone) acquired No 5 (Firestone).

Other sectors where important realignments took place these last few years include the metal packaging industry (the merger of Metal Box with Carnot), the automobile industry (Volkswagen/Audi acquired Seat, Fiat acquired Alfa Romeo in Italy, most recently, Ford acquired Jaguar, and negotiations are underway between Renault and Volvo).

Cooperation agreements and joint ventures between European and Japanese firms have already started taking shape, e.g. the current discussions between Rover and Honda, where there is even talk of cross-shareholding. Finally, the food sector has also been hit with a wave of acquisitions, with the BSN group (France) being particularly active last year.

Vertical concentration

Concurrently with the increase in the degree of concentration in the sector itself (= horizontal concentration), certain company acquisitions were aimed chiefly at control of the entire chain of production, so as to attenuate the impact of certain factors such as fluctuations in the prices of raw materials or supply difficulties.

Although this strategy, used frequently in the past, is applied less frequently at present, it remains characteristic of the metal products and non-ferrous metals sectors.

In the packaging sector, the acquisition of American Can by Pechiney, which caused such a stir in early 1989 is a typical example. Other examples of vertical concentration can be found in the food and beverage sector, where manufacturers of food products often own packaging plants, both glass and cardboard.

Capitalizing on synergies in the production processes

A new type of realignment is currently taking place. It consists of joint ventures or acquisitions of companies which are part of sectors as apparently different as the automobile and aerospace industries for example, and are aimed at capitalizing to the maximum on existing synergies at the production process level. Another advantage of this type of realignment, according to some, is to smooth out economic cycles for certain up-market products. An example of this type of realignment is the acquisition of MBB (aerospace) by Daimler-Benz (thus virtually in control of the entire German aerospace industry), or the acquisition of Rover (when it was privatized) by British Aerospace.

Increased specialization of production

The heightened competition on internal and external markets and the liberalization of trade have compelled certain companies to reduce their line of products and to specialize in a certain market segment where they enjoy certain comparative advantages (e.g. in terms of technology or know-how), or where they could take advantage of economies of scale, or were better placed to meet a specific need (in the glass sector in particular).

This trend can be observed in very different sectors, from clothing and textiles to chemical products to window frames.

Both in the clothing and textiles sector and that of chemical products, the primary cause of the development was to be able to face increasing competition from third countries. In the window frames sector, the proximity of final customers with a specific demand also played a decisive role.

Despecialization, or expanding the range of products

On the contrary, other sectors have opted to diversify their product line in order to protect themselves better against often cyclical changes in demand. Thus, the costume jewellery sector diversified its product range to the maximum to include items intended for the clothing sector (belt buckles, inlays for clothes) and hairdressing (hair pins), while the pulp and paper companies are getting increasingly involved in downstream activities such as printing, or the production of hygiene products, to protect themselves from the cyclic nature of their business.

Greater flexibility regarding costs and the production process

The production process

Certain sectors have accelerated the production automation trend in an effort to reduce their labour costs and also to be able to adjust quickly the structure or appearance of the final product to better suit the variations in demand. A typical example is to be found once again in the automobile sector, where manufacturers have invested in machines that can easily be 'reprogrammed' in order to produce different models and thus satisfy, in a very short time, changing tastes and demands for bigger or smaller cars, or even move production from one plant to another in case of prolonged strikes, as was the case at Peugeot this year. Generally speaking, the increased use of computer-aided production techniques has enabled many sectors to acquire greater flexibility relative to production.

Costs

Use of multipurpose production equipment

Another example of a change intended to acquire greater flexibility, regarding costs this time, is that of the cement sector, which invested in multipurpose production equipment that makes it possible to switch from one source of primary energy to another depending on the relative cost of the different energy products.

Externalization of certain activities

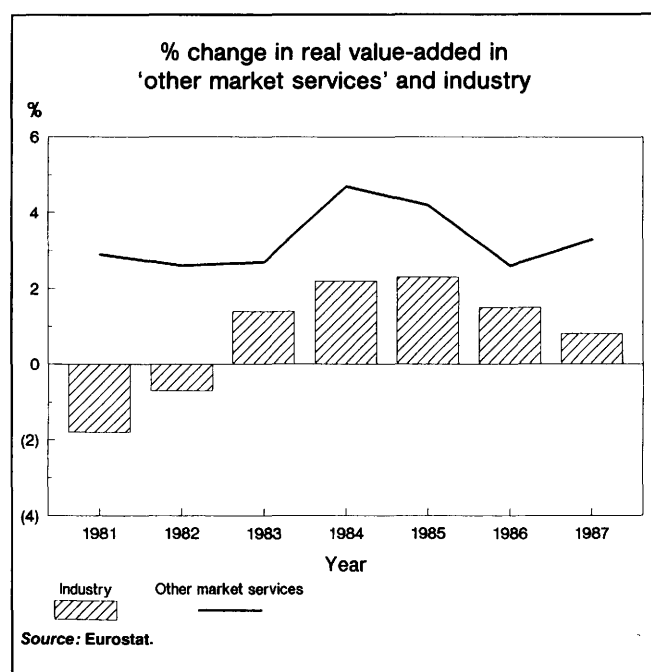
Again in an effort to avoid too great a rigidity regarding costs, most sectors opted for a sizeable externalization of a large part of their activities; a direct consequence of this phenomenon was the fast growth of a large number of service activities, such as:

- industrial cleaning,
 - accounting services,
 - management consulting,
 - advertising,
 - public relations,
- and many others.

We should also mention the use of temporary labour to avoid increasing the number of permanent jobs and then having to deal with over-employment during downswings of economic cycles. This has led to very fast growth in the temporary employment

sector, as can be seen in the description of that sector in Chapter 28.

Figure 8



These sectors thus experienced a very rapid growth over the period 1980-87, much faster than in the manufacturing sector as a whole. As indicated in Table 3, the rate of growth of real value-added in the 'other market services' sectors averaged 3.3% a year over the period 1980-86, compared to an average growth of 2.8% in total market services (i.e. including banking and finance, retail trade, transport and communication services) and of only 0.8% for industrial sectors. These trends are also illustrated in Figure 8.

Relocation

Following, at times belatedly, the example of the United States and Japan, European manufacturers

have, when possible, built plants in low-salary countries or in NICs, so as to be able to import semi-finished products at clearly less expensive prices. This, however, is only possible in sectors where transport costs are relatively low in relation to the labour cost savings. Such operations have taken place in the textiles sector, where outward processing has become increasingly common, as well as in electronic components, the automobile industry, aluminium and plastics.

All these changes have contributed and will continue to contribute to the competitiveness of European industry, to enable it to capitalize to the maximum on opportunities created by the single European market and to counter similar operations mounted by other European or foreign corporations trying to increase their market share.

Let us now see how production is divided inside the Community and which sectors are likely to grow faster inside each country.

Geographic distribution of production and employment in the EC

Figure 9 shows how the GDP and total population of the EC are divided among the different countries. As can be seen, the four main European countries (the Federal Republic of Germany, the United Kingdom, France and Italy) account for more than 70% of the Community's GDP, while the share of Spain is less than proportional to that of its population.

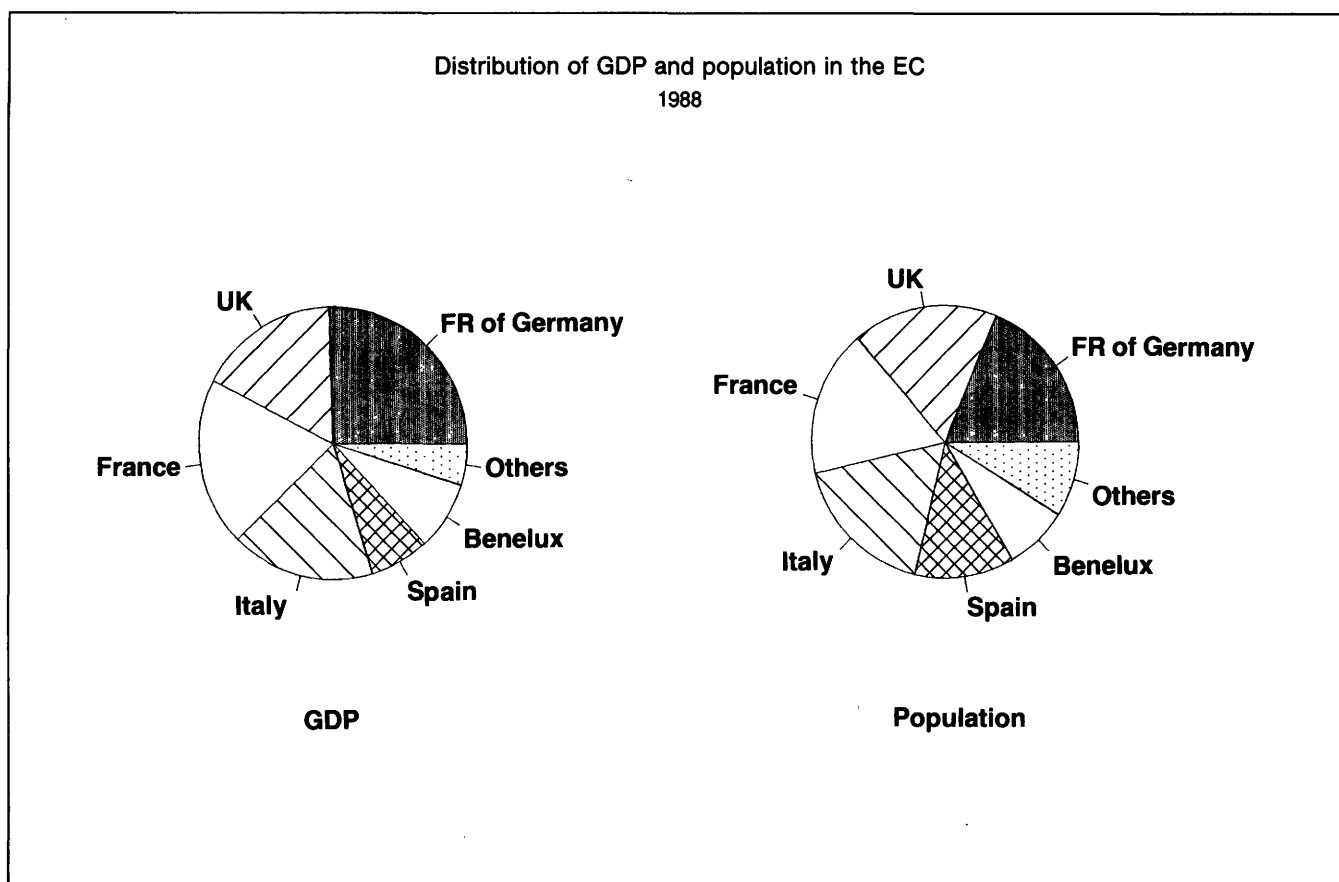
Within the EC, the share of industry in the economy varies considerably from one country to the other, with a maximum of 39.2% in the Federal Republic of Germany and a minimum of 24.3% in Denmark. It should be pointed out that these shares exclude the energy, building and construction sectors. The agricultural sector continues to play a dominant role in Denmark, where a large part of agricultural production, in particular meat production, is exported.

Table 8
Share of main economic activities in value-added at market prices, 1987

(%)	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK	EC
Agricultural, forestry and fishery products	2.2	5.3	1.8	16.2	5.4	3.9	8.8	4.3	2.4	4.4	7.6	1.4	3.3
Fuel and power products	5.0	2.0	4.8	4.3	7.9	5.1	N/A	5.0	1.9	9.7	3.6	7.9	5.7
Manufacturing	21.6	19.8	30.5	18.8	23.1	21.3	N/A	23.8	25.5	19.3	27.9	23.5	24.3
Building and construction	5.6	6.3	5.4	6.5	6.7	5.5	5.9	5.8	5.2	5.6	5.7	5.6	5.8
Market services	50.9	45.2	43.9	38.6	46.3	46.7	36.2	48.5	53.3	48.5	42.9	46.1	46.2
Non-market services	14.7	21.5	13.7	15.5	10.6	17.5	17.5	12.7	11.7	12.5	12.4	15.6	14.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	N/A	100.0	100.0	100.0	100.0	100.0	100.0

Source: Eurostat (Sec2).

Figure 9



Other countries where the share of the agricultural sector is higher than average are Greece, Ireland, and the southern European countries in general.

The market services sector represents more than half the economic activity in Belgium and Luxembourg,

and more than 45% of the activity in eight of the 12 Member States. This represents an increase of about three percentage points in comparison with 1980. The share of non-market services fluctuates in general between 12 and 15%.

Table 9
Share of industry in GDP and working population, 1988 (1)
Breakdown by country

(%)	GDP (billion ECU)	Share of GDP (2)	Share of working population (3)	Relative productivity of industry (4)
Belgium	126.2	30.7	23.8	1.29
Denmark	90.9	25.1	25.1	1.00
FR of Germany	1 025.4	39.2	36.0	1.09
Greece	44.1	24.7	N/A	N/A
Spain	289.8	38.9	24.0	1.62
France	804.2	30.2	26.1	1.16
Ireland	27.1	N/A	N/A	N/A
Italy	701.8	33.7	28.2	1.20
Luxembourg	5.6	36.6	34.3	1.07
Netherlands	194.7	33.2	22.2	1.50
Portugal	35.1	36.6	26.3	1.39
United Kingdom	686.5	36.0	26.7	1.35

(1) Industry, including energy, building and construction.

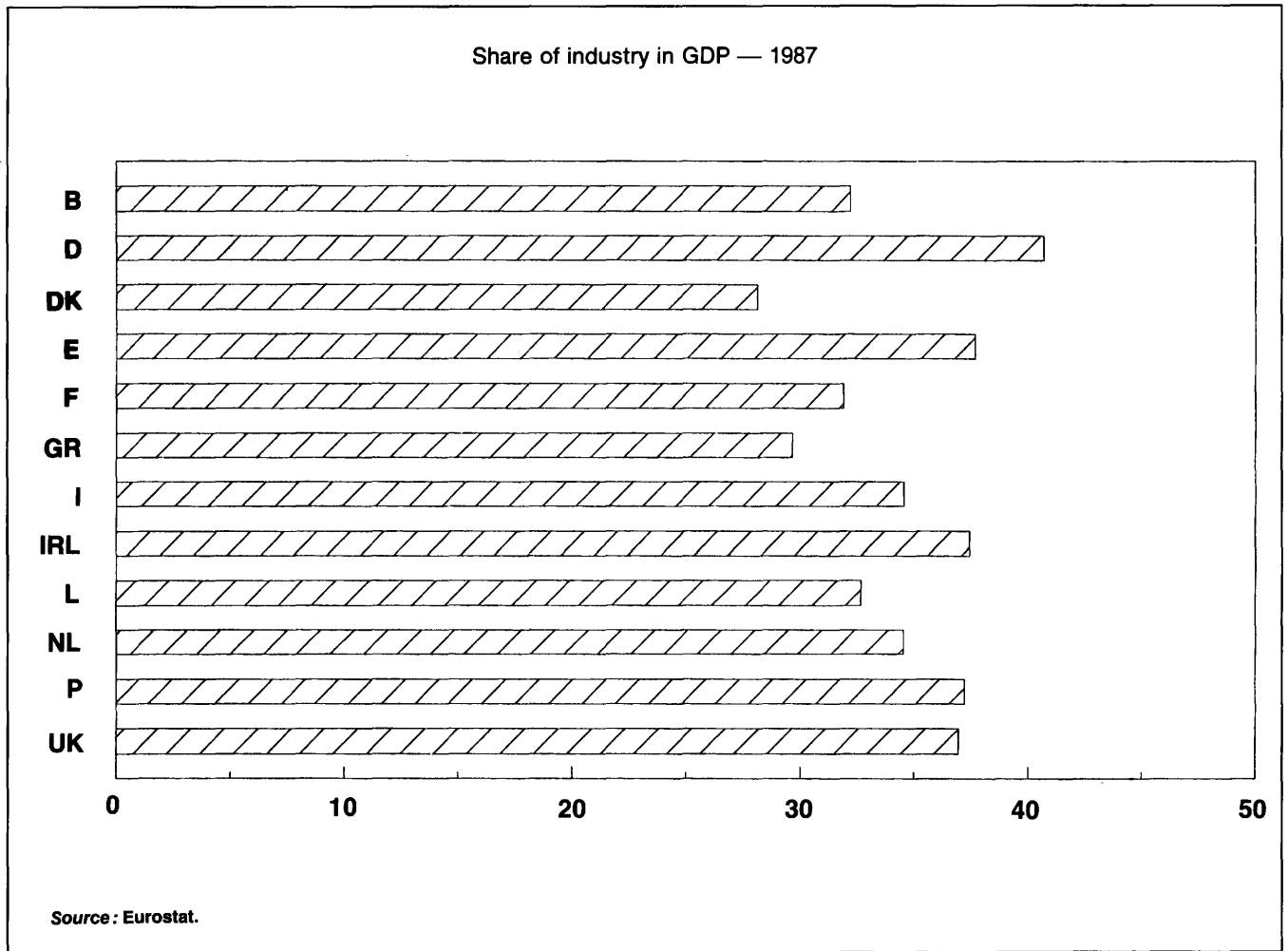
(2) 1986 figures for Belgium, Luxembourg, Netherlands and Portugal.

(3) 1985 figures for Denmark, 1986 for Luxembourg, Portugal and United Kingdom; working population excludes the armed forces.

(4) Share of GDP/Share of working population.

Source: Eurostat (Sec2, Soci).

Figure 10

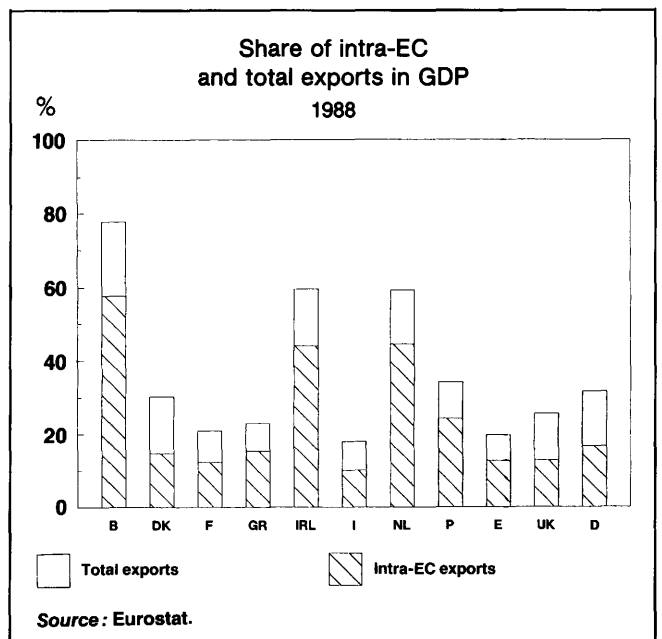


Within industry, there are wide differences in the distribution of production among the different sectors. These differences reflect at least in part the comparative advantages of the different countries as well as their level of development.

Taking into account their geographic situation, their size and other economic and historic factors, the Member States of the EC are more or less open to the rest of the world. Figure 11 illustrates the share of total and of intra-European exports of goods and services respectively in the total added value of the different Member States. Three observations can be made from this graph:

1. The part of production exported by each country varies widely from one Member State to the other.
2. The great majority of exports from each country are destined to other Member States.
3. In a general manner, the most open economies are those of the small Member States, i.e. BLEU, Ireland, and the Netherlands. The new arrivals, i.e. Greece, Portugal and Spain, still have too low an export rate, even if Portugal's open trade policy

Figure 11



before its adhesion (Portugal being a member of EFTA) places this country at a higher level than

Table 10
Share of services in GDP and working population, 1988
Breakdown by country

(%)	GDP (billion ECU)	Share of services GDP (1)	Share of working population (2)	Relative productivity of service(3)
Belgium	126.2	63.2	61.8	1.02
Denmark	90.9	57.0	59.4	0.96
FR of Germany	1 025.4	56.4	51.2	1.10
Greece	44.1	48.3	44.7	1.08
Spain	289.8	60.0	44.0	1.36
France	804.2	61.9	56.7	1.09
Ireland	27.1	49.9	N/A	N/A
Italy	701.8	60.9	56.4	1.08
Luxembourg	5.6	72.8	66.1	1.10
Netherlands	194.7	60.5	53.2	1.14
Portugal	35.1	54.4	34.6	1.57
United Kingdom	686.5	60.9	59.2	1.03

(1) 1986 figures for Belgium, Ireland, Luxembourg and Portugal.

(2) 1986 figures for Greece, Luxembourg, Portugal and United Kingdom; working population excludes the armed forces.

(3) Share of GDP/Share of working population.

Source: Eurostat (Sec2, Soci).

Denmark in terms of export rate in value-added. The export rate of the different countries, however, depends not only on the size of the country and type of economic policy pursued in the past, but also and especially on the production structure and the rate of specialization of the economy in more or less export-oriented sectors.

Table 13 shows the degree of specialization of the different Member States in the main sectors of activity. This specialization rate is defined as the difference between the share of each sector in the total value-added of the country considered, minus the share of the sector in value-added in the EC as a whole. Thus, a specialization coefficient of 11% for Greece in the agricultural sector means that the share of the agricultural sector in Greece in 1987 was 11 percentage points higher than the share of this sector in the Community as a whole.

The analysis of specialization coefficients per country makes it possible to analyse certain characteristic traits of the industrial structure of the different Member States.

Belgium

Belgium has a production structure generally close to the European average. Although the share of the manufacturing sector is three percentage points lower than the average of the EC, no sector in particular is responsible for this fact. Actually, with the exception of ferrous and non-ferrous metals, the chemicals and the food, beverages and tobacco sectors, all manufacturing sectors have a slightly lower share than the European average. The share of market services, and among them, repair and transport services, is on the other hand greater than the EC average, reflecting in part the geographic position of the country. Another sector where the country exceeds the EC average is the governmental services sector, which includes, *inter alia*, health and education.

Federal Republic of Germany

In the Federal Republic of Germany, on the other hand, the share of the manufacturing sector is markedly greater than the average of the EC, due chiefly to the country's specialization in the production of

Table 11
Share of employees by country and sector of economic activity, 1988

(%)	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK	EC
Agriculture	0.5	2.2	9.7	1.5	21.4	10.7	0.9	31.6	0.0	2.7	6.0	12.8	100
Industry	2.6	1.9	26.8	2.0	8.6	16.3	0.7	15.3	0.1	3.8	3.5	18.4	100
Services	3.4	2.4	18.8	2.2	8.1	17.8	0.8	15.9	0.1	4.9	2.4	23.1	100

Source: Eurostat (Soci).

Table 12
Employment by sector of economic activity, 1988

(%)	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK	EC
Agriculture	3	6	5	26	15	7	15	10	4	5	22	2	8
Industry	28	26	40	27	31	30	28	32	32	27	35	30	32
Services	69	68	55	48	54	63	57	58	64	69	43	68	60
Total	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Eurostat (Soci).

electrical equipment, agricultural and industrial machinery, and transport equipment. Thus, Germany is *a priori* in an ideal situation to take advantage of the economic recovery and investments which have taken place these last few years in the world in general and in the EC in particular. Indeed, the growth rate of GDP in the Federal Republic of Germany was among the highest in Western Europe in 1987 and 1988, and forecasts for the next few years continue to indicate sustained growth. The fast growth of exports due to this German specialization

in the production of capital goods explains for that matter the large surplus in the trade balance of Germany with other Member States, which cannot be reduced in a significant manner, unless demand for goods in which Germany does not specialize very much were to increase. The sectors in which the Federal Republic of Germany has a lower specialization rate than the average is the food, beverage and tobacco sectors, and the sector of textiles and clothing, i.e. two sectors geared chiefly to household consumption.

Table 13
Specialization indicators for EC industry, 1987 (1)

Sector	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK
Agricultural, forestry and fishery products	- 1.1	1.3	- 1.5	11.0	2.4	0.5	4.9	1.1	- 0.6	1.0	4.2	- 1.9
Fuel and power products	- 0.8	- 3.9	- 1.0	- 1.8	2.6	- 0.7	N/A	- 0.7	- 3.5	3.7	- 2.1	2.1
Manufacturing	- 3.1	- 6.7	5.8	- 7.3	0.2	- 3.5	N/A	- 0.3	4.7	- 5.3	3.6	- 0.8
Ferrous and non-ferrous ores and metals	0.7	- 8	0.1	N/A	0.3	- 0.1	N/A	0.1	11.2	- 0.2	- 0.2	- 0.2
Non-metallic minerals and mineral products	- 0.2	- 0.3	0.0	N/A	0.5	- 0.3	N/A	0.4	0.9	N/A	0.8	- 0.2
Chemical products	0.3	- 0.8	0.7	- 1.2	- 0.1	- 0.4	N/A	- 0.4	- 1.6	N/A	- 0.2	0.0
Metal products, except machinery and transport equipment	- 0.7	- 0.6	0.8	N/A	- 0.2	- 0.3	N/A	0.3	- 0.3	N/A	- 0.5	- 0.9
Agricultural and industrial machinery	- 0.8	- 0.1	1.2	N/A	- 1.4	- 0.9	N/A	- 0.2	- 0.2	N/A	N/A	0.2
Office and data-processing machines, precision and optical instruments	- 0.6	- 0.3	0.2	N/A	- 0.2	0.1	N/A	0.0	N/A	N/A	N/A	- 0.1
Electrical goods	- 1.0	- 1.4	1.2	N/A	- 0.9	- 0.5	N/A	- 0.9	N/A	- 0.1	- 1.4	- 0.3
Transport equipment	- 0.6	- 1.7	1.3	- 1.4	0.4	- 0.2	N/A	- 0.7	- 2.3	- 1.5	- 0.8	- 0.2
Food, beverages and tobacco	0.4	0.2	- 0.1	- 0.1	1.3	- 0.5	N/A	- 0.9	- 0.7	- 0.2	2.0	1.3
Textiles and clothing, leather and footwear	- 0.3	- 1.0	- 0.6	N/A	0.5	- 0.3	N/A	1.9	- 1.5	- 1.4	6.0	- 0.6
Paper and printing products	- 0.6	0.0	0.3	- 0.7	- 0.4	- 0.2	N/A	- 0.3	- 0.8	0.3	0.2	0.3
Rubber and plastic products	- 0.1	- 0.4	0.4	- 0.5	0.0	- 0.2	N/A	- 0.1	3.1	N/A	- 0.4	- 0.2
Other manufacturing products	0.2	0.1	0.0	N/A	0.1	0.0	N/A	0.3	- 0.9	N/A	0.4	- 3
Building and construction	- 0.4	- 0.1	- 0.2	0.3	1.5	- 0.2	0.0	0.2	0.3	- 0.1	0.0	0.0
Market services	4.0	- 5.8	- 2.3	- 10.9	3.3	- 0.3	- 11.4	3.0	14.7	1.7	- 2.8	0.2
Recovery and repair services, wholesale and retail trade services	2.5	0.1	- 2.6	- 0.5	1.4	- 0.1	- 4.0	3.4	1.0	- 0.5	7.1	- 0.6
Lodging and catering services	0.5	- 1.3	- 1.0	N/A	4.1	- 0.1	- 0.3	0.9	- 0.1	- 0.8	0.5	- 0.7
Transport services (2)	1.7	1.3	- 0.7	1.0	0.0	- 0.1	- 0.9	0.6	- 0.3	0.5	0.7	- 0.2
Communication services	- 0.2	- 0.4	0.2	0.0	- 0.3	0.3	0.2	- 0.5	0.2	- 1.9	0.2	0.5
Services of credit and insurance institutions	- 1.5	- 4.0	- 2.3	- 5.2	- 1.3	- 2.5	- 1.9	- 2.2	16.2	- 2.3	- 1.6	11.9
Other market services	1.0	- 1.4	4.0	N/A	- 0.6	2.1	- 4.5	0.9	- 2.3	4.6	- 9.6	- 10.6
Non-market services	0.0	4.4	- 0.9	- 0.5	- 3.1	2.6	2.1	- 1.6	- 1.1	- 2.1	- 2.0	1.1
General government services	4.3	9.2	2.4	N/A	- 8.8	- 8.8	N/A	2.8	3.8	3.0	2.5	4.9
Other non-market services	0.0	- 0.5	1.0	N/A	- 1.0	- 1.0	N/A	- 0.1	- 0.5	- 0.8	- 0.2	0.6

(1) The specialization indicators are defined as the difference between the share of the value-added in the GDP of a particular sector for a particular country from the total Community share for the sector.

(2) Netherlands estimated.

Source: Eurostat (Sec2).

The share of wholesale and retail trade is on the other hand clearly lower than the EC average (by 2.6%), as is the financial services sector (insurance and credit institutions). This may however simply reflect definition problems, since the share of 'other market services' exceeds the EC average by nearly four points.

Denmark

The cause of the economic problems this country is facing at present is chiefly due to the sizeable deficit of the current balance of payments, as is clearly evident in Table 13. Indeed, the share of the manufacturing sector is very much lower than the European average, with a specialization coefficient of -6.7%, which is due primarily to a smaller share of manufacturing sectors of capital goods such as electrical and transport equipment. The share of production in sectors which have registered high export growth rates, i.e. office equipment, electrical and electronic machines and chemical and pharmaceutical products is also lower than the EC average.

Concurrently, Denmark ranks fifth in the EC with the highest specialization rate in the agricultural sector, where demand, both interior and exterior, is growing only modestly.

Spain

The Spanish economy is currently at a relatively less developed stage than most of the other Member States, which is reflected by the fact that the share of the agricultural sector is 2.4 points higher than the Community average. That said, the country seems to be in a good position to capitalize fully on the rapid growth of economic activity in Europe and the world, in that it means higher purchasing power for the population and higher demand for consumer goods, sectors in which the Spanish economy enjoys comparative advantages. Even though the share of capital goods producing sectors in 1987 was still below the European average, the rapid growth of this economy these last few years and the considerable increase of foreign investments in Spain suggest that the Spanish economy could make up for lost time quickly.

France

France is, together with Belgium, Denmark, Greece and the Netherlands, one of the countries where the share of the manufacturing sector is lower than the EC average. When the specialization rates are examined at a more broken-down level, the share of

nearly all industrial sectors turns out to be slightly lower than the average, with the biggest difference in the case of agricultural and industrial machinery (-0.9%). The share of market and non-market services, however, is greater than the EC average, reflecting in part the major role that the State continued to play in the French economy in 1987.

The fact that the French economy is relatively unspecialized in the production of capital goods, and in a much more general manner, of products for which export demand is growing rapidly explains, to a large extent, the relatively serious deterioration in the balance of manufactured goods these last few years.

Unless there is a structural reorientation of the French production apparatus and a shift of production toward sectors with more dynamic growth, the French economy does not seem to have a growth potential that is clearly above the average.

Greece

Although data are not available for all sectors in Greece, nevertheless the sectorial distribution of production between the various branches differs fundamentally from the European average, with a clearly larger share of production in the agricultural sector, and a specialization rate way below the average for all industrial sectors and for commercial services as well.

Italy

Italy appears to have a traditional type of production structure, with a slightly higher degree of specialization than the EC average in traditional sectors such as textiles and leather, metallic and other manufactured products, the major part of which consists of furniture. Although the share of electrical equipment is lower than the EC average, that of telecommunication and office equipment is nearly equal to the European average.

Italy ranks second behind Portugal in the European Community in terms of the share of production in the textiles sector in the economy as a whole. These two countries are consequently particularly vulnerable to strong competition from low-wage producers, and must stake their effort on quality and creativity factors in order to maintain their market share in the years to come.

Ireland

Very few detailed data are available for Ireland. Nevertheless, the share of the agricultural sector in this country continues to be extremely important, even if it has been reduced these last few years, while the share of market services is lower than in other countries.

Luxembourg

Luxembourg has a very specialized production structure, having capitalized to the maximum on certain niches that enable it to take full advantage of its geographic situation and its own resources. The economy of Luxembourg is therefore extremely specialized in the steel industry (even if the share of this sector has been diminishing these last few years), and in the sector of financial services. The share of financial services in the country's economy is greater by an impressive 16.2% than the EC average.

The economy of Luxembourg is therefore particularly sensitive to regulation changes in the services sector, and to any measure that could jeopardize its privileged position as a fiscal oasis in Europe.

The Netherlands

The Netherlands, for which there are relatively few data available at Eurostat, has a higher specialization rate in the energy sector than the European average (thanks to natural gas), and also a markedly higher specialization rate (than the European average) in the sector of market and non-market services. This reflects both the high industrialization level of the country and the fact that it offers a very wide social security coverage, a feature which increases the share of the services sector in relative terms.

Portugal

As already mentioned, Portugal ranks first in the Community with the highest specialization rate in the sector of textiles, footwear and clothing. Consequently, the country's adhesion to the Community opened up new prospects, since up to that point, Portugal's exports of textile products to the EC were

governed by a system of quotas. Since Portugal joined the Community in 1986, these quotas have been gradually lifted, with their complete elimination scheduled for the early 1990s. Nevertheless, competition from low-wage countries in this area may well limit the growth potential of Portuguese exports.

The United Kingdom

Table 13 clearly shows the importance of the energy sector in the United Kingdom, with an energy specialization rate two points higher than the European average. On the other hand, the share of the manufacturing sector is slightly lower than the average. Within this sector, however, three branches have a relatively high specialization rate, namely: food, beverages and tobacco; agricultural and industrial machinery, and the paper and printing industry. The degree of specialization of the British economy in dynamic export sectors is not very pronounced, however, as can be gathered from examining the specialization rates in the sector of computer and office equipment, electrical equipment, transport equipment and other manufactured products. The share of the chemicals sector on the other hand is nearly identical to the EC average, this being one of the sectors, as we have already mentioned, where the EC enjoys comparative advantages.

The rapid growth of foreign investments in the transport equipment sector, and more particularly in the automobile industry, could none the less contribute to a greater degree of specialization of the British economy in this sector and enable it to capitalize on the rapid growth of the demand for this type of goods that is expected for the coming years.

In conclusion, although certain countries appear today to be in a better position than others in order to benefit from the single market and the type of orientation that demand has assumed today, they all have certain advantages that they could use to their benefit while waiting for the completion of the necessary structural transformation that would guarantee sustained rapid growth in the years to come.

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ANNEX

Figure 1

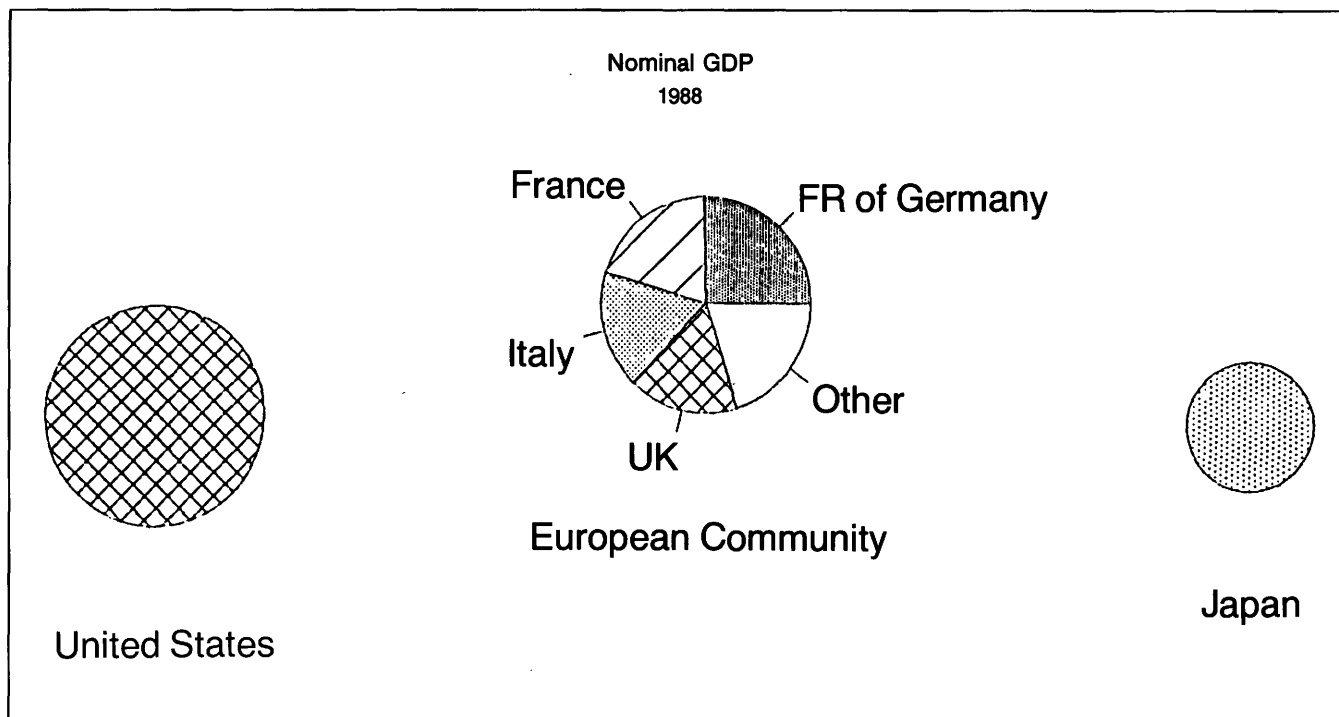


Table 1A
Ranking of major EC sectors by output and employment, 1988 (1)

NACE Code		Output (2)		Employment	
		(million ECU)	Rank	(1 000)	Rank
64	Retail trade	958 700 (3)	1	3 873.6 (4)	1
41	Food and drink (except tobacco)	331 232	2	2 208.0	5
25	Chemicals	263 983 (5)	3	1 922.0	7
35	Motor vehicles and motor vehicle parts and accessories	206 714	4	1 815.3	8
34	Electrical engineering	205 374	5	2 661.4	3
50	Building and civil engineering	201 221	6	2 814.7	2
32	Mechanical engineering	190 977	7	2 344.0	4
31	Manufacture of metal articles	145 511	8	2 123.0	6
22	Production and preliminary processing of metals	125 814	9	919.7	12
43	Textile industry (except jute industry)	84 300	10	1 547.5	9
48	Processing of rubber and plastics	80 710	11	981.2	10
24	Manufacture of non-metallic mineral products	80 140	12	977.1	11
36	Other means of transport	59 715	13	783.7	13
33	Office and data-processing machinery	39 878 (6)	14	238.7 (6)	16
75	Air transport	24 725	15	258.8	15
13	Crude oil and natural gas	22 700	16	95.0	18
37	Instrument engineering	20 381	17	309.3	14
23	Extraction of minerals other than metalliferous and energy-producing	9 761	18	128.1	17

(1) The rankings are based principally on Panorama sectoral data; wherever this was not possible, Eurostat (Inde data base) estimates were used to complete the table.

(2) Output: production figures for manufacturing; turnover for services.

(3) 1985.

(4) 1984.

(5) Turnover; excluding Greece.

(6) Excluding Greece and Portugal.

Source: Industry Associations, Eurostat (Inde).

Table 1B
Ranking of EC subsectors by output and employment, 1988 (1)

NACE Code		Output (2)		Employment	
		(million ECU)	Rank	(1 000)	Rank
822	Life insurance	221 967 (3)	1	742 (4)	6
351	Motor vehicles (including road tractors)	161 448	2	1 296	2
251	Basic industrial chemicals and further processing of such products	116 749	3	683	8
790*	Telecommunication services	69 400	4	N/A	
221	Iron and steel	68 845	5	522	11
412	Slaughtering, preparing and preserving of meat	60 669	6	387	15
413	Dairy products	59 592	7	260	29
344	Telecommunications equipment	54 817 (5)	8	806 (5)	4
316	Tools and finished metal goods, except electrical equipment	52 869	9	743	5
473	Printing	51 439	10	667	9
483	Plastics processing	47 150	11	573	10
453	Clothing	46 514	12	1 051	3
257	Pharmaceutical products	44 343	13	410	13
467/316.6	Furniture	38 665	14	723 (6)	7
224	Production and preliminary processing of non-ferrous metals	37 229	15	200	36
429	Tobacco products	36 661	16	106	55
838	Advertising	36 213	17	36	92
472	Paper and board conversion	35 795	18	364	17
325	Machinery for the mining, iron and steel, metallurgical and other industries	34 215	19	385	16
345	Consumer electronics; manufacture of records and tapes	32 975	20	351	18
364	Aerospace equipment	31 600	21	489	12
258	Soaps, synthetic detergents, perfume and toilet preparations	27 981	22	193	37
422	Animal and poultry feeds (including fish meal and flour)	25 769	23	86	62
471	Pulp, paper and board	25 638	24	173	40
481	Rubber products	25 364	25	347	21
427	Brewing and malting	23 935	26	157	45
839*	Software and computing services	22 700 (6)	27	287 (6)	24
324	Machinery for the food, chemical and related industries	22 355	28	258	30
255	Paints, varnishes and inks	21 597	29	177	38
313	Secondary transformation, treatment and coating of metals	21 513	30	351	19
432	Cotton industry	20 718	31	301	23
314	Manufacture of structural metal products	20 627	32	280	25
322	Machine tools for working metal and other tools and equipment for use with machines	20 564	33	280	26
243	Manufacture of concrete, cement or plaster products for construction	20 484	34	221	34
436	Knitting industry	19 150	35	343	22
419	Bread and flour confectionery	19 059	36	391	14
421	Cocoa, chocolate and sugar confectionery	18 795	37	164	44
247	Manufacture of glass and glassware	18 282	38	233 (7)	32
311	Foundries	17 827	39	270	27
346	Household appliances	17 615 (8)	40	204 (8)	35
315	Boilermaking	17 372	41	227	33
411	Vegetable and animal oils and fats	16 923	42	54	82
451/452	Footwear	16 900	43	348	20
483*	Fibre-reinforced plastics	16 524	44	82	68
424	Alcohol and spirits	15 090	45	72	74
420	Sugar manufacturing and refining	14 633 (9)	46	68 (9)	77
321	Manufacture of agricultural machinery and tractors	14 562	47	165	43
344/345	Electronic components	14 406	48	N/A	
242	Manufacture of cement, lime and plaster	14 180	49	84	65
431	Wool industry	14 070	50	176	39
361	Shipbuilding, repair and shipbreaking	14 022	51	269	28
248	Ceramic goods	13 922	52	243	31
414	Processing and preserving of fruit and vegetables	13 197	53	129	48
923	Industrial cleaning services	13 028 (14)	54	1 491 (14)	1
345.1	Audiovisual equipment	12 906	55	123	50
223	Drawing, cold rolling and cold folding of steel	12 694	56	97	58
839.3	Temporary work services	12 500	57	N/A	
416	Grain milling	11 910	58	45	87
428	Soft drinks including bottling of natural spa waters	11 400	59	89	59
258.1	Soaps and detergents	11 048	60	N/A	
326	Transmission equipment for motive power	11 013	61	170	41
341	Insulated wires and cables	10 843 (10)	62	111 (10)	52
322*	Machine tools	10 611 (11)	63	170 (12)	42
255*	Paints and varnishes	9 540 (13)	64	88 (13)	60

Table 1B (cont.)

NACE Code		Output (2)		Employment	
		(million ECU)	Rank	(1 000)	Rank
463	Wooden building components	9 152	65	146	46
222	Steel tubes	9 047 ⁽¹⁵⁾	66	75	71
323	Textile machinery and accessories; sewing machines	8 815	67	120	51
371	Measuring, checking and precision instruments and apparatus	8 712	68	128	49
837*	Consulting engineers	8 389	69	140	47
323.1	Textile machinery	7 951	70	102	57
243.6	Ready-mixed concrete	7 805 ⁽¹⁶⁾	71	N/A	
245	Working of stone and of non-metallic mineral products	7 470	72	76	70
441	Leather tanning and finishing	7 017	73	72	75
415	Processing and preserving of fish and other sea foods	6 793	74	105	56
462	Semi-finished wood products	6 708	75	67	78
256.8	Fertilizers	6 700	76	50	84
231	Extraction of building materials and refractory clays	6 480	77	82	67
316.42	Light metal packaging	6 203 ⁽¹⁷⁾	78	57 ⁽¹⁷⁾	80
347	Electric lighting	5 980 ⁽¹⁸⁾	79	85 ⁽¹⁸⁾	64
362	Railway and tramway rolling stock	5 635	80	87	61
372	Medical and surgical equipment and orthopaedic appliances	5 512	81	84	66
491	Jewellery	5 019 ⁽¹⁹⁾	82	55 ⁽¹⁹⁾	81
373	Optical instruments and photographic equipment	4 977	83	73	72
241	Clay products for constructional purposes	4 939 ⁽¹⁷⁾	84	86 ⁽¹⁷⁾	63
467.2	Office furniture	4 867 ⁽¹⁰⁾	85	59 ⁽¹⁰⁾	79
461	Sawing, planing, drying and seasoning of wood	4 798	86	73	73
494.1	Toys and games	4 718 ⁽¹⁰⁾	87	69 ⁽¹⁰⁾	76
465/466	Other wood manufactures and articles	4 501	88	81	69
328.3	Liquid pumps	4 440 ⁽²⁰⁾	89	N/A	
322.2*	Special tools	4 362 ⁽²¹⁾	90	N/A	
839.1*	Management consultancy	4 068	91	43	89
363	Cycles, motorcycles and parts and accessories thereof	3 777	92	51	83
232	Mining of potassium and natural phosphates	3 553	93	46	86
345.2	Music recording	3 175 ⁽²²⁾	94	110 ⁽⁶⁾	54
248.6	Tableware and ornamental ware	2 797 ⁽¹⁷⁾	95	110 ⁽¹⁷⁾	53
327.1	Machinery for working wood	2 474 ⁽²³⁾	96	43 ⁽¹³⁾	88
464	Wooden containers	2 359	97	40	91
362*	Railway rolling stock: locomotives, coaches, goods wagons and parts	2 276 ⁽²⁴⁾	98	50 ⁽²⁴⁾	85
325.5	Industrial trucks	2 047 ⁽⁶⁾	99	41 ⁽⁶⁾	90
322.2*	Cutting tools	1 924	100	N/A	
342	Power transformers	1 715 ⁽²⁵⁾	101	N/A	
839.1*	Market research	1 658	102	23	93
839.2*	Data banks	1 431 ⁽²⁶⁾	103	N/A	
466.3	Brushes	1 052	104	19 ⁽²⁷⁾	94
492	Musical instruments	768 ⁽²⁸⁾	105	14 ⁽²⁸⁾	95
790*	Express couriers	566	106	8	96
839.1*	Public relations	356	107	2	97

* The industry covered by this NACE code is larger than the industrial sector defined here.

(1) The rankings are based principally on Panorama sectoral data; wherever this was not possible, Eurostat (Inde data base) estimates were used to complete the table.

(2) Output: production figures for manufacturing; turnover for services.

(3) Total insurance premiums, 1987.

(4) 1985.

(5) Excluding B, DK, L, NL and P.

(6) 1987.

(7) Estimated.

(8) Excluding B, DK, L and NL.

(9) Excluding DK, IRL and NL.

(10) Excluding L.

(11) Excluding GR and IRL.

(12) Excluding DK, GR and IRL.

(13) Excluding GR, IRL and L.

(14) 1986.

(15) Deliveries.

(16) Excluding DK, L, NL and P.

(17) Excluding IRL.

(18) Excluding B, DK, IRL and NL.

(19) Excluding L and P.

(20) Excluding IRL and P.

(21) Excluding DK, GR, IRL and L.

(22) Ex-factory sales.

(23) Excluding GR, IRL, L and NL.

(24) Excluding NL and UK.

(25) 1987; D, F, I, UK.

(26) Excluding DK, GR, IRL and P.

(27) Excluding GR and P.

(28) Excluding B, GR, IRL and P.

Source: Industry associations, Eurostat (Inde).

Table 2
Population projection, 1988, 2000, 2025
International comparisons

(1 000)	1988 (1)	2000	2025
Belgium	9 925	10 034	9 920
Denmark	5 119	5 139	4 972
FR of Germany	60 714	59 818	53 965
Greece	10 013	10 193	10 080
Spain	39 053	40 812	42 530
France	55 789	58 196	60 442
Ireland	3 650	4 086	4 958
Italy	57 265	57 881	54 919
Luxembourg	367	368	349
Netherlands	14 648	15 207	15 081
Portugal	10 246	10 587	10 935
United Kingdom	56 799	57 509	57 464
EC	323 588	329 830	325 615
USA	245 414	266 194	300 796
Japan	122 424	129 105	128 596
USSR	283 682	307 737	351 450
Eastern bloc	112 856	117 112	123 292
Less developed countries (2)	3 919 249	4 988 573	7 114 430
Total	5 112 298	6 251 055	8 466 516

(1) Mid-year figures.

(2) All regions of Africa and Latin America.

All of Asia excluding Japan, Melanesia, Micronesia and Polynesia.

Source: United Nations.

Table 3
Value-added in industry as percentage of GDP
International comparisons

(%)	1968	1978	1987
EC	41.1	38.2	34.5
USA	36.7	34.0	29.2
Japan	44.4	41.7	40.6

Source: OECD.

Table 4
EC population by sex and age group, 1987
Percentage of total population

(age group)	Females	Males	Total
0-19	25.7	28.5	27.1
20-39	28.9	31.3	30.1
40-59	23.3	24.2	23.7
60 +	22.1	16.0	19.1
of which:			
70 +	7.8	4.3	6.1
Total	100	100	100

Source: Eurostat (Soci).

Table 5
Employment by major sector (1)

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988 (2)	AAGR
Agriculture, forestry and fishing	11 887	11 551	11 093	11 067	10 843	10 666	10 351	10 249	10 065	-2.1
Fuel and power products	1 942	1 946	1 947	1 919	1 869	1 837	1 777	1 751	1 728	-1.5
Manufacturing	34 112	32 559	31 413	30 276	29 540	29 352	29 330	29 196	28 641	-2.2
Building and construction	9 795	9 496	9 175	8 955	8 628	8 432	8 387	8 447	8 295	-2.1
Market services	44 442	44 702	45 106	45 255	46 282	47 223	48 291	49 434	50 076	1.5
Non-market services	22 309	22 656	22 949	23 243	23 523	23 934	24 298	24 539	24 833	1.4

(1) Employment comprises all persons in paid employment or working on their own account during the reference period.

(2) Estimated.

Source: Eurostat (Sec 2).

Table 6
Number of employees by major sector, 1987
Breakdown by country (1)

(1 000)	B	DK	D	GR	E	F	IRL	L	NL	UK	EC (2)
Agriculture, forestry and fishing	13	56	213	971	526	273	22	1	64	320	2 459
Energy and water	52	22	477	48	135	302	15	1	62	502	1 616
Mineral extraction and chemicals	165	52	1 226	89	371	682	33	19	152	769	3 558
Metal manufacturing	253	194	4 087	123	756	1 940	58	8	364	2 264	10 047
Other manufacturing	304	254	2 576	446	1 132	1 795	109	11	445	2 097	9 169
Building and civil engineering	156	165	1 429	232	682	1 186	65	14	305	1 000	5 234
Distributive trades etc.	437	402	3 590	661	1 256	2 797	144	29	791	4 370	14 477
Transport and communications	240	159	1 454	244	467	1 303	47	11	326	1 334	5 585
Financing, insurance etc.	262	203	1 765	146	438	1 625	71	19	532	2 284	7 345
Other services	1 164	878	6 345	637	2 133	6 045	254	37	1 590	6 635	25 718
Total	3 046	2 385	23 162	3 597	7 896	17 948	818	149	4 631	21 575	85 207

(1) Employees comprise all persons bound to an enterprise by an employment contract guaranteeing remuneration for their work.

(2) Excluding Italy.

Source: Eurostat (Soci).

Table 7
Unemployment rate (1)

(%)	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK	EC
1983	12.6	9.5	6.9	9.0	17.8	8.3	15.3	8.9	3.5	12.4	7.8	11.2	10.0
1984	12.6	9.1	7.1	9.3	20.6	9.8	17.0	9.5	3.1	12.4	8.5	11.4	10.7
1985	11.8	7.5	7.2	8.7	21.9	10.3	18.4	9.5	2.9	10.6	8.6	11.5	10.8
1986	11.8	5.8	6.6	8.2	21.2	10.4	18.3	10.5	2.6	10.3	8.3	11.5	10.8
1987	11.5	5.8	6.3	8.0	20.5	10.5	18.1	10.2	2.7	10.0	6.9	10.6	10.4
1988	10.5	6.4	6.3	8.5	19.5	10.0	17.8	10.7	2.2	9.5	5.5	8.5	9.8
1989	9.6	7.0	5.7	N/A	17.0	9.6	17.2	11.0	1.9	9.3	5.0	6.5	9.0

(1) Unemployment rates correspond to definitions established by the ILO in 1982 (persons older than 14 years of age, looking for employment and immediately available for work). This method, used for all Member States, gives the annual averages obtained from interpolation of the data on the number of registered unemployed, supplied by the Annual Labour Enquiry.

Source: Eurostat (Soci).

Table 8
Exchange rates, 1970-88
1 ECU = ... national currency

	B-L	DK	D	GR	E	F	IRL	I	NL	P	UK	USA	Japan
1970	51.11	7.667	3.741	30.67	71.36	5.678	.4259	638.9	3.700	29.38	.4259	1.022	368.0
1971	50.87	7.753	3.646	31.43	72.57	5.772	.4286	647.4	3.658	29.64	.4286	1.048	363.8
1972	49.36	7.789	3.577	33.65	72.20	5.657	.4489	654.3	3.600	30.48	.4489	1.122	339.7
1973	47.80	7.416	3.276	36.95	71.81	5.468	.5023	716.5	3.429	30.27	.5023	1.232	333.2
1974	46.40	7.259	3.084	35.78	68.82	5.734	.5098	775.7	3.202	30.25	.5098	1.193	347.5
1975	45.57	7.123	3.049	39.99	71.16	5.319	.5600	809.5	3.135	31.50	.5600	1.241	367.7
1976	43.17	6.762	2.815	40.88	74.74	5.345	.6216	930.1	2.955	33.62	.6216	1.118	331.2
1977	40.88	6.856	2.648	42.04	86.85	5.606	.6537	1 006.8	2.800	43.59	.6537	1.141	305.8
1978	40.06	7.019	2.556	46.78	97.43	5.740	.6639	1 080.2	2.754	55.86	.6639	1.274	267.1
1973	40.17	7.209	2.511	50.77	91.97	5.829	.6695	1 138.5	2.749	67.04	.6464	1.371	300.5
1980	40.60	7.827	2.524	59.32	99.70	5.869	.6760	1 189.2	2.760	69.55	.5985	1.392	315.0
1981	41.29	7.923	2.514	61.62	102.68	6.040	.6910	1 263.2	2.775	68.49	.5531	1.116	245.4
1982	44.71	8.157	2.376	65.34	107.56	6.431	.6896	1 323.8	2.614	78.01	.5605	.980	243.5
1983	45.44	8.132	2.271	78.09	127.50	6.771	.7150	1 349.9	2.537	98.69	.5870	.890	211.4
1984	45.44	8.146	2.238	88.34	126.57	6.872	.7259	1 381.4	2.523	115.68	.5906	.789	187.1
1985	44.91	8.019	2.226	105.74	129.16	6.795	.7152	1 448.0	2.511	130.25	.5890	.763	180.6
1986	43.80	7.936	2.128	137.42	137.46	6.800	.7335	1 461.9	2.401	147.09	.6715	.984	165.0
1987	43.04	7.884	2.072	156.22	142.19	6.928	.7754	1 494.7	2.334	162.58	.7047	1.154	166.6
1988	43.43	7.952	2.074	167.58	137.60	7.036	.7757	1 537.3	2.335	170.06	.6644	1.182	151.5

Source: Eurostat (Icg).

CORPORATE STRATEGIES OF EUROPE'S 70 LARGEST CORPORATIONS

Introduction

The 70 corporations whose strategies are analysed below were selected on the following basis:

- companies in the oil and mining sectors, in the distribution sector, public companies and subsidiaries of non-EC companies were excluded from this survey.
- State-owned companies that are exposed to market forces in the same way as private companies (Renault, for instance) were however included in this survey.

The ranking is based on 1987 turnover, converted into ecus; some companies were excluded from the ranking because, in July 1989, when this study was completed, no financial information on these companies had been received. Similarly, turnover figures for 1988 were not available for all companies.

The purpose of this survey is to analyse the competitiveness of European companies, by sector and in comparison with their Japanese and US competitors.

The angle is mainly financial, as opposed to 'economic': the objective is to understand corporate strategies with respect to the companies' financial

situation, rather than their general economic strategy, which would include such issues as market shares, etc.

As a result, one should avoid drawing general conclusions on the level of competitiveness of the different countries; this remark holds true in particular for the comments on the Japanese companies' financial situation.

Note on methodology

The financial results used for the purpose of this study come from the annual reports of companies. In order to conduct a Europe-wide comparison, annual figures were converted into ecus on the basis of the average exchange rate for that year (source: Eurostat). This obviously causes a few distortions due to the impact of the variations of each currency in relation to the currency of reference. For fiscal 1988, we obtained financial data for about 60% of the sample. These figures were used to estimate the results of all the groups for 1988.

The comparison of American, European and Japanese companies on the basis of the net results reveals a weaker performance for Japanese firms in all sectors of activity. This, however, should be qualified by the following elements:

Table 1

Operating profit, net income and cash flow of the biggest corporations in Europe, the USA and Japan

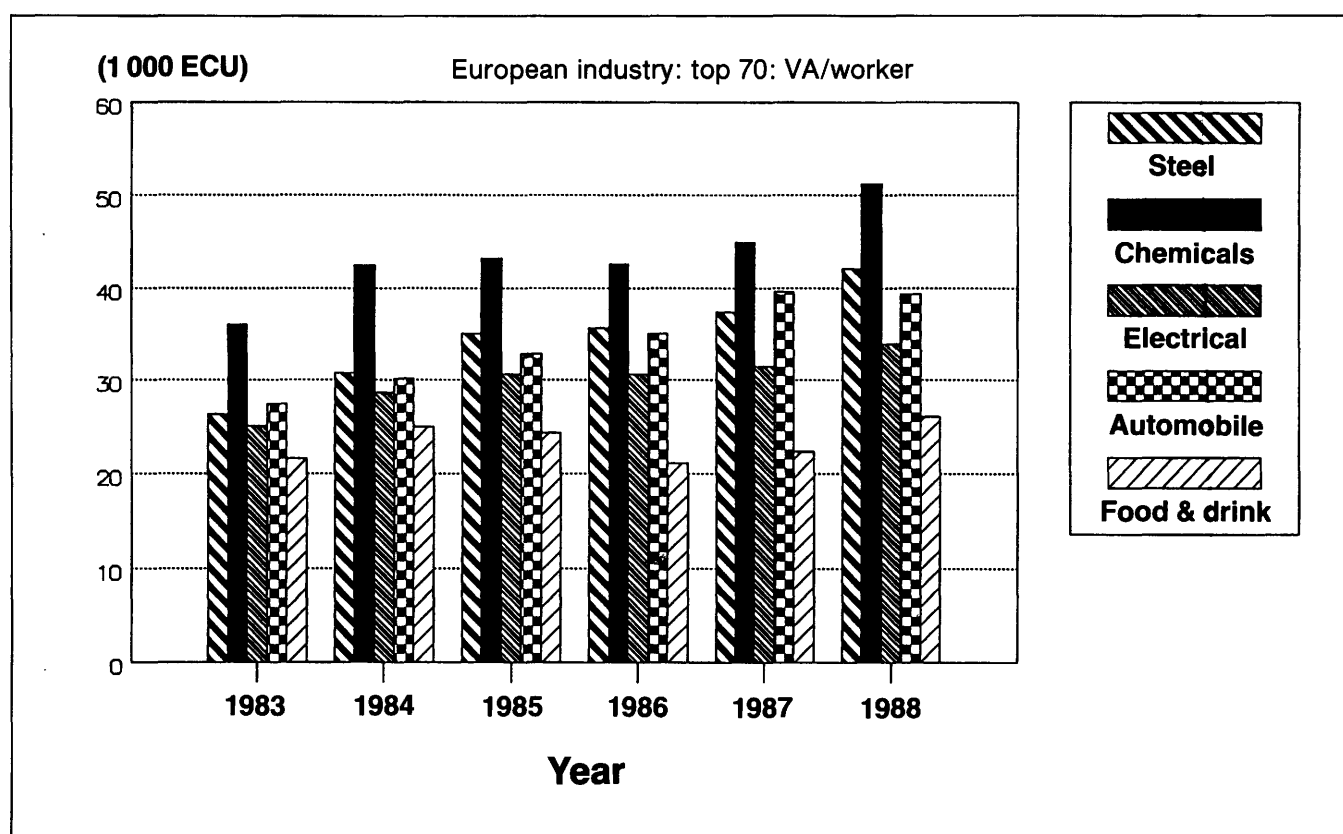
(% of turnover)		1983	1984	1985	1986	1987	Average
Europe	Oper. margin	6.0	6.1	7.1	6.3	7.1	6.5
	Net result (1)	1.7	2.1	2.5	3.0	3.1	2.5
	Net result (2)	1.4	0.7	1.2	2.3	3.1	1.7
	Cash flow (1)	6.4	6.9	7.6	8.1	8.2	7.5
	Cash flow (2)	5.9	5.3	6.1	7.3	8.0	6.6
USA	Oper. margin	13.1	13.8	12.1	10.2	11.4	12.1
	Net result	6.3	6.9	6.0	4.7	5.5	5.9
	Cash flow	10.1	10.7	9.9	9.8	10.0	10.0
Japan	Oper. margin	5.2	5.3	6.0	4.2	1.5	4.4
	Net result	2.7	2.6	2.8	2.4	1.4	2.4
	Cash flow	6.8	6.7	7.1	6.7	6.2	6.7

(1) The top 10 groups with the exception of Renault.

(2) The top 10 groups.

NB: The operating profit is defined as the gross operating surplus less the capital depreciation allowance.

Figure 1



Basically, Japanese companies do not have the same organizational structure as European and American corporations, consolidated data are not always accessible, and very often the groups tend to be organized in subcontracting networks. Hence, the results of these activities are not available at the whole group level, because they are often owned by several companies within this group.

Other factors which explain the poorer financial performance of Japanese companies are to be found in

the industrial structure of groups which are highly capital-intensive (this is particularly the case in the automobile industry): this puts a burden on depreciation allowances, which weighs heavily on results. Finally, the debt burden of these companies is also higher, resulting in heavier financial costs.

Consequently, comparisons based on the net result must be made with caution. Moreover, we should point out that the aggressive marketing of the Japanese groups has a counterpart: massive investments have to be financed in part by debt.

Table 2
Key figures for the main sectors

Sector	Number of companies	% of total turnover 1988	AAGR (1) 1983/88 (%)	VA/workers (ECU)		GOS (2)/VA (%)		Invest./VA (%)		Net res./turn. (%)	
				1983	1988	1983	1988	1983	1988	1983	1988
Production and primary transformation of metals	8	8.5	+ 4.7	26 290	42 100	11.8	28.0	13.2	17.0	- 3.0	2.7
Chemicals	15	20.3	+ 4.0	36 080	51 260	35.1	39.1	13.3	18.2	1.7	5.0
Electrical and electronic engineering	9	16.3	+ 9.1	25 100	33 990	19.1	24.2	10.9	14.2	2.1	3.2
Automobiles	8	24.1	+ 10.7	27 420	39 440	27.5	33.1	21.5	24.4	- 0.1	3.7
Food & drink	13	17.0	+ 6.8	21 690	26 100	38.0	48.2	15.5	19.8	4.2	7.3

(1) Average annual growth rate.

(2) Gross operating surplus.

Source: Eurostat.

In conclusion, the comparison between the top 10 corporations in Japan, the United States and Europe was conducted on the basis of the following three indicators: the operating profit, the net result, and the cash flow (net result and depreciation allowance). These three indicators are given as a percentage of turnover. The operating profit is defined as gross operating surplus minus the depreciation allowance.

Table 1 shows a generally improved performance of American corporations for all indicators. For their part, the top European and Japanese companies have achieved quite similar economic results. We should point out none the less that whereas European companies are improving their cost structure, Japanese companies are experiencing the opposite trend. This is particularly true of the following companies: Hitachi, Toshiba and Fujitsu.

The European groups: competitiveness regained

The analysis of the 70 biggest European corporations is based on an examination of their strategy and their financial results during the last six years (1983-88). The companies considered are those found in the classification drawn up by the *Nouvel Economiste* on the basis of their 1987 turnover.

The groups are divided in accordance with 12 sectors of activities (NACE). The chemical industry tends to dominate (15 companies with 21% of the total turnover), followed by the automobile industry (8 companies, 21% of the total turnover), the manufacture of electrical and electronic products (9 firms, 16% of the turnover), and the food and drink sector (13 groups, 15% of the turnover).

Other sectors where European firms are market leaders are the production and preliminary processing of metals (9.5% of the total turnover), and the aerospace industry (4 companies with 4% of the total turnover).

The Community is not well represented (no more than three companies) in six other sectors: metallic mineral products, machinery, EDP, rubber, publishing and finally construction and civil engineering.

The five sectors where European groups are predominant will be analysed in detail below.

General data

In 1988, the first most important sectors comprised 75% of the companies in the sample (in numbers), but the same companies accounted for more than 86% of turnover. It is worth pointing out that in 1983, these same companies accounted for 86% of the total as well.

The trend of sectoral growth rates nevertheless reveals a change in the specialization of the Community economy over the past few years.

Thus, the automobile and electrical and electronics industries have grown faster than the average of the sample, which is around +7.3%. The food and drink sector grew at the average growth rate, while two sectors have declined, for different reasons: the steel industry, due to considerable restructuring efforts, and the chemical industry, because of its leading position in the world.

Finally, in all sectors there was a clear improvement of profit, productivity and investment ratios.

Thus the productivity ratio (VA/person employed) went up by +9.8% a year in the steel industry, +7.5% in the automobile industry, +7.2% in the European chemical industry and 3.8% in the food and drink sector.

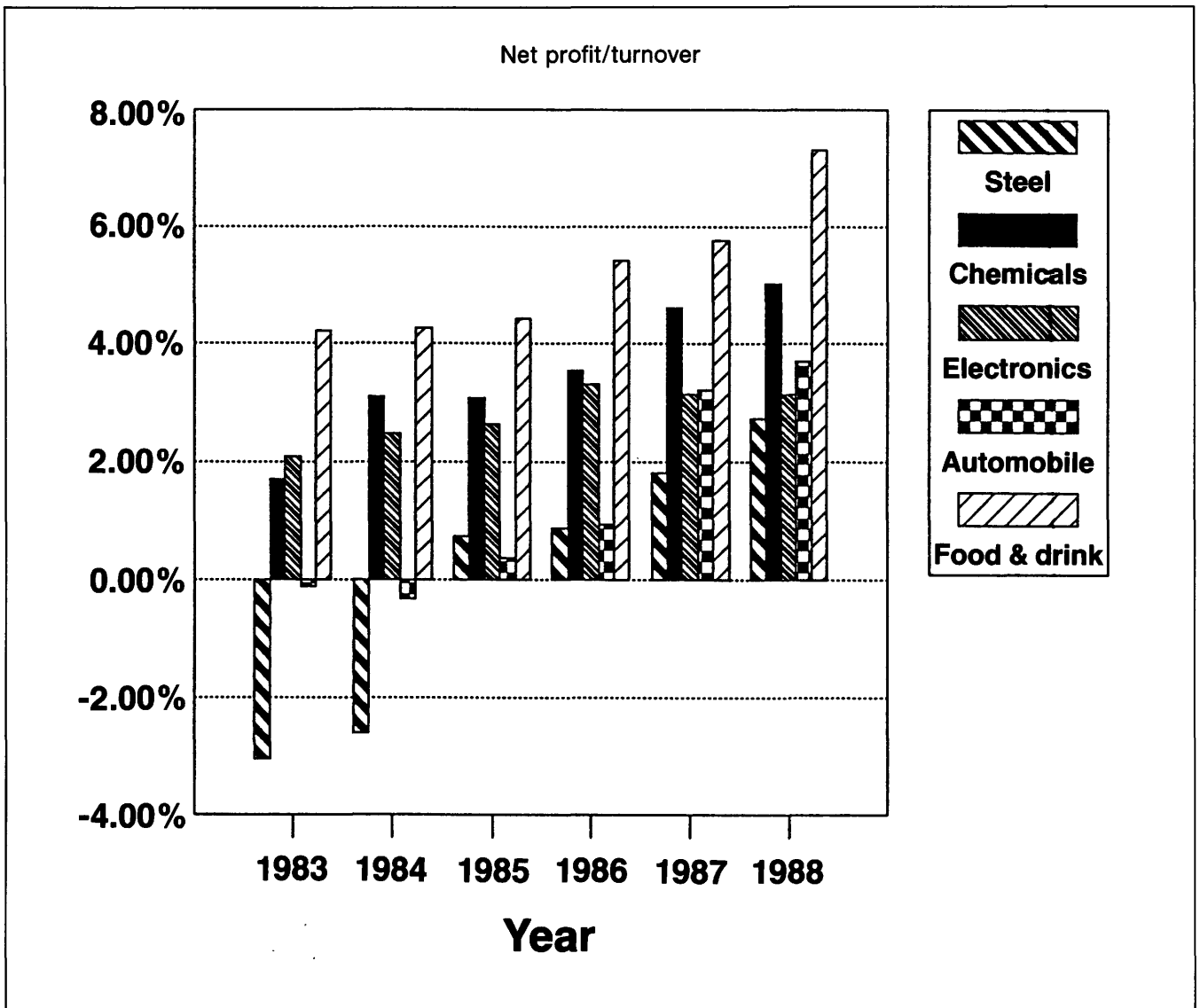
There was therefore a concourse of two factors: an improvement in the production apparatus (whence a growth in industrial investments for the period), and a drop in the labour force. The industrial margin (GOS/VA), which grew strongly especially in the food sector and in the steel industry, has enabled to raise the self-financing ratio.

The financial situation of the groups has therefore improved, but 1988 profit levels still placed most of these industries at a generally lower level than their American competitors. On the other hand, and even though comparisons with Japanese companies should be done with caution (see note on methodology), it appears that European companies are achieving better results than their Japanese competitors.

Thus, on the basis of 1987 figures, the comparison of net margins (net result/turnover) within the sample of the first 280 leading groups worldwide — which include the top 70 European corporations — give the following results (see Table 3).

In all the major sectors of activity, Japanese companies reveal levels of performance amply inferior to those of their American and European competitors.

Figure 2



American companies have, on the whole, higher profitability margins; this is particularly the case in the electrical and electronics sector, as well as in the chemicals sector. In the food sector, Europe is on a par with the United States now, which may explain the new flow of investments from Europe to the United States.

Only the European mechanical industry, thanks to the powerful German corporations, scores a clearly higher margin than its non-EC competitors.

Importance of the groups in the Community economy

It is worth comparing the development of these top 70 European groups with the overall development of the Community economy.

A comparison of the main economic indicators gives the following results (see Table 4).

The European groups represent about 6% of the wealth created (value-added), and of investment of the Community economy.

On the other hand, they absorb a few more jobs (8%). These indicators must be slightly undervalued by the output of groups outside the Community (in relative terms this is quite low and does not affect the general conclusions).

Between 1983 and 1988, these indicators remained stable, except for investment, the average rate of which (for the sample) increased from 14.9% in 1983 to 18.7% in 1988. For Europe as a whole, the gross fixed capital formation ratio remained stable (19.5% in 1983, 19.8% in 1988).

This slight under-investment in fixed assets by the major industrial groups is the result of a strategic policy which has tended to favour development by external growth (acquisition of companies) over the last few years, causing a transfer from industrial investment to financial investment.

Table 3
Number of companies and net results in the main sectors of activity

	Europe	USA	Japan
Metal products			
Number of companies	8	3	6
Net result/turnover (%)	2.3	5.2	- 0.4
Chemical products			
Number of companies	15	6	9
Net result/turnover (%)	4.1	5.6	2.3
Mechanical engineering			
Number of companies	3	4	5
Net result/turnover (%)	3.7	3.3	0.4
Electrical and electronic eng.			
Number of companies	9	14	10
Net result/turnover (%)	2.8	7.8	2.9
Automobiles and parts			
Number of companies	8	5	11
Net result/turnover (%)	3.6	4.6	2.4
Food & drink			
Number of companies	13	19	6
Net result/turnover (%)	5.8	5.8	1.3

Source: Eurostaf.

Furthermore, there is a data consistency problem for certain groups, which publish investment figures net of transfers conducted during the year.

Table 4
Comparison of the main economic indicators
Comparison 1983-88

(%)	European groups	European economy
Value-added	+ 7.3	+ 6.9
Wage bill	+ 6.1	+ 5.8
Investment	+ 13.2	+ 7.1
Employment	+ 1.5	+ 0.8
Value-added/worker	+ 6.6	+ 6.0
Wage bill/worker	+ 4.6	+ 4.9
Investment ratio (Invest./VA)	17.2	19.3

Source: Eurostaf/Eurostat.

As regards the comparison of growth rates from 1983 to 1988, the large European groups have registered a faster growth — for all indicators — than the economy as a whole.

Labour productivity, measured by the VA/worker ratio, went up by an average of 6.6%, as opposed to 6% for the Community. This is due to the quasi-stabilization of employment and the rapid growth of value-added (+ 7.3% for the groups).

Table 5
Importance of the groups within the EC economy

(%)	1983	1984	1985	1986	1987	1988
Value-added	5.8	6.2	6.1	6.0	6.2	6.2
Wage bill	7.9	8.0	8.0	8.1	8.1	8.0
Employment	6.2	6.1	6.2	6.5	6.5	6.3
Investments	4.4	5.0	5.6	5.8	5.8	5.9

Source: Eurostaf/Eurostat.

Moreover, the relative decline in labour costs, which grew by 6% only, meant a strong improvement in industrial margins during this period (27.1% in 1983, 33.7% in 1988), and in profits, whose share of turnover increased from 1.2% in 1983 to 4.2% in 1988.

Table 6
Key ratios of the top 70 European corporations

(%)	1983	1984	1985	1986	1987	1988
Investment/VA	14.9	15.7	17.6	18.4	18.1	18.7
VA/turnover	35.3	35.3	34.7	36.3	37.5	36.7
GOS/VA	27.1	31.5	31.3	30.4	32.5	33.7
Wage bill/turnover	25.7	24.2	23.9	25.3	25.3	24.3
Net result/turnover	1.2	1.8	2.4	2.9	3.7	4.2

Source: Eurostaf.

Finally, it is worth pointing out that, on average, the productivity of the groups is close to that of the Community: a 'group' employee produces ECU 33 260 per year, while a European employee in general produces ECU 33 950 a year.

On the other hand, average pay is much higher in the big corporations: the average annual salary is ECU 22 510, compared with ECU 17 700 in Europe. This is altogether logical, as industrial groups probably employ a higher number of managers and on the whole need more qualified staff.

Main changes in the sample between 1983 and 1988

In 1983 as in 1987, the top 70 European groups were among the top 280 companies in the world. Some 15 companies have disappeared from the ranking between 1983 and 1988, due to acquisitions or mergers, or because other companies grew at a higher rate.

Companies out

- Imperial Group
- Flick
- Reed International
- GKN
- Deutsche Babcock
- Tate and Lyle
- Boc
- Unigate
- Brenninkmeyer
- Rank Hovis
- Bowater
- Dunlop
- Reemtsma

Companies in

- STC
- Hanson
- Tabacallera
- Schneider
- Rolls Royce
- Pilkington
- L'Oréal
- Bouygues
- Trafalgar House
- Heineken
- Hillsdown
- Orkem
- Pirelli

Among the newcomers, it is worth noting the strong growth of the Hanson conglomerate, which now ranks 18th thanks to an active acquisition policy. Its average growth over the last five years has been 34%. Bouygues also registered high growth in its turnover, following various acquisitions (in particular SCREG). Schneider has undergone restructuring and has multiplied its consolidated turnover by six.

Aside from the above, the companies with the highest growth rates (over 15% a year) are Daimler

Benz, CGE, Olivetti, Hillsdown (+41% between 1983 and 1988), Guinness and Cockerill.

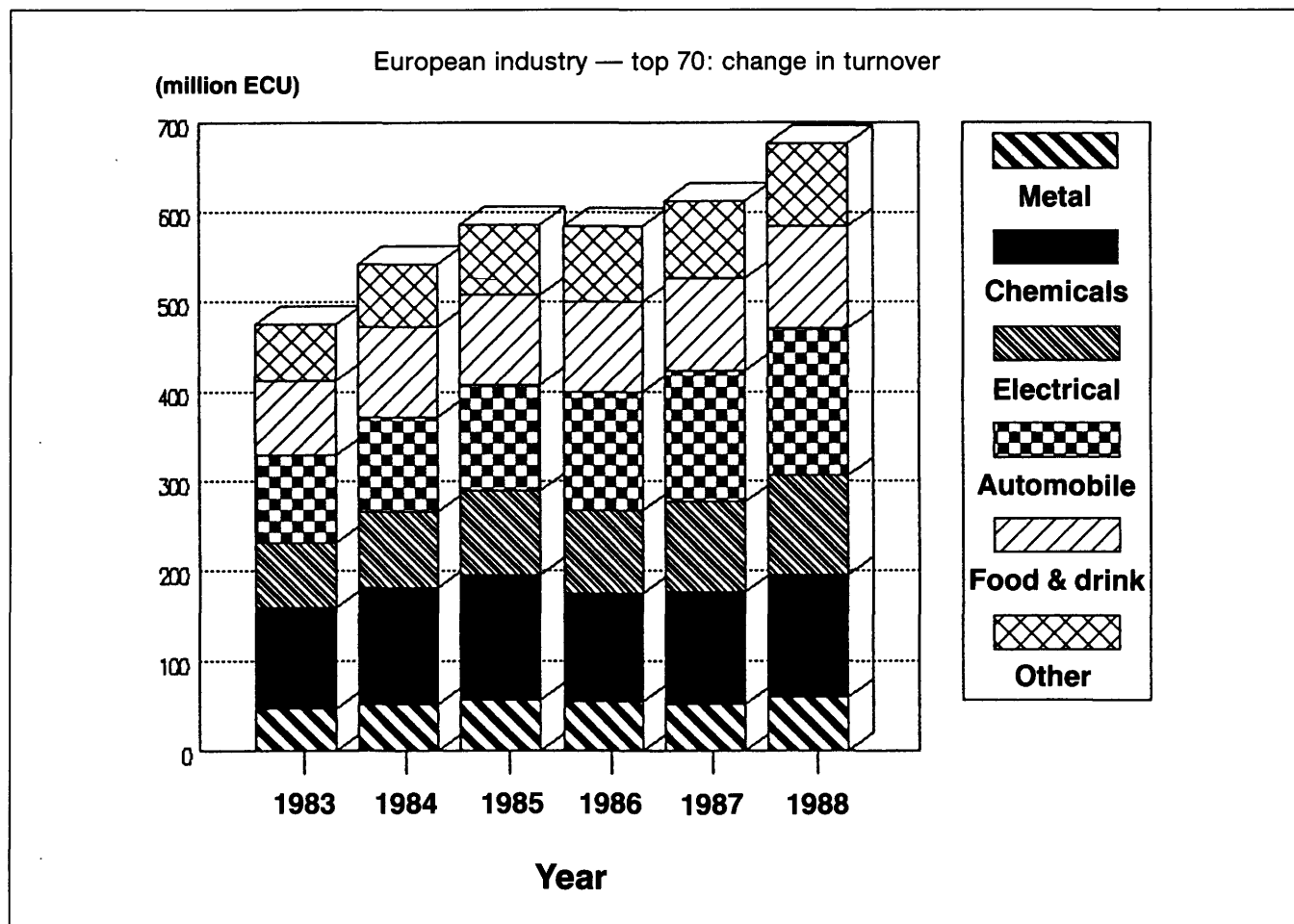
There have also been backslides in turnover between 1983 and 1987 at GEC, Krupp, Salzgitter, Rover, Thorn EMI, DSM, Courtaulds, ABF, Orkem, STC, Cadbury Schweppes.

These widely varying growth rates do not really follow any sectorial logic, but tend to reflect the different strategies pursued by groups in one and the same sector.

As to the top 50 companies in the world, the highest growth rates — in comparison with 1983 — have been registered by Daimler Benz (+17%), ATT (+24%), Philip Morris (+23%), Samsung Group (+22.6%), NEC (+29%), Mitsubishi Electric (+19%), CGE (+21%) and Digital Equipment (+22%).

Five groups registered a drop in their turnover between 1983 and 1987. These are: EI Du Pont de Nemours, United Technologies, Volvo, Dow Chemical and Mitsubishi Heavy Industries.

Figure 3



Analysis of the strategy of groups per sector of activity

The predominant sectors

1. The chemicals sector: Dominance of European firms

Importance of the EC in the world chemicals sector

The chemicals sector is one of the rare industrial sectors where there are no Japanese groups among the leaders. This sector is in fact dominated by European companies: seven of the world's top 10 are European companies, lead by the German troika (Bayer-Hoechst—BASF). Together, they have registered a turnover of USD 250 billion in 1987, i.e. a fourth of world chemistry, for a growth rate of 3.2% compared with only 2% for EC industry as a whole.

Three American companies are among the top 10, but their importance, in terms of turnover, has risen thanks to improved exports linked to the drop in the value of the dollar since 1986.

Development of the strategy of the groups

During the 1960s and up to the mid-1970s, the strategy of chemical groups was characterized by a will to increase production capacity. However, the recession of the 1970s meant a considerable reduction in the number of outlets, which compelled chemical corporations throughout the world to implement major restructuring operations, sometimes at the initiative of the government (especially in France and Italy), entailing:

- Exchanges of activities between groups, aimed at specialization and the size effect;
- Rationalization efforts: reducing employment and modernizing the production apparatus;
- Concentration and specialization of companies and sites of production.

The world economy has staged an important recovery since 1983/84, more or less substantial depending on the country. The consumption of chemical products has however recovered a high rate of growth nearly everywhere, and should continue rising rapidly at least until the beginning of the 1990s.

New competitors have also appeared on the world scene, often from South-East Asia, but also from

Brazil and the Middle East. Nevertheless, production is essentially still in the hands of American and European groups. In the economic wars that are waged, the fluctuations of the dollar often play the role of arbitrator:

- 1984-85: the rise of the dollar affected the competitiveness of American products, which lost market shares both in the domestic and foreign markets. American chemical corporations responded with comprehensive restructuring programmes aimed at increasing the profitability of their production apparatus.
- During this period, the turnover of the chemical industry registered high growth, as the growth of the turnover of the companies in our sample shows. Value-added registered a lower growth rate. In fact, the rise in the value of the dollar had an effect on the prices of raw materials, leading to a considerable rise in intermediate consumption of European chemical corporations. As a result, the value-added ratio dropped slightly in 1984 and 1985, and the net profit margin was reduced.
- 1986-87-88: initially, the rise of the American currency penalized the sales of European groups, whose turnover (calculated on our sample) dropped by more than 12% in 1986. Then, the drop of the dollar caused a drop in the prices of raw materials, enabling European chemical companies to increase their value-added ratio and their net profit margin in 1987 and 1988.
- Since 1986, the market share of American corporations has increased, and their turnover grew much faster than that of the European groups: in 1988, American chemical production went up by about 5%, and exports advanced by 9%.

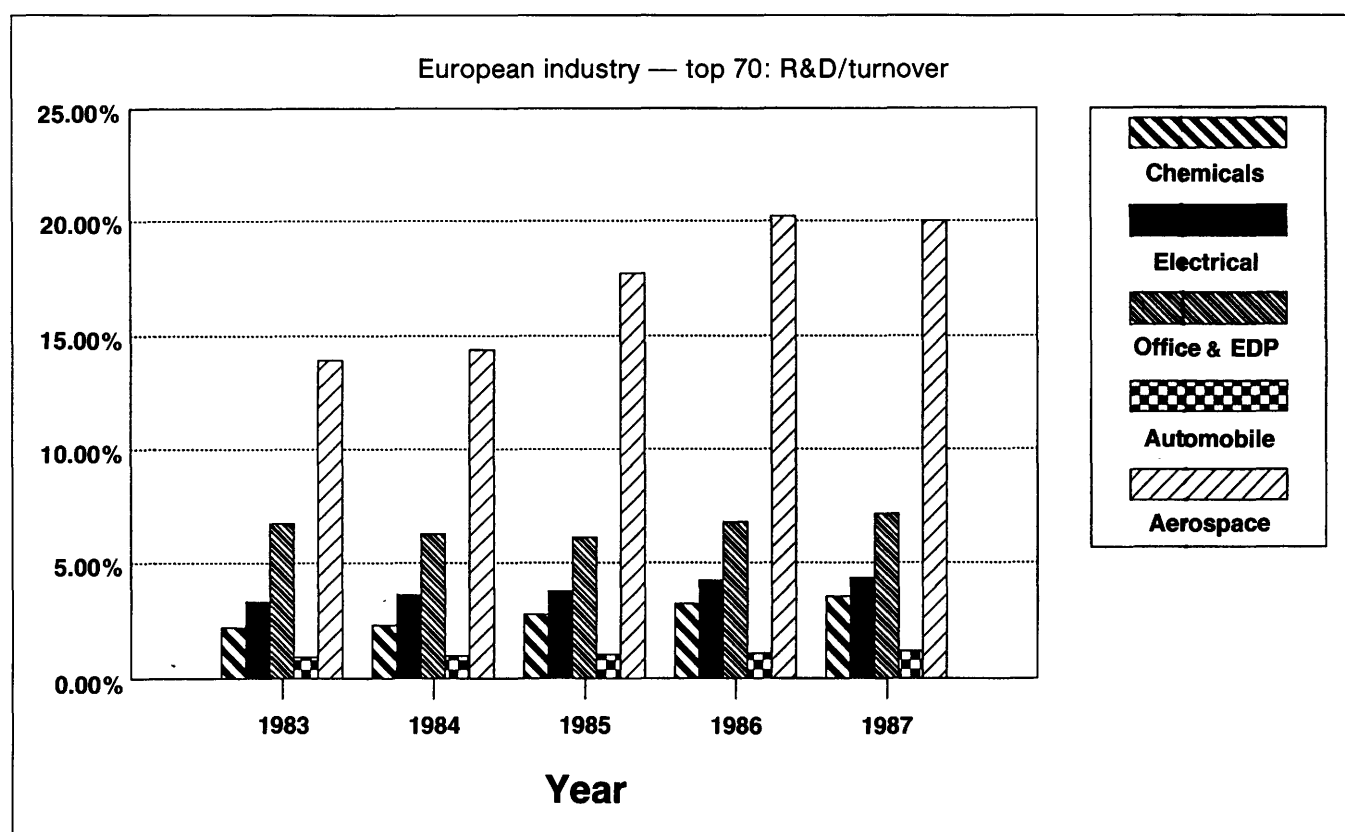
Main strategic directions

These positive results were obtained thanks to the implementation of cautious, pragmatic strategies that can be summarized in four points:

(a) Shift of activities to downstream chemical sectors

Activities relative to the first processing of raw materials, better known as 'basic chemicals' have entered a maturity phase, marked by considerable productive overcapacity levels and low market growth. On the other hand, the specialty chemicals sector is registering a high growth rate and certain sectors, such as pharmacy for example, are yielding a considerable value-added.

Figure 4



As a result, most corporations are investing relatively little in basic chemicals and are concentrating their resources on expanding their activities in specialty chemicals.

(b) Search for new niches in high-tech chemicals

Biotechnologies, composite materials, technical plastics, etc. are sectors registering high growth rates. Thanks to ever increasing and intensive research efforts and the acquisition of small companies already present in these niches, the major European chemical corporations are trying to integrate these activities in their product portfolios.

(c) Continuation of efforts to improve the profitability of the production apparatus:

- Rationalization of production methods, particularly in basic chemicals; modernization, reduction of labour force, etc.
- Specialization and (geographic and sectoral) concentration of production sites.
- Disengagement from not very profitable sectors, such as fertilizers, which are suffering from too much competition from Eastern European countries.

(d) Penetration of foreign markets to obtain new opportunities for growth

This is particularly important for groups with an insufficient local market. In the mid-1980s, European corporations increased their presence in North America — the world's number one market — through acquisitions of local companies and exports (acquisitions by European corporations in the chemicals sector jumped from 125 in 1985 to 371 in 1986).

Nevertheless, in 1987 and 1988, American corporations reinforced their presence in Europe, taking advantage of renewed profitability and greater exports.

Asian countries, especially those of the Far East which are growing at a rapid rate, constitute a new target for European and American corporations which have concluded a considerable number of joint-venture agreements with local companies these last three years.

The means

The improved market share of American corporations is not due exclusively to the drop in the value of the dollar:

- Research and development efforts are more intensive in the USA than in Europe; despite the fact that it has made progress, the average

R&D/turnover ratio hardly exceeds 2% in Europe; it is more than 5% in the USA;

- After considerable increases in 1985, investments by European chemical corporations declined in 1986 and 1987, both in value and as a percentage of turnover. On the other hand, American chemical corporations increased their rate of investment during this same period.

In fact, European groups have allocated their cash flow to the reimbursement of their debts and to external growth. As a result, the production apparatus has tended to age, which could weigh on long-term profitability.

Consequently, we can anticipate a reinforcement of the American presence in Europe in the next few years, unless European chemical corporations take more risks with their investment policies.

2. The automobile industry: improved productivity and shift in focus

Since the end of the 1960s, the world automobile industry has been in a transition phase as regards the characteristics of production and the structure of competition.

The supply conditions were upset by the timing in the development of needs (a slowdown of demand, differentiation demand) and on the global over-competitiveness of Japanese car makers.

Technology (in terms of product and process) is becoming a major trump in the competition struggle. It constitutes a reply to new regulatory restrictions (environment), but must also make it possible to improve substantially the efficiency of the industrial apparatus.

In the world rankings of the automobile industry, the top European manufacturer is the Volkswagen group (in fourth place), with three other major car manufacturers (Fiat, PSA, Renault) being in sixth, eighth and ninth position respectively.

Specialized car manufacturers (Daimler Benz, BMW) are characterized by smaller production runs, but of up-market vehicles.

Since 1980, European car manufacturers have implemented adjustment strategies which have enabled them to capitalize fully on the regular growth of the market since 1985 (see table on the development of value-added from 1984 to 1988).

Restructuring programmes

These ambitious modernization programmes implemented from 1978 to 1983 led — in the wake of the second oil crisis — to overcapacity levels estimated at 2.5 million units in 1979. In 1983, the annual losses of the companies considered in the sample totalled ECU 356 million.

Daimler Benz and BMW registered considerably better results, thanks especially to the growth of their sales in the United States. Their net profit margins remained stable for the period, i.e. comparable to those of the previous decade. Sustained by their brand image and the quality of their products, they continued to hire and to invest.

The major car manufacturers, on the other hand, had to lower their cost-effectiveness margin and to improve both productivity and profitability, in a much more competitive European market.

Although implemented at different times, their policies all consisted of an effort to reduce jobs and to slow down investment. By harmonizing the conditions of production, these adjustments tend to define a European competitiveness standard (see the table on VA/worker).

Fiat initiated the movement and regained profitability as of 1982, followed by PSA (profitable again in 1985) and Renault (in 1987). Rover, the industrial and commercial validity of which is largely dependent on its cooperation with Honda, reduced its losses following drastic cuts in jobs and investments. Yet productivity remains low.

Only Volkswagen did not proceed with changes of this type. Yet, insufficient productivity and profitability have recently compelled the group to reduce its labour force.

Reconcentration strategies

Whereas Japanese companies have been accelerating their internationalization efforts since 1983, general European car manufacturers have been concentrating on the European market.

Fiat and PSA have reduced their extra-European ambitions. Volkswagen concluded an agreement with Ford to maintain its presence in South America and withdrew from the North American market in 1988, one year after Renault (transfer of AMC to Chrysler).

This fallback concerns the range of activities as well. Renault and Volkswagen have gone through with a

number of transfers and disengagements to concentrate on their basic product lines.

Like Fiat, PSA is developing an equipment structure.

On the other hand, Daimler Benz has embarked on an ambitious diversification policy in electronics and aeronautics, a conglomerate-type strategy similar to that of General Motors.

The European automobile industry remains vulnerable

The policies pursued have enabled most European car manufacturers to regain satisfactory levels of profitability and investment.

But industrial performance levels remain insufficient when compared with Japanese and even American standards, particularly as regards productivity, product quality, stocks and the speed with which models are renewed.

The stability and homogeneity of market entry conditions should, as of 1993, accelerate the Japanese relocation in Europe and could lead to overcapacity.

The current trend is more intense competition on all market segments.

The pressure on European car manufacturers to constantly search for ways to improve productivity and quality will continue.

3. Electrical and electronic engineering: in search of world agreements

If we take into consideration the ranking (see that of the *Nouvel Economiste*) of the main world corporations in this field for both 1987 and 1983, we note that:

- electrical and electronics companies of all nationalities combined 'advanced' vigorously in the overall ranking. Thus, in 1983, the 10th electrical engineering corporation (Samsung — South Korea) was ranked 88th overall, whereas in 1987, the last one (i.e. the Japanese NEC corporation) was only 42nd;
- in terms of global weight in the total turnover of electrical engineering corporations, the European groups have maintained a stable share of the total (27% both in 1987 and in 1983), whereas American corporations are in sharp decline (26% in 1987 compared with 35% in 1983) and Asian corporations in rapid expansion (47% of turnover in 1987, as opposed to nearly 38% in 1983);
- in terms of net margin (net result/turnover), the European corporations registered a slight

improvement in 1987 compared with 1983; US companies recorded a slight decline, though they maintained the highest profit rate (more than 6%); and Asian companies scored clear improvements in their performance levels (1.9% compared with 1% in 1983);

- as regards European groups, the three corporations (Siemens, Philips and CGE) which were ranked in 1983 are still there in 1987.

Analysis of the strategy of electrical and electronics corporations

In general, and especially in Europe, the electronics industry cannot be dissociated from the electrical industry because the top electronics firms such as Philips, Siemens or CGE are also the most important electrical corporations.

Faced with general economic difficulties and keen competition, especially from Japan, in the late 1970s and early 1980s, these firms which had already embarked on a major technological changeover based on electronics, developed a strategy between 1983 and 1987 that can be summarized as follows:

- Focusing on activities considered as their 'basic lines';
- Reinforcing their presence abroad, either through external growth operations or through cooperation agreements, one of the basic aims being to 'produce in dollars what we sell in dollars'.

Most of the groups in the sample were concerned with reconcentration movements. Closer scrutiny, however, reveals both common and different points in the strategies of the three main leaders: Philips and CGE both disengaged from what were deemed non-strategic activities (e.g. cable activities for Philips, transferred in 1986, or the manufacture of diesel engines or low-tension gear by CGE).

Concurrently, these firms reinforced their potential in consumer electronics (Philips) and in communication and information industries (CGE).

Siemens, whose turnover remained remarkably stable over the period 1983 to 1988, did not have to make drastic reinvestments in its portfolio of activities; the three groups invested in their strategic niche par excellence, i.e. active electronic components.

The internationalization trend is generally on the rise, with one priority: the US market, where the leading European groups have acquired or are in the process of acquiring strong positions. The most important transactions include, by way of illustration, the recent agreement between Philips and Whirlpool, which holds 27% of the North American market in heavy electrical appliances, and the CGE/ITT agreement, which has enabled CGE to increase its presence in different European countries quite substantially, and to a lesser degree in the United States.

Analysis of the financial results

This sector is characterized by a high degree of technology which implies that the products have a particularly high value-added content (more than 40%).

The turnover of the nine corporations considered in the sample grew by an annual average of 9.1%. Productivity gains, measured by the VA/workers ratio (+6.3%) are marginally less than the average for all groups in the sample (+6.6%) and marginally greater than the average figure for the economy as a whole (+6.0%).

This improvement has made it possible to increase industrial investments, (an increase which is necessary if growth is to be sustained) and to raise net profit margins from 2.1 to 3.2%.

Compared with the American and Japanese groups, the Europeans are far behind the United States: on average, American companies have recorded net margins of close to 7% in 1987; on the other hand, European companies achieved much better results in Europe than Japanese companies.

As in the case of the food and drink sector, this difference in profitability explains the attempt made by European companies to internationalize, and expand in the United States.

4. The food and drink industry: growing internationalization

Beginning in 1982, and continuing still today, very important upheavals have reshaped the world food and drink industry. The wave of mergers and acquisitions first hit the American market before propagating to Europe.

Restructuring programmes were developed from two types of groups:

- Conglomerates (Hillsdown Holdings, Hanson, Beatrice);

- Groups geared towards specialty markets, who are either seeking to refocus their activities, or seeking product complementarity or geographic markets in accordance with an industrial and organizational logic (BSN, Ferruzzi, RJR Nabisco, Philip Morris).

Thus, regional at first, the strategy of the corporations has been internationalize, and the food market itself has become international. The major groups have sought to compensate the absence of natural growth through diversification operations.

The food and drink groups have become extremely sensitive and fragile as a result of erratic developments in raw material prices and exchange rates. This partly explains the strategic choice of attenuating the effect of these constraints by going international (whence the distribution of risks linked to parity changes) or in gravitating towards downstream products. This strategy can be quantified from a financial point of view by looking at the trend in this sector's value-added.

International protagonists have therefore become more numerous in this sector, and have increased their size significantly in order to exceed 'critical' dimension. An indicative development is that a quarter of the US food and drink companies have been subject to mergers or acquisitions during this period.

Growing internationalization

This worldwide restructuring took place in the following framework:

- British firms, which have a considerable weight in the sample, have sought to expand further on a UK/USA axis (Hanson, Grand Metropolitan, Dalgety). Some of them, like Hillsdown Holdings, have limited themselves to the British market and internationalized only a little. Diversifications inside Europe are rare.
- The other European groups first conquered their own territory, and only these last few years did some of them expand — through external growth — on the American market (Unilever — Cheeseborough Ponds; Grand Metropolitan — Heublein; Cadbury-Schweppes — Canada Dry; Perrier — Eaux Minérales US. The trend of the geographic breakdown of turnover shows an increase of the US share in the turnover of the main European groups as of 1985.
- The North American groups are without doubt the most internationalized: Philip Morris, Coca-Cola

and Pepsi-Cola, Seagram and Nabisco have increased their presence on the European continent. The importance of American companies (in terms of both size and profit) constitutes an obstacle to the penetration of European companies in the US market, while at the same time weakening the European food industry's position on its own market.

The strategic axes

The groups have generally chosen one of two major strategies: a product strategy and an acquisition strategy. In the former case, expansion is based on a brand or a leading product (Coca-Cola, Perrier, Orangina, Marlboro, etc.). The strategy is identical throughout the world; the brand name is used as a banner which gradually confers a dominant position to the company.

On the other hand the acquisition strategy consists of obtaining very rapidly a significant market share in a high number of products. This notion of 'acquiring a market share' explains the very high amount of transactions registered in the food industry (the purchasing price of the company ranging between 30 and 40 times the profits).

The company realignments that we have witnessed these last few years are marked by a reconcentration movement and/or an attempt to become integrated in the food industry. Thus, negotiators (Cargill, Berisford) took interest in the preliminary transformation of the products that they then market (grain — milling trade, cattle — slaughtering and the meat industry).

In the transformation sector, on the other hand, groups are geared towards a major reconcentration movement: ABF is transferring its distribution activities, Unilever is abandoning its peripheral activities and expanding its product line, Seagram is withdrawing from table wines and exploring the up-market segment (e.g. acquisition of Martell). The tobacco industries (Philip Morris, Tabacallera) are beginning to diversify in the food and drink sector and going international, due to lack of growth prospects on their initial market.

All of these operations are headed in one direction: that of increasing value-added and searching growth vectors.

Financial performances

The sample of the top 70 European corporations includes 13 companies from the food and drink

sector, which account for 15% of the total turnover. The average annual growth of the turnover is +4.9%. This is one of the most modest rates, and is explained as follows:

- Unlike their American counterparts, the European corporations have not resorted to external growth very much, but tended towards reconcentration;
- The food and drink market is characterized by low natural growth, due to demographic trends. By way of comparison, since 1983 Philip Morris has been growing at an annual rate of 20%, as has RJR Nabisco (before being acquired by KKR) (+18%).

The value-added has increased slightly over the entire period to stabilize at around 30% of the turnover.

Because of lower labour costs than in other sectors — a little more than ECU 20 000 per year/per employee — the industrial margin (gross operating surplus/value-added) is very high: 42% in 1987.

Thus, in so far as this industry is not among the most capital-intensive sectors (investments only represent 20% of the value-added), the net result of the food and drink sector since 1983 has been rising substantially. The net margin has now stabilized at more than 6% and thus exceeds that of the European chemicals sector, which averaged 4% in 1987.

The European food industry may thus soon match the net margins of the major North American corporations: Kraft (about 6%), Philip Morris (7%), Seagram (nearly 12%, taking into account revenues from the investment of Dupont de Nemours) and RJR Nabisco (more than 8%).

5. Metallurgy: the bright spot of European companies

Steel, the lame duck of European industry since the beginning of the 1973 recession, has been undergoing an exceptional regeneration since 1985. Proof: a net profit margin (calculated on our sample) of 2.3% as opposed to -3% in 1983.

It should however be pointed out that American and Japanese competitors are in a similar situation. The weight of the latter in world steel production remains important: among the top 10 steel corporations in the world, five are Japanese and four are from the EEC (Thyssen (2), Usinor-Sacilor (3), Krupp (5) and British Steel (10)); the first American — Bethlehem Steel — is only 11th.

From recession to collapse

According to our sample, in 1984 the European steel industry lost nearly ECU 1.3 billion, which nevertheless constitutes an improvement compared with previous years. The situation of Japanese and American steel industries was hardly any more enviable. The reason for the collapse of the steel industry in the industrialized countries is linked to the recession of the 1970s, but also to inappropriate measures taken by companies and governments.

● Cyclical factors

The economic recession of the 1970s caused a severe contraction in traditional outlets for the steel industry (BTP, automobile, machinery and many other types of equipment). Furthermore, the appearance of substitution products (such as plastics, for example) contributed to a drop in consumption. Finally, new competitors from newly industrialized countries surfaced in the mid-1970s and rapidly won market shares thanks to greater competitiveness linked to the use of more modern equipment and cheaper labour.

● Structural factors

Wage rigidities in most industrialized countries and the old age of the capital stock in the USA and in Europe aggravated the economic crisis in the steel industry. US steel producers for instance refused to modernize their equipment in the beginning of the 1970s; the French did so, however, but refused for social reasons to close certain (older) production sites.

European governments turned the situation from bad to worse, by sustaining an unprofitable industry that was moreover technologically inefficient. The restructuring that had been necessary all along was finally decided and implemented toward the end of the 1970s, and during the 1980s:

- drastic cuts in employment: 129 000 jobs were lost in Japan between 1974 and 1981, and 250 000 in Europe between 1980 and 1987;
- increased concentration in industry, with the closure of less profitable units, through mergers and acquisitions, often dictated by the national governments, at least in Europe;
- search for higher profitability, through the modernization of the production apparatus.

State intervention in the restructuring of the steel industry was crucial in Europe. Massive subsidies, later turned into own capital, enabled groups such as Usinor-Sacilor, British Steel and Cockerill-Sambre

to get over financial difficulties that no other private sector company would have been able to survive.

The new look of the European steel industry

The modernization of the European steel industry continued throughout the decade, with a doubling of investment, and should continue in the years to come.

Production capacities in Europe, which fell by 32 million tonnes over the eight-year period considered, should be reduced further according to European experts, especially for long products. Existing rationalization and modernization projects will reduce employment further, by about 80 000 to 90 000 persons. A reduction in production capacity is also envisaged in Japan (up to 50% of the present capacity), and in the United States, which should also lead to further job losses there.

In 1988, the European steel industry thus appears to be a modern industry, with a good productivity level which partly explains the good performance of this sector in 1988. Value-added per worker increased from ECU 26 290 in 1983 to ECU 42 100 in 1988, and the rate of value-added exceeded 30% in 1988, which compares with a figure of 25.9% in 1983.

The restructuring efforts were accompanied by quality improvements and the development of new products, which also explains the rise in the value-added ratio and in selling prices.

The modernization effort appears to be a common feature of all steel producers. Over the last couple of years, differences in the strategic orientation of firms started to appear: several groups decided to diversify in order to avoid the negative implications of a new fall in demand on the market, as happened in 1974.

This strategy has been followed by nearly all the Japanese groups, and further diversification by these groups is likely to take place in the coming years. Examples of this are the joint ventures between Nippon Steel and IBM-Japan, of Kawasaki and Harris or the acquisition of Arrow Tool by Kobe Steel.

Several US groups have also chosen to diversify: in 1981, US Steel launched a bid for Marathon Oil.

In Europe, the German groups are the only groups who have, historically, become active in other sectors; 23% only of Krupp's turnover and 37% of Thyssen's turnover originates from the steel sector.

On the other hand, most of the other European corporations tended to reconcentrate their activities by abandoning downstream sectors. These groups — British Steel, Usinor-Sacilor, Cockerill-Sambre — are currently attempting to merge certain activities in view of operating on a wider scale within the context of the European market: e.g. the agreements between Usinor-Sacilor and Cockerill-Sambre and with the Italian firm Riva or between Arbed from Luxembourg and Unimétal from France.

The 1987-88 improvement: cyclical or structural recovery?

The exceptional results of 1988 are explained to a large extent by the recovery of the profit margin as of 1986, itself linked to a very clear progression in value-added. There is no doubt that these figures are the concrete results of efforts under way for some 15 years now to modernize the European steel industry.

Nevertheless, we should underscore that, since 1987 and especially in 1988, the steel industry has enjoyed more than favourable economic conditions: world steel consumption grew at an exceptional rate, rising from 740 to 780 million tonnes in a single year.

This rise is chiefly due to the growth of the sector's main customers such as the automobile industry, BTP and capital goods, especially in Japan, which in 1987 launched an exceptional public works programme.

In 1988, apparent consumption went up by 13% in Japan, by 5% in the United States and by 8% in the EC (Source: IISI, 15% according to PPA). The strong recovery of demand, which required plants to run at full capacity, has led to logical rises in selling prices. Considerable efforts to rationalize and modernize facilities have made it possible to slow down the rise of production costs, at least in the EC and Japan. These two factors have enabled producers to register sizeable profit margins.

Product quality requirements on the market have become stricter. Moreover, competition from South-East Asian manufacturers is surely going to grow thanks to the impetus that internal consumption gives to their growth. Given their low production costs, European, American and Japanese products are likely to be threatened.

A few newly industrialized countries with heavy debt burdens are going to increase their production capacity even more, with a view to exporting larger quantities of mass products.

The other industries

1. Aerospace: narrow margins requiring alliances

The aeronautics and aerospace industry is a high-tech sector in which the public sector plays an important role through military orders and different types of subsidization.

In terms of production, the United States dominates the aeronautics market with more than two-thirds of the world production in 1987; EC countries account for nearly 30%. These proportions are practically the same in the aerospace sector.

World market trends

The 1980s were marked by a trend reversal.

In the beginning of the decade of the 1980s, the share of outlets in the United States was growing fast (thanks to the boom in military spending) while at the same time the civil aeronautics market was in a deep recession. In 1970, the share of civil aeronautics amounted to 32%, compared with 56% for the military.

In other words, the share of outlets provided by governments (military and space aeronautics) accounted for about 70%. The recession that hit the civil market corresponded to the end of the fleet renewal by airlines.

Since the mid-1980s the military market has virtually stagnated, due to budgetary restrictions and a drop of exports as a result of the economic difficulties of Third World and oil-producing countries (debt, drop in the prices of raw materials).

At the same time, the civil market is staging a strong recovery due to the increase in air traffic and the need to renew airline fleets. The share of civil activity should thus increase substantially during the next few years.

During the same period, the distribution of production by geographic zones has changed substantially:

- Between 1980 and 1985, the share of the United States rose considerably thanks to bigger military credits, while the share of Europe remained stable;
- Since 1985, the share of the United States has tended to diminish to the benefit of European countries and Japan. In Europe, strong recovery in production was registered in the United Kingdom and the Federal Republic of Germany,

with annual growth rates of +16% and +11% respectively from 1985 to 1987.

In terms of foreign trade in civil aeronautics equipment, we should point out that the EC is the number one supplier of the United States (more than 50% of American imports), whereas about one fourth of the imports of the EC come from the United States, with the balance favouring the latter none the less.

The advancement of European countries in the world aeronautics market is linked especially to the development of alliances and agreements of a particular form.

The strategic dimension of agreements and alliances in the sector

The size of outlays needed for the development of technologies in the aerospace sector, their stakes and strategic impact have led companies to conclude agreements with external partners and to alliances between competitors.

Governments intervene on a more or less massive scale to promote technological development (which guarantees national independence and the economic development of the country); and corporations are the main beneficiaries of this intervention for the financing of research and/or public orders.

This is the case of Airbus, the development of which was financed in part by the different countries concerned. On average, the total research and development of European companies in the sector amounts to 20% of turnover, 7% of which is self-financed.

For American corporations, the total research and development effort represents nearly 17%, 4% of which is financed by the companies themselves.

The area where the role of the State is most clear-cut is weapons, and this in turn explains the often greater margins of military sector activities, compared with civilian programmes.

But the strategic role of technology in the development and growth of companies also leads to a plethora of alliances aiming for the joint development of products or technologies.

In Europe, this type of alliance in research and development comes on top of a common industrialization policy, where the State plays a pivotal role. This type of agreement addresses two problems:

- European companies are often too small because of the small size of national markets, compared with the United States;

- The will of governments to preserve national independence has led to an overcapacity of production in Europe.

Alliances provide two solutions:

- Fixed development costs too heavy to be borne by one country are shared;
- The market is expanded: the competitive market extends to the world, the internal market now being the whole of the EC.

The example of Airbus-Industrie, which brings together Aérospatiale (France), MBB via Deutsche Airbus (Germany), British Aerospace (United Kingdom) and Casa (Spain), is a good illustration of this strategy. Nevertheless, this alliance can be further strengthened by transatlantic agreements, as is the case for the engines (Snecma (France) and General Electric (USA) in CFM International) or for certain components of Airbus (Textron with British Aerospace and with MBB for the development of components for the A-330/340).

Thus, a new industrial network is coming into being, with a network of alliances which is placing greater competition pressure on independent manufacturers.

The same applies to the space industry: Ariespace acts as chief contractor for Ariane launchers and negotiates contracts with seven companies (Aérospatiale, the Société Européenne de Propulsion, MBB-Erno, Matra, Contraves, Air Liquide and Santa-BPD) which subcontract part of the production to companies located in the participating countries (Belgium, Denmark, Spain, France, Netherlands, Italy, Germany, United Kingdom, Sweden and Switzerland). This distribution leads to a specialization that eventually limits competition among these companies.

Specialization may be one of the problems of the alliance, because it may lead to a loss of skill on the parts entrusted to partners, and thus to a strategic problem when the alliance is broken.

One solution to this dilemma is the presence of several alliances: for example, Aérospatiale has developed the ATR with Aeritalia outside the framework of Airbus Industrie, enabling the firm to maintain its expertise and to design and produce an entire plane.

Main financial characteristics

The consolidated turnover of the European aerospace industry accounted for ECU 35 850 million in

1987, putting Europe in second place behind the United States (about ECU 95 billion) which represents a third of world production.

During the period from 1983 to 1987, the average annual growth rate of the European consolidated turnover was 8.5%, which reflects high growth between 1984 and 1986 (between 9 and 10% per year) and a slowdown in 1987 (+ 7%). The difference between these growth rates and the development of the turnover of our sample is explained by the composition of the latter, which includes the four major European manufacturers, namely British Aerospace, Aérospatiale, MBB and Rolls Royce.

The value-added ratio (VA/turnover) of the sample averaged 40% for the period from 1983 to 1987, with the European average around 45% and the American average at 42.5%.

We should note the high labour costs in relation to value-added — a characteristic feature of the sector, which is explained by the importance of research and development.

In terms of apparent productivity, Europe and the United States obtained comparable results in the period under review (1983-87): value-added was 1.3 to 1.4 times the labour costs.

Total investment financed by the companies themselves (compared to the turnover) is higher in Europe than in the United States — due to a size-effect. Inside Europe, the relative research and development effort which is self-financed was highest in France during this period.

The low net margin of the sample at the end of the period is explained by the drop of the dollar which had an effect on the sales of Airbus, since three quarters of the companies considered in the sample are members of GIE.

At world level, the profitability of the European groups is lower than that of their American counterparts, the latter benefiting from a large internal market and particularly big orders from the government.

2. Machinery (plants and equipment)

This is a sector shared nearly equally by the Europeans, the Americans and the Japanese: Mitsubishi Heavy Industries is the current world leader, but there are four Europeans among the top 10 corporations in the world: Mannesmann (second), MAN (fourth) BTR (fifth) and Schneider (ninth) which we

have classified in the electrical industry in our sample.

The American groups hold the sixth and tenth positions (Caterpillar and Deere).

The recovery of industrial growth in developed countries stimulated this sector, which feared a drop in orders from oil-producing nations short of cash.

The market expanded rapidly in the United States — the largest market in the world — before 1985, thanks to the industrial growth policy launched by President Reagan.

Japan and Europe followed suit, so that production is expected to be multiplied sixfold between 1981 and 1990.

The turnover of European companies grew considerably (29.4% between 1983 and 1987) despite a levelling off in 1987. The value-added ratio has grown rapidly since 1985, exceeding the 40% mark in 1987.

As a result, the net margin of European groups has increased even more (2.06% in 1987), although it remains at a sizeably lower level than the average of European industry (3.77% in 1987).

The Europeans are pursuing a policy of intensive investments (the investment/value-added ratio has grown constantly since 1985, and is at 22.3% clearly above the European average): this should enable them to capitalize on the current industrial growth.

3. The EDP industry

This is undeniably the sector where European groups are least present, whereas the American groups have managed to preserve their leading position, although the Japanese appear to be in good position.

The world industry is dominated by one giant, IBM, with an annual turnover of ECU 43 billion, whereas its competitors Digital Equipment (USA), Unisys (USA), Fujitsu (Japan), Nippon Electric (Japan) and Hitachi (Japan) each generate a turnover of about ECU 7 billion.

The first European group, Siemens, is only in seventh place. Olivetti and STC (which constitute our 'EDP' sample) are 10th and 20th respectively in the world.

For some years now, the microcomputer market has made considerable headway to the detriment of minicomputers. The big systems sector is the exclu-

sive domain of IBM. Manufacturers in South-East Asia have opted for the micro segment, churning out PC clones at low prices, and registering exceptional growth rates.

As a result, IBM has withdrawn from this market, and Apple has regained its leading position with a net margin of 9.8% and a turnover of ECU 2.6 billion.

The small market share of the European groups is certainly due to the fact that they have not been able nor capable of attaining the critical size that would enable them to compete with the Americans and Japanese on an equal footing. A study published by OSI (Observatoire des Stratégies Industrielles) blames the European governments for this error, as they insisted on developing — for political reasons — national manufacturers in the 1960s and 1970s, counter to the 'European' spirit of the 1980s.

Then, in order to catch up, European companies had to form alliances with foreign manufacturers (Bull with NEC and Honeywell, Olivetti with ATT, Siemens and ICL with Fujitsu), and have developed relatively few links between them.

Consequently, turnover has been stagnating since 1985, the value-added ratio has dropped from 50 to 42% in five years, and investment has slowed down since 1984.

These results are all the more serious as demand rises faster in Europe than in the United States, and it is the Americans and the Japanese who are increasing their market shares.

The question looming is whether the opening of the European market will lead to a concentration of this sector — something which seems necessary if these groups are to survive.

4. The tyre industry

This industry is characterized by the dense concentration of world market shares in the hands of a small number of mainly European, Japanese and North American manufacturers: Thus, 85% of the world turnover is generated by six companies: one American, Goodyear (the world leader with 19% of the market), two Japanese, Bridgestone/Firestone and Sumitomo/Dunlop (with 16.6% and 6.5% of the market) and three European, Michelin, Pirelli/Armstrong and Continental/General Tyre (with 18.2%, 5.9% and 7.8% respectively).

The tyre industry went through a difficult period in the early 1980s due to the relatively slow growth of

the automobile industry, which meant negative results for European manufacturers.

Numerous restructuring operations were undertaken during the first half of the 1980s (cuts in jobs and production capacities, rationalization of working methods) that enabled the industry to regain its productivity: Our sample shows in fact that the value-added/workers ratio went from ECU 25 000 in 1983 to ECU 31 490 in 1987. (We should point out that for the tyre sector, the sample includes Michelin and Pirelli. In 1987, Continental — before the merger with General Tyre — was not listed among the European top 70).

Furthermore, economic conditions throughout the world improved considerably during this period, with a growth recovery in the automobile industry, especially in the USA, where sales went from 8.7 million vehicles in 1982 to more than 12 million in 1985 and 1986.

This gave a new impetus to tyre sales, and manufacturers in Europe saw their profit margin go from -2.99% in 1983 to +4.32% in 1987.

Nevertheless, the difficulties the industry went through between 1980 and 1985 led to the disappearance of small and medium-sized manufacturers. In fact, realizing that they were positioned in a low growth sector, the major corporations adopted concentration strategies with a view to:

- achieving economies of scale thanks to the synergic effects produced by mergers with other groups;
- ensuring their presence on new markets through the acquisition of companies already present on these markets.

Thus, numerous American companies were absorbed by European and Japanese groups: Firestone by Bridgestone, Armstrong by Pirelli, General Tyre by Continental, etc. Even the Japanese market was opened to imports under pressure from Washington, and American exports to South Korea jumped by 86.8% in one year.

Investments by the big world corporations also advanced sizeably these last three years. The European groups, where the industrial investment/value-added ratio went from 12.35% in 1983 to 15.03% in 1987, are planning to build production sites in Third World countries where labour costs are low.

The globalization of the tyre industry should continue in the next few years, with more massive

investments in Third World countries, especially in the Asia—Pacific zone. The opening of the European market is not expected to cause profound changes in the strategy of European groups, as they are already widely diversified (geographically) inside and outside Europe.

In the future, experts expect demand to stagnate, and this will surely mean more intense competition. To meet this challenge, corporations will proceed with new operations of concentration, geographic diversification and an increase in their research and modernization efforts.

Conclusions

Since the beginning of the 1980s, European groups have achieved considerably improved results in all sectors of activity. Rising value-added, improved productivity through redundancies, investment efforts financed primarily by the companies themselves, and an increase in net results are the four keystones of the strategy of European corporations in relation to their direct competitors, i.e. American and Japanese companies.

Most European markets are faced with the same restrictions: lack-lustre markets and increasingly high barriers to entry due to new factors relative to the competitiveness of companies, i.e. industrial investments, research and development and marketing.

Efforts deployed by groups have consisted primarily in rationalizing the production apparatus. The new efficiency has in turn enabled market leaders to raise cash (investment securities, banks), which have fanned the fearful stock exchange battles these last few years.

A few groups have none the less preferred to pursue a debt-repayment strategy, one particularly appropriate in light of the fact that real interest rates in Western economies have been high for several years now.

Among the sectors which improved their position, the following have done so exceptionally:

- the food and drink sector, the privileged ground for mergers and acquisitions these last few years;
- the automobile industry, which has recycled its cash into industrial investments and equity;
- the chemical industry which has tended to repay its debts and grow through acquisitions.

European corporations at a turning point?

Many industrialists think that today the major industrial restructuring operations have been completed; this study assesses the efforts made by these corporations these last few years to improve their commercial and financial situation. Once these objectives have been reached, what directions will these groups take given that the single market is nearing completion?

First of all, there remains a profitability differential between European and American firms which will have to be reduced further. In relation to Japanese firms, the commercial aggressiveness of which can be quantified (which incidentally seems have a detrimental effect on their financial results), there are no big distortions in terms of financial results. There is then the crucial question of the motor of growth: the good results of these last few years are explained by a sustained industrial demand, which has in fact surprised a number of experts. Prospects for a recession are still there and introduce a risk to the forecast even in the medium term.

As regards growth, however, Europe can take advantage of a new opportunity, namely outlets in Eastern European countries. It has all the assets from the political point of view; it merely needs to translate them quickly into economic terms and actions.

The reconcentration policy is probably going to be replaced by a phase geared somewhat more towards internal management. More specifically, groups which have experienced abrupt changes are going to have to 'digest' their new acquisitions.

There is no guarantee that all will succeed in this endeavour, as the interactivity effects sought do not always turn out for the best.

Finally, acquisition strategies, which have become riskier as prices have gone up, should be replaced by a period of alliances, the latter constituting the pendant of the acquisitions and merger policy.

These alliances have already appeared in the European chemical industry (pooling means of production) and in the Japanese automobile sector (transfer of production costs to newly industrialized countries), while the most significant example in Europe is the aerospace sector, where this strategy has been pursued with success.

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CHARACTERISTICS AND STRUCTURE OF THE EXTERNAL INDUSTRIAL TRADE OF THE EC MEMBER STATES

Introduction

This chapter presents an overview of the external trade of the European Community during the period 1980-87. The analysis is presented in four parts:

- (1) Structure of world trade,
- (2) Structure of EC trade with the world,
- (3) Patterns of trade specialization of the EC Member States,
- (4) Competitiveness of the EC in the world market.

Structure of world trade, 1980-87

Although the EC is by far the world's largest trading region, accounting for some 36.5% of total world trade in 1986, its share of world trade has recently decreased as a result of a faster rate of growth of exports of several non-oil-exporting developing countries, and even some developed countries, among which Japan. Japanese exports grew consistently faster than world exports until 1985, most of these exports being directed to the US market. The USA ranked as the world's second fastest-growing exporter in the early 1980s, but their exports have shown a much more cyclical pattern. The USA's share of world exports is furthermore comparatively small. Figure 1 presents an overview of the structure of world exports by major trading regions, and shows the actual and projected changes in this structure over time. The regions shown in Figure 1 are the following:

- NA: North America
- EU: Western Europe (including the 12 EC countries)
- AS: Pacific Rim (Japan, Australia, New Zealand)
- FE: Far East Asia
- CH: China
- IS: India

- AFR: Africa (including the Middle East)
- LA: Latin America

Though Europe, and, within it, the EC, are major trading regions, a substantial share of the trade takes place within the region itself. The share of intra-EC trade for instance represents 58% of the total trade of the individual Member States. Thus, this overall picture has to be slightly modified when the EC is considered as one single market, as in Figures 2 and 3, which compare the structure of OECD exports by major regions when intra-European trade is respectively included or excluded.

Below, we will analyse in more detail the structure of the EC's trade with the rest of the world by looking at the past trends in the exports and imports of different product groups and trying to identify the main factors behind these trends.

Within the EC, however, as will be mentioned on several occasions throughout this book, the share of production in given sectors sometimes varies significantly from one Member State to the next. Differences in the structure of employment, in levels of training, geographical or climatic conditions, as well as cultural and historical factors are some of the reasons which explain why the share of production of the different sectors in total GDP is not the same everywhere in Europe. Similarly, the share of production of a given sector that is exported often varies across Member States. The third part of this study will thus focus on the trade specialization patterns between Member States, in an attempt to identify the comparative advantages of individual countries in certain branches, and explain why some countries are systematically running large trade deficits for some product categories, and large surpluses for others.

The fourth part of the study summarizes the analysis and provides an indication of future trends in world trade, based on an analysis of price competitiveness, both on a historical and on a forecast basis.

Figure 1

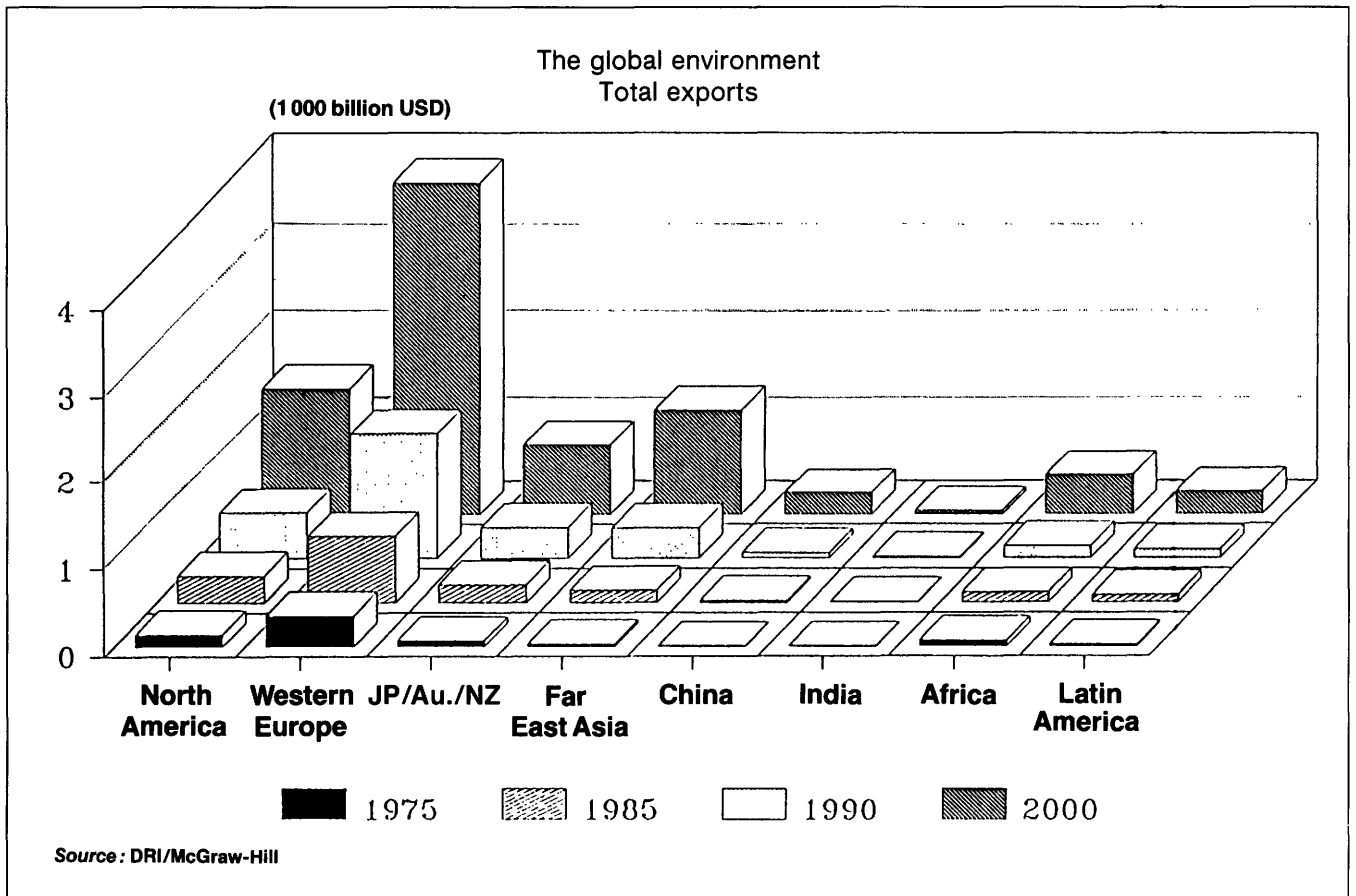
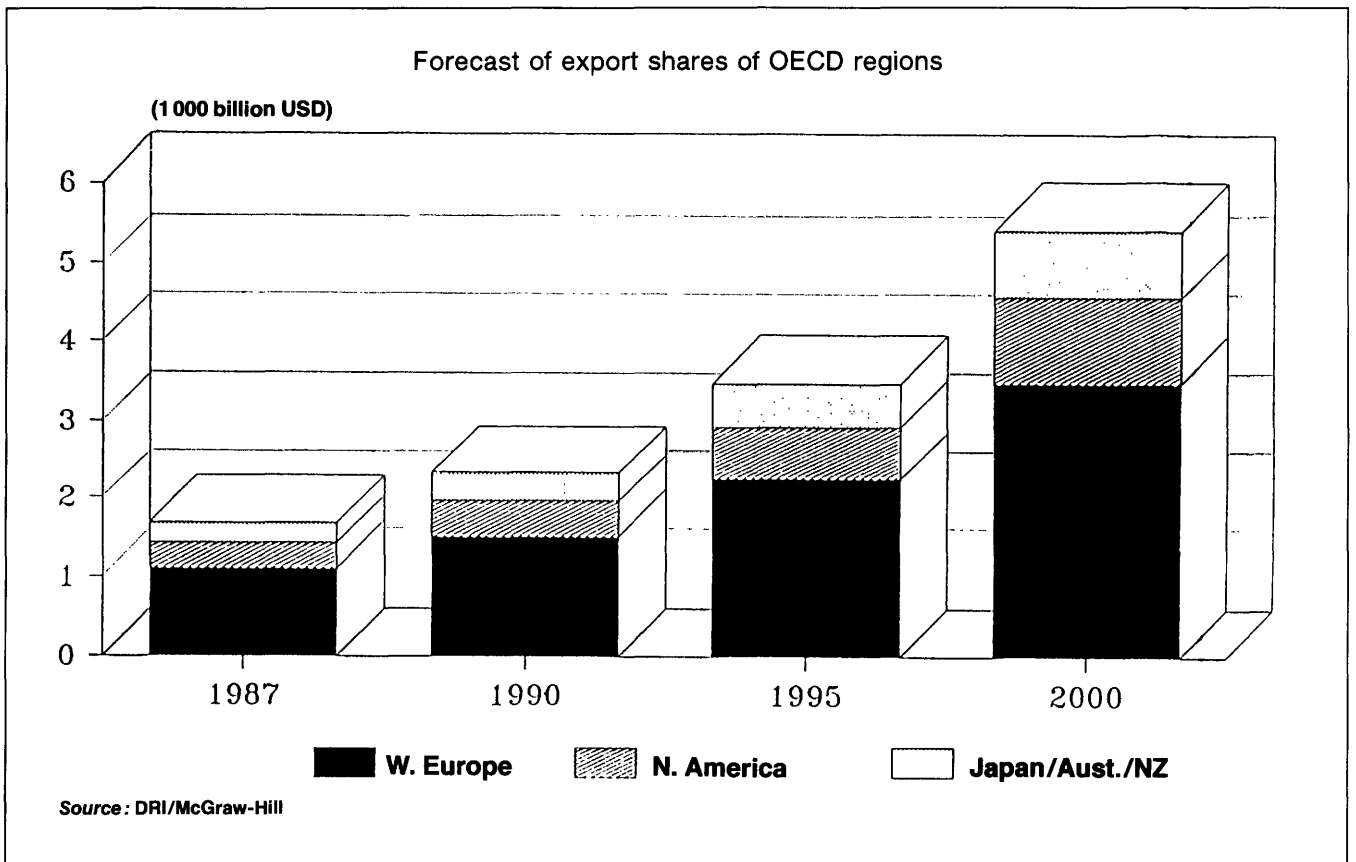


Figure 2



Structure of EC trade with the rest of the world

EC trade by region

Figure 4 provides an overview of the evolution of total EC trade with the rest of the world between 1980 and 1987. For this analysis, we have chosen to look at the major trading partners of the EC, namely the USA, Japan, the newly industrialized countries (NICs), and the rest of the world aggregated (ROW).

EC exports to the USA increased by 160% in value during 1980-87, compared to an increase in EC imports from the USA of only 21%. As we will see later, this remarkable improvement in the trade performance of the EC with the USA has enabled the EC's trade balance to move from a deficit with the US to a surplus during these eight years.

With Japan, the EC's trade situation has worsened somewhat, but the relevant trade volumes are still significantly lower than with the USA.

Import volumes from the NICs are even smaller, but the nominal balance of trade has remained virtually constant during the period 1980-87.

Trade with the ROW (excluding the EC countries) remains brisk, but these trade volumes are still small when compared with the value of trade between EC Member States. Imports during the period increased by 57% while exports to the ROW increased by only 38%. This increase was however sufficient to maintain the healthy trade surplus which existed in 1980.

Major changes in the structure of EC imports from the combined extra-EC regions during 1980-87 include a 6% decrease in the share of imports originating in the USA, and a 5% increase in the share of imports from Japan. NIC and ROW shares of EC imports were virtually the same in 1987 as in 1980. With respect to EC exports to extra-EC regions, the most significant 1980-87 changes are a rise in the share of exports to the USA from 12 to 20%, and a fall in the share of exports to the ROW from 82 to 72%.

EC trade by product

Figure 5 presents the evolution of total EC trade by product, all regions combined (including the EC countries). In general, we have selected for this analysis the six product categories which are most heavily traded.

Among imports, we see a weakening in EC imports of ores/metals, whose share of total EC imports decreased from 11 to 7% between 1980 and 1987. Meanwhile, notable increases in imports by the EC occurred in electronic products and motor vehicles, the former moving from 8 to 10% of imports, and the latter from 7 to 10% of imports during 1980-87.

With respect to exports from the EC to all regions combined, the greatest changes in the export structure occurred in the same three sectors as for imports, and in the same directions, although in the case of exports these changes were less severe. For example, motor vehicle exports increased from 10 to 12% of EC exports during 1980-87.

EC trade structure

In figure 4, we have divided overall EC trade into trade among Member States of the EC ('intra-EC trade') and trade between all Member States as an entity and the rest of the world ('extra-EC trade'). In order to provide a useful analysis of the characteristics and structure of EC trade, we first compare intra-EC trade with extra-EC trade, and then with the trade structure of the other regions under consideration.

Comparison of extra-EC with intra-EC trade

Relative trade values

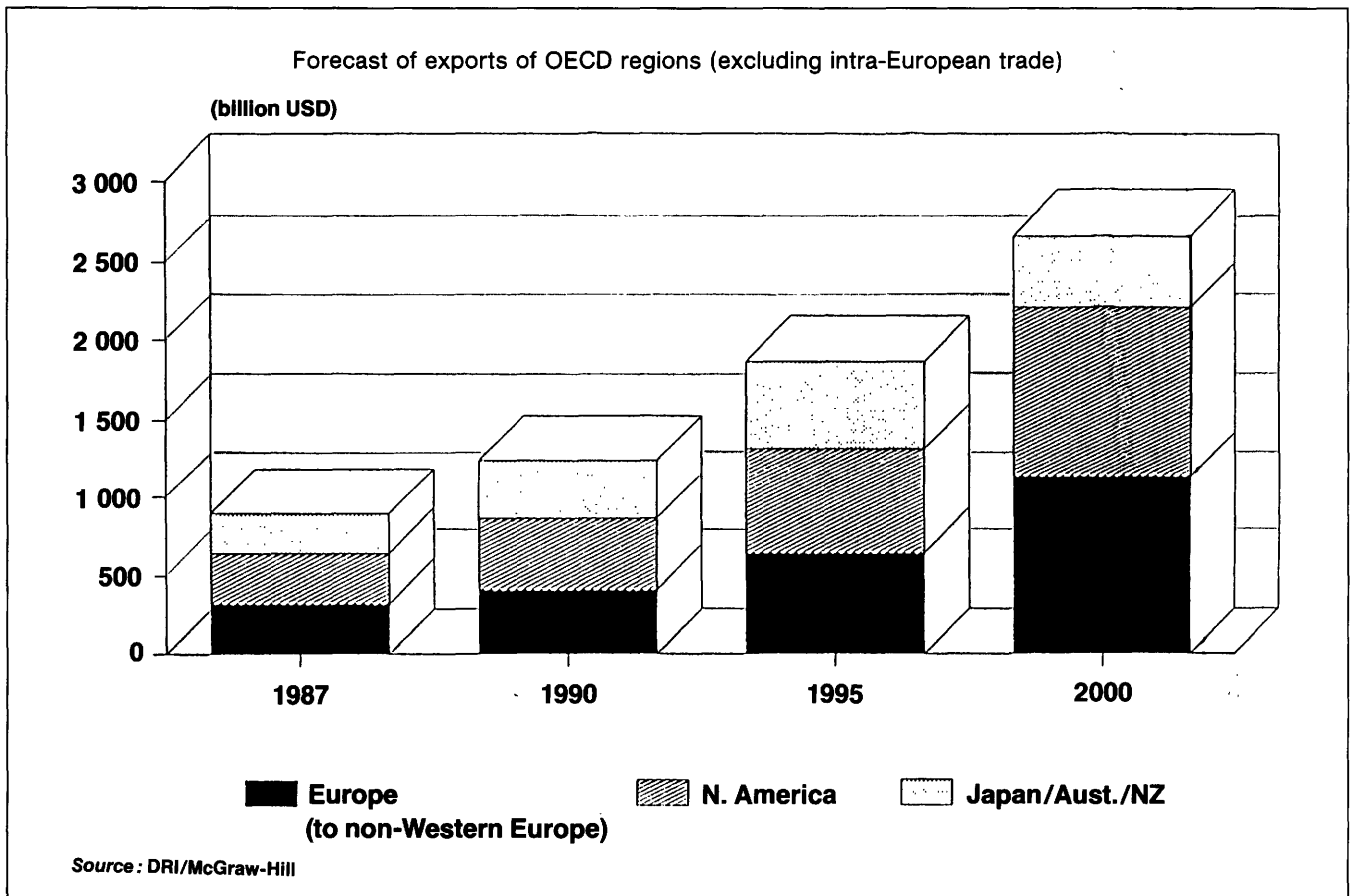
As shown in Figure 6, more trade is handled within the EC than with the rest of the world in nearly all significant product categories. The notable exception is agricultural and industrial machinery, of which the EC exports significantly more (46% more in 1980, 27% more in 1987) outside the EC than it trades among member countries.

Even in this category however the gap between intra and extra-EC trade has decreased considerably during the 1980-87 period. Another interesting category is agricultural products, of which trade among the EC countries roughly equalled EC imports in 1987, whereas in 1980 substantially more (69% more) were imported from outside the EC than were traded within. This confirms the fact that the common agricultural policy has encouraged intra-Community trade, as had already been observed in other studies (Jacquemin, A. and Sapir, A., *Intra-EC trade: a sectorial analysis*, Centre for European Policy Studies, Brussels, 1987).

Relative product shares

Another conclusion to be drawn from Figure 6 is the already high and still increasing dependence of EC

Figure 3



countries upon trade with each other: between 1980 and 1987, the share of intra-EC trade has risen from 58 to 61% for imports, and from 55 to 58% for exports.

The left side of Figure 6, however, indicates that no particular sectors are responsible for this increased dependence. Between 1980 and 1987, only the ores/metals sector changed its share of intra-EC trade substantially — a decrease of 4%. The motor vehicles share of intra-EC trade increased by 2%, and agricultural machinery and electrical equipment each changed by 1%. On the other hand, overall intra-EC trade increased in value by 81% during this period, compared to a nominal increase of only 56% for extra-EC trade.

Key components of extra-EC trade include agricultural products, whose share of overall imports by the EC fell from 15 to 10% between 1980 and 1987. The share of ores/metals imports fell from 12 to 8%, while electrical equipment imports rose from 8 to 13% of extra-EC imports. These trends partly reflect the fact that agricultural products and ores/metals have a lower elasticity to economic activity than products such as electrical equipment (i.e. a 1% growth in the EC's GDP requires a greater rise of

electrical products than of ores/metals or agricultural products).

The share of ores/metals in EC exports to extra-EC regions fell by 3 percentage points between 1980 and 1987, while the relative export share of electrical equipment increased by 2%. We will nevertheless see that these trends did not take place in a uniform way, since there have been major shifts in the relative importance of the EC's usual supply/export markets.

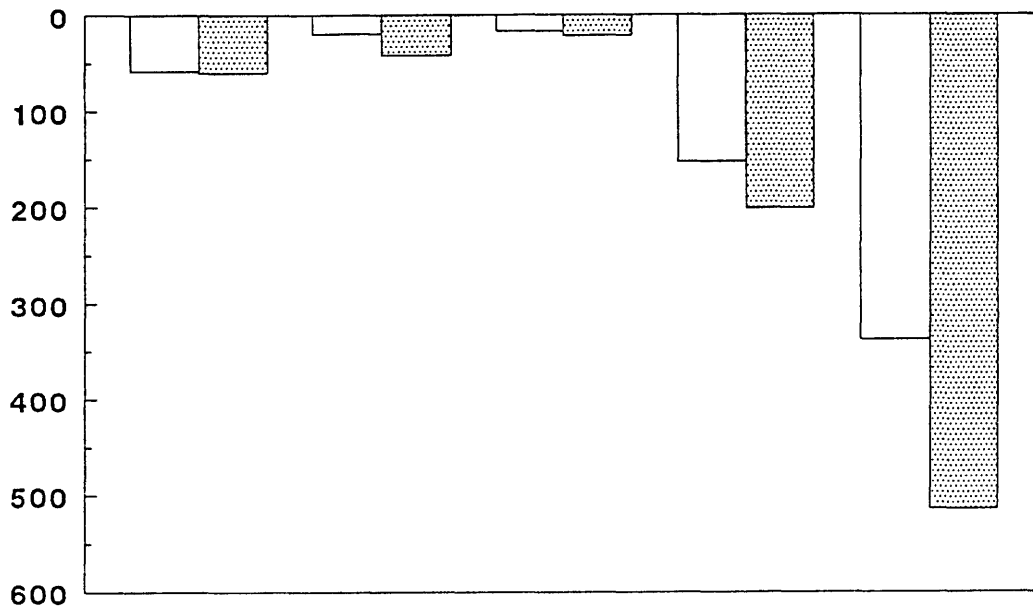
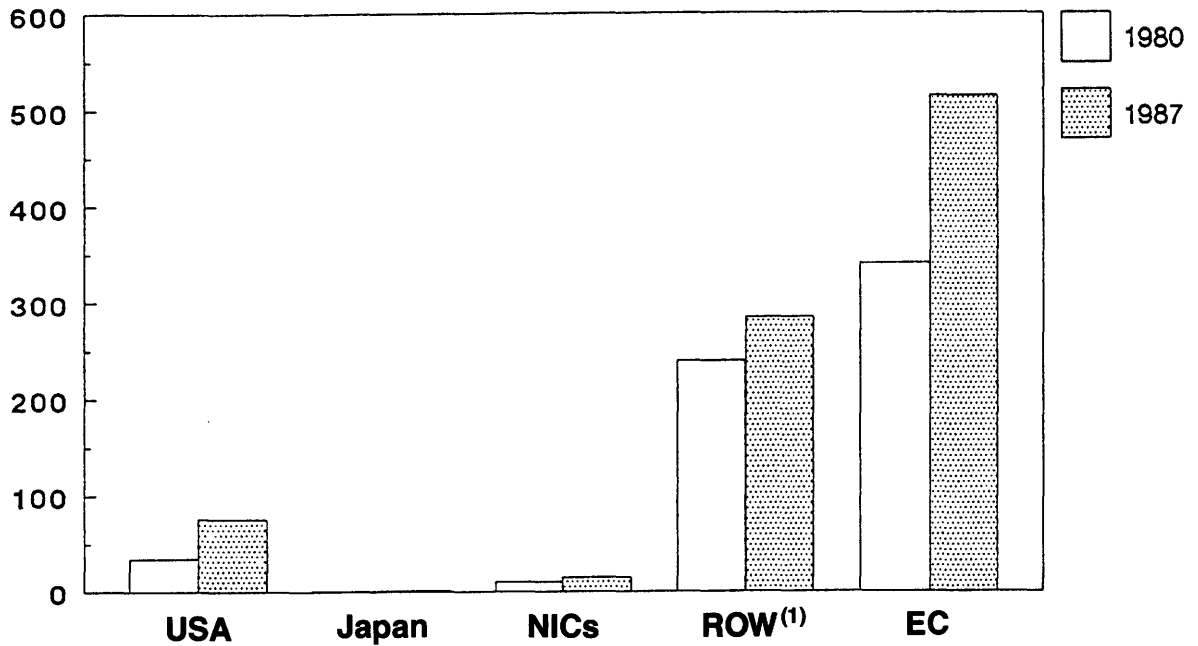
Key products traded

In 1980, the dominant product among intra-EC trade was chemicals (15%), with ores/metals and agricultural/industrial machinery tied in second place (11%). In 1987 chemicals were still at the top (15%), but with vehicles solidly in second place (12%). The high specialization of the EC in chemicals, and in particular in pharmaceuticals exports is a recurrent phenomenon throughout this study. As we will see later, in the discussion on the trends in the EC's external competitiveness, pharmaceuticals is one of the areas in which EC countries are highly competitive.

Figure 4

EC imports and exports by region
(billion current USD, 1980-87)

Exports to



Imports from

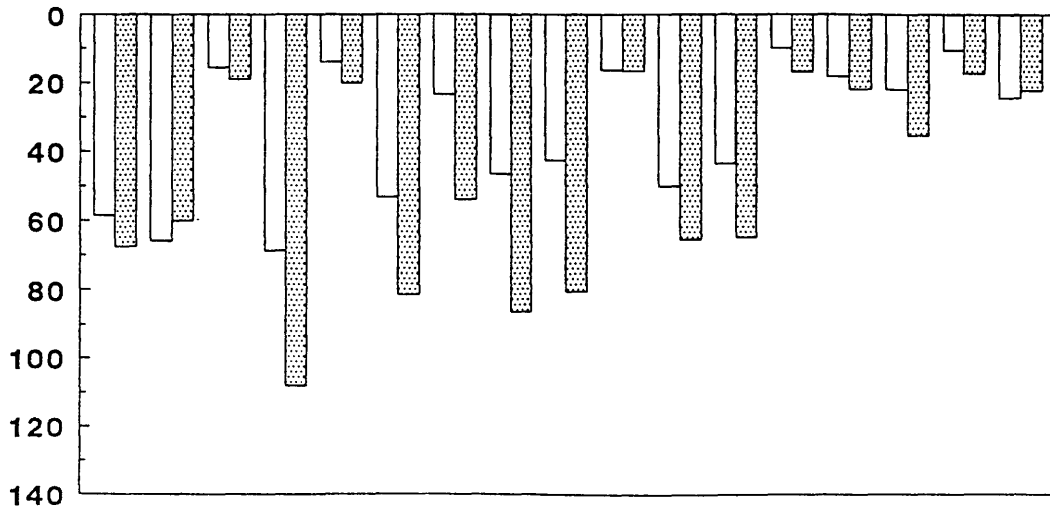
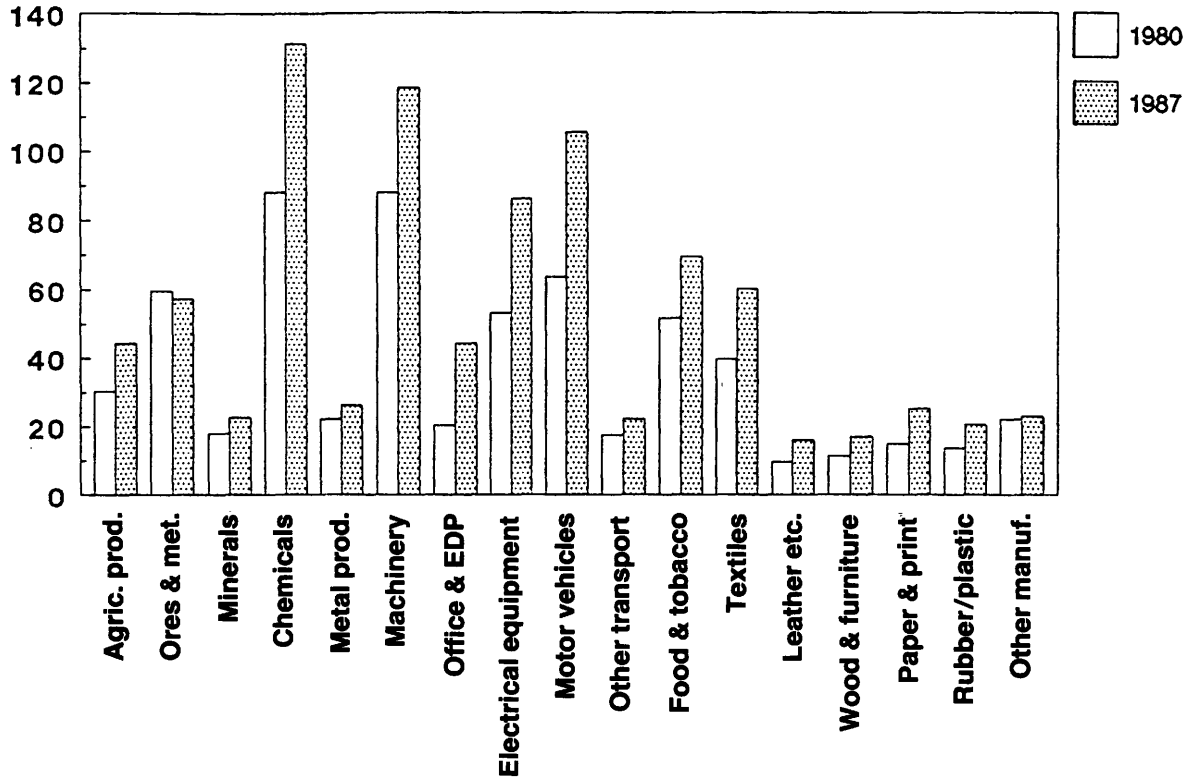
⁽¹⁾ROW=Rest of the world

Source: Volimex, DRI Europe.

Figure 5

EC imports and exports by product
(million current USD, 1980-87)

Exports



Imports

Source : Volimex, DRI Europe.

Figure 6

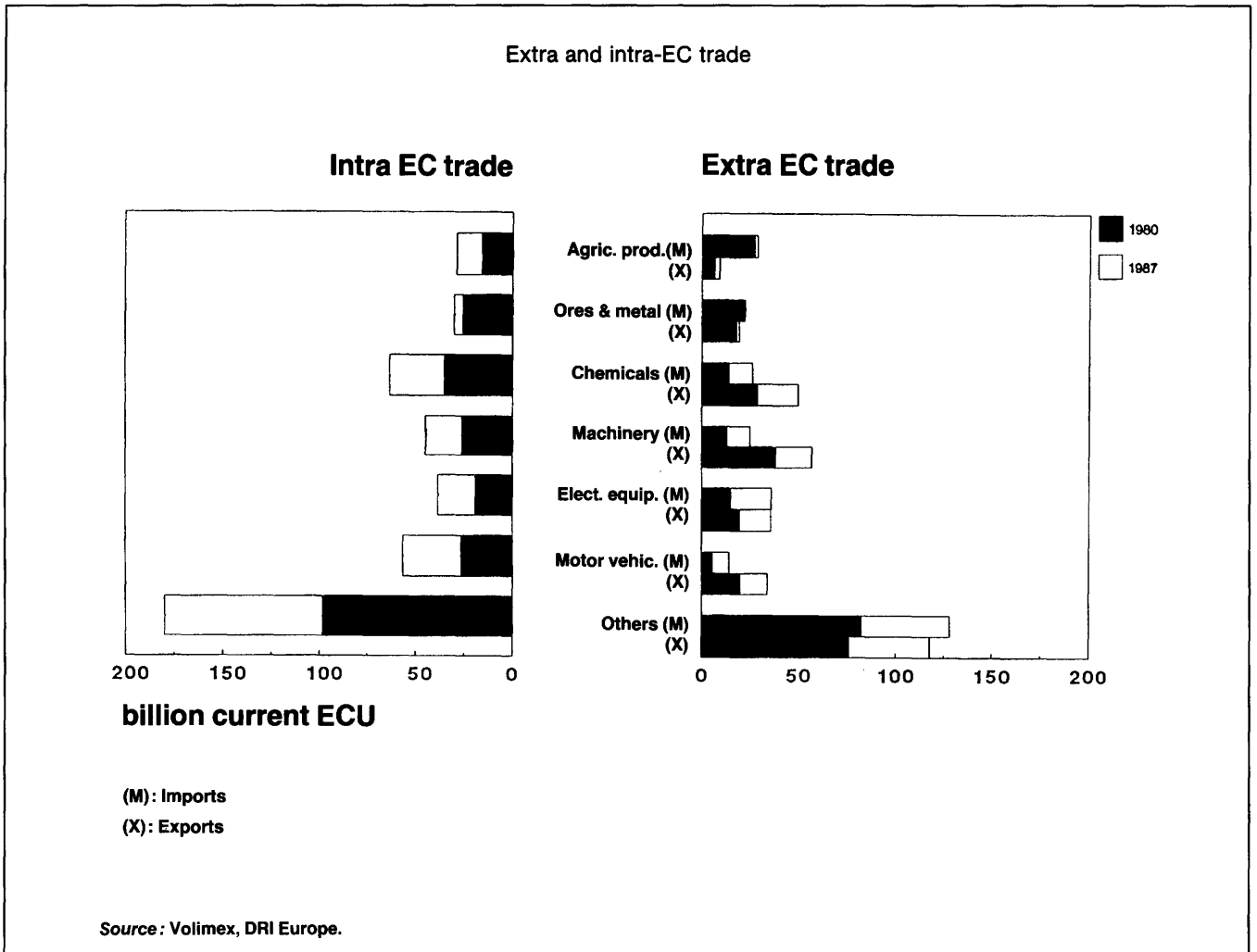


Figure 7

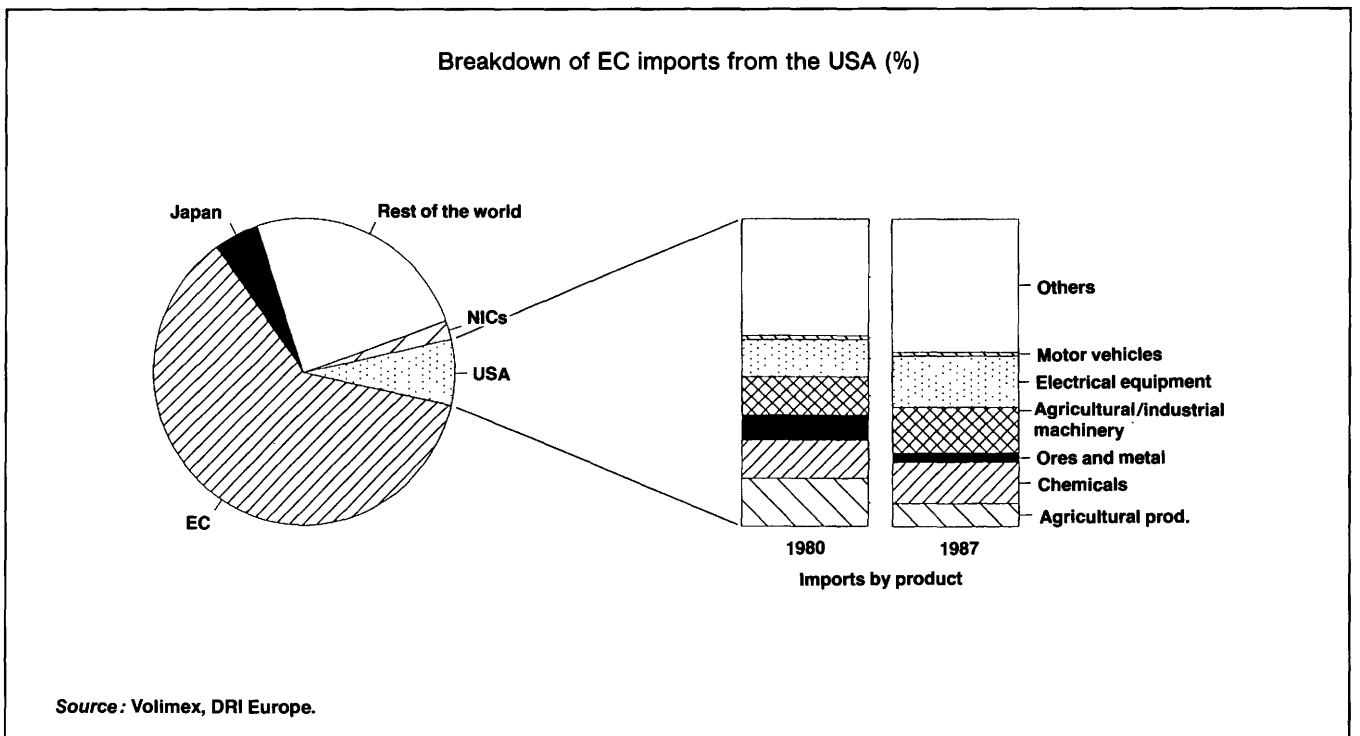
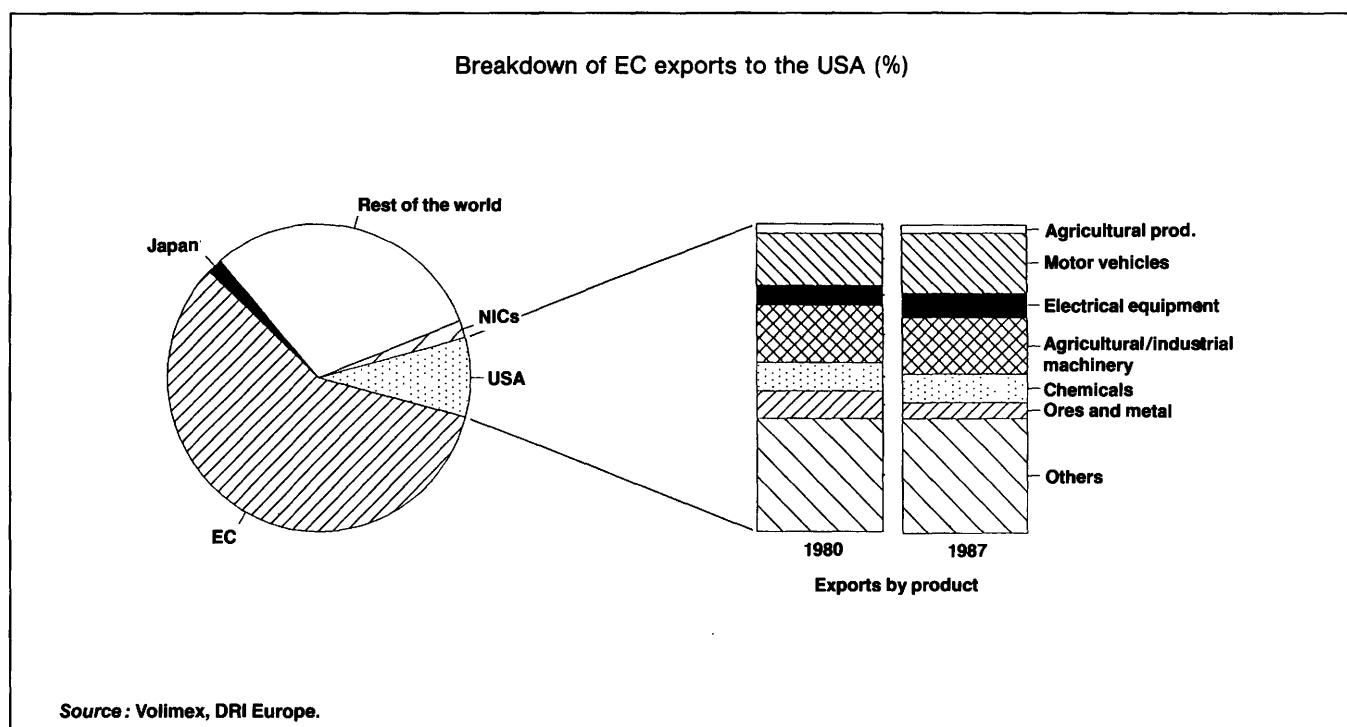


Figure 8



With respect to extra-EC trade, in 1980 agricultural equipment (15%) and ores/metals (12%) dominated imports; by 1987, electrical equipment (13%) was at the top, and agricultural equipment (10%) was second.

With respect to EC exports to extra-EC regions, in 1980 agricultural/industrial machinery (19%) and chemicals (14%) led all exports. By 1987 the same two sectors were still responsible for 33% of extra-EC exports.

EC trade with the USA

Key products traded

Key products imported from the USA by the EC in 1980 included agricultural products (15% of imports from the USA), agricultural/industrial machinery (13%), chemical products (13%) and electrical equipment (12%) (see Figure 7). By 1987, the share of electrical equipment had risen to 17%, and agricultural/industrial machinery to 15% but the share of agricultural products shrank by half. During the same period, total EC imports from the USA increased by 23% in nominal terms.

Among exports to the USA from the EC in 1980 (Figure 8), agricultural/industrial machinery comprised 18%, and motor vehicles 17%. By 1987, exports to the USA had risen by 160% in nominal terms, of which motor vehicles comprised 19%, and agricultural/industrial machinery 18%.

Trade shares of specific products

No particular product accounts for the EC's remarkable performance in stemming import growth from the USA between 1980 and 1987. While imports of agricultural goods and ores/metals showed the most evident (nominal and real) declines, it is more likely that the gradual relaxing of trade restrictions in the USA, as well as the deleterious (to the USA) trade effects of the rise in the value of the dollar from 1982-85, and general efforts throughout the EC to stimulate the private sector, supported the EC's overall trade performance demonstrably.

Likewise among exports, most production sectors performed equally well in 1987 relative to their results in 1980. Their shares of EC exports to the USA remained roughly the same.

EC trade with Japan

It is more difficult to find a general single explanation to the changing structure of the EC's trade with Japan than it is for the trade between the EC and the USA, since movements between product categories are more heterogeneous; changes in exchange rates seem to have had a less immediate effect than in the case of the USA. The real effective exchange rate of the ecu relative to the Japanese yen fell considerably between 1980 and 1985 (by nearly 30%), but subsequently rose by 40.9% between 1985 and 1988. The EC sectors that are exposed to competition from

Japanese producers, both on the domestic and on foreign markets, were thus put under considerable pressure by these large fluctuations in exchange rates. The degree to which EC producers were able to respond to the resulting large changes in competitiveness varied across sectors, as illustrated below.

Figures 9 and 10 show the evolution of EC trade with Japan between 1980 and 1987. Trade values of most products are much smaller than those for trade with the USA, except in the case of imports of electrical products and motor vehicles. (In 1980 the EC imported about ECU 1.5 billion more of electrical products from the USA than from Japan. In 1987 this situation has however been reversed).

In the automobile industry, the EC has been importing more motor vehicles from Japan than from the USA — about ECU 2 billion more in 1980, and ECU 7 billion more by 1987. However, this situation is due more to the magnitude of the long-term US commitment (read 'investment') to vehicle manufacturing within the EC countries than to factors such as exchange rate parities. Thus, while 'American' vehicles have long been produced in Europe, Japan has come to this strategy only recently.

Besides motor vehicles, two product categories dominated EC imports from Japan, both in 1980 and in 1987: electrical equipment, and agricultural/industrial machinery. In 1980, imports of electronic products accounted for 25% of EC imports from Japan, and this share increased to 29% in 1987. Motor vehicles in 1980 were 19% of EC imports from Japan, increasing to 22% in 1987, while agricultural/industrial machinery formed 8% of imports in 1980, moving to 11% in 1987. Together, these three product categories comprised in 1987 a remarkable 62% of all EC imports from Japan, compared to 52% in 1980. This high degree of specialization of EC imports from Japan reflects the strong comparative advantage enjoyed by Japanese industry in those sectors.

With respect to exports, the most significant EC trade with Japan is in chemicals, which formed 22% of EC exports to Japan in 1980, and decreased by only 1% by 1987. As noted earlier, the EC enjoys a competitive advantage in this sector, which includes among others petrochemicals and pharmaceuticals. In the pharmaceuticals industry, competitiveness is largely determined by non-price factors such as economies of scale, the ability to invent new formulae, and the effect of government policies on profitability and the regulatory environment for distributing the drugs. In the USA, competition among pharmaceutical companies is more severe than in

Europe, where the market is still largely regulated, and companies have probably more difficulties in generating the level of profitability that is required to finance the necessary investment in research and development, as well as the necessary capital investment.

Agricultural/industrial machinery formed 13% of exports in 1980, decreasing to 10% by 1987. In a product category where imports are also sizeable, it is interesting to note that EC exports of agricultural/industrial machinery to Japan by value in 1980 were 50% of imports from Japan, whereas they were only 34% in 1987. Finally, motor vehicle exports to Japan leaped from 6 to 15% of EC exports to Japan during 1980-87, but started from an unfortunately small base. Most of these motor vehicle exports in 1987 were high performance or 'status' automobiles, many of them from the Federal Republic of Germany.

With regard to overall trade between the EC and Japan, imports from Japan in 1987 increased by a nominal 154% over those of 1980, while EC exports to Japan increased by 178%. We should note, however, that the total value of exports in 1980 was only 33% of imports, and still only 36% in 1987.

It is clear that the trade situation between the EC and Japan would be far more favourable to the EC if imports by the EC were less concentrated among products which seem to be registering healthy increases in demand. The rise in EC exports to Japan (+178% during 1980-87) would be quite remarkable were it not overshadowed by the import statistics for electronic products, motor vehicles, and agricultural/industrial machinery.

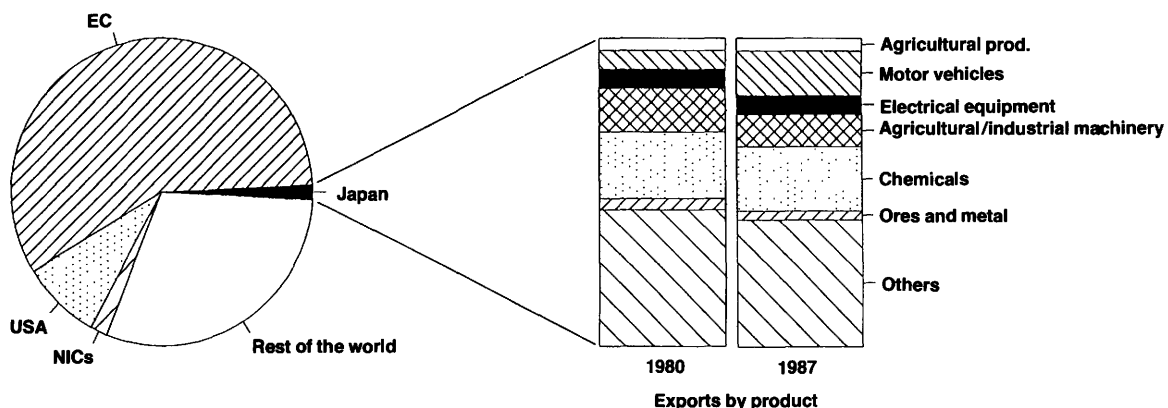
EC trade with NICs

EC trade with the newly industrialized countries (NICs), which include Singapore, China (Formosa), the Philippines, Taiwan, South Korea, Hong Kong, and Malaysia, is similar in volume and characteristics to EC trade with Japan, except in the categories of electrical products and motor vehicles. Except for these two products, EC trade with the NICs is fairly well balanced.

As illustrated in Figures 11 and 12, in 1980 textiles accounted for the highest share of EC imports from the NICs, at 26%. Electrical products followed with 16%. By 1987, imports of electrical products had jumped to 25% of EC imports from the NICs, while textile imports dropped only slightly, to 24%. But the significant increase in import concentration evident in these two product categories is ominous. For tex-

Figure 9

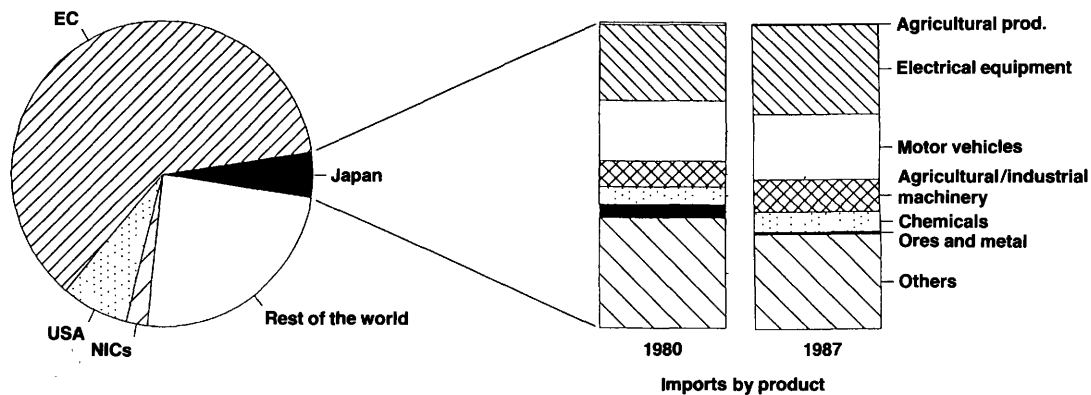
Breakdown of EC exports to Japan (%)



Source : Volimex, DRI Europe.

Figure 10

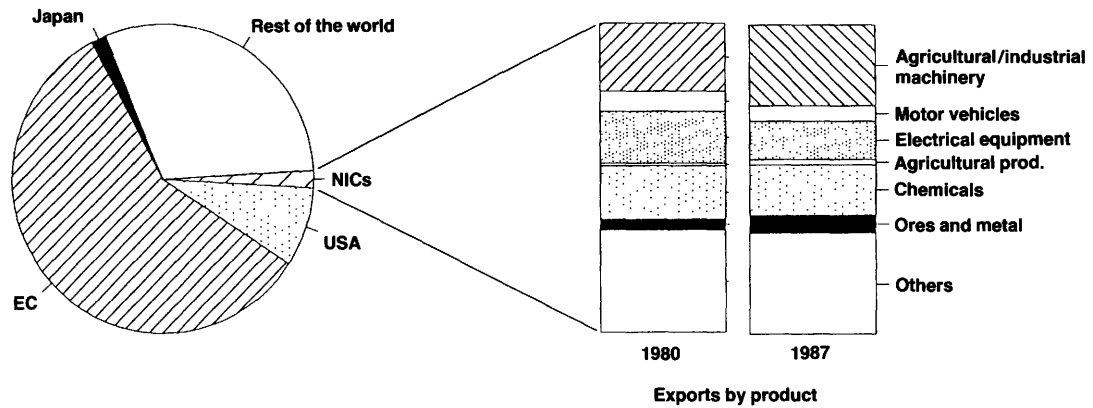
Breakdown of EC imports from Japan (%)



Source : Volimex, DRI Europe.

Figure 11

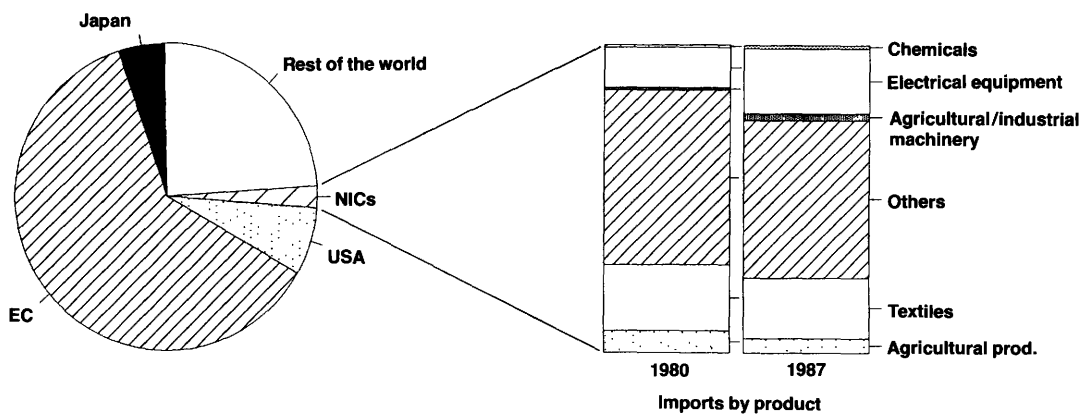
Breakdown of EC exports to the NICs (%)



Source : Volimex, DRI Europe.

Figure 12

Breakdown of EC imports from NICs (%)



Source : Volimex, DRI Europe.

tiles, although the rate of penetration of non-EC imports into the EC's domestic market increased throughout the 1980s, there was a change in supplier, with China in particular expanding its share of the EC market, at the expense of the South-East Asian NICs. As for electrical products, the increasing share of EC imports from the NICs can be explained by the same factors as for Japan, namely both price and non-price competitiveness factors.

In virtually all other product categories, imports have decreased between 1980 and 1987, or have stayed quite small; overall EC export volume to the NICs is however still low enough to permit these two major product categories to dominate overall trade activity.

The EC countries, like most other large industrial nations, however also benefited from the rapid industrialization of the NICs, as they provided a large share of the equipment needed for investment. Thus, in 1980, agricultural/industrial machinery (22.2%), and electrical equipment (16.4%) together accounted for 38.6% of EC exports to the NICs. By 1987 the share of these products had fallen to 33.8% of exports to the NICs, with most of the decrease due to slackening demand for machinery. A third product accounted for a particularly large share of the EC's exports to the NICs: chemical products (17.5% of EC exports to the NICs in 1980, 18.1% in 1987).

As in the case of trade with the USA, once again the improvement in EC exports between 1980 and 1987 (+72% in nominal terms) outstripped the 53% increase in imports from the NICs. The total value of exports accounted for 62% of the value of imports in 1980, moving up to 69% by 1987. This performance would have improved the EC trade situation even more if EC imports of electrical products had been better controlled; however, few parts of the world have been able to escape the repercussions of the NICs trade boom in electronics. As a result, whereas in 1980 the value of EC exports of electrical goods was 63% of imports of electrical goods from the NICs, by 1987 this figure had plummeted to 41%.

EC trade with the rest of the world

We have defined the rest of the world (ROW) as those parts of the world not covered by the preceding analysis, i.e. excluding the USA, Japan, the NICs, and the EC countries themselves.

Figures 13 and 14 summarize EC trade with the ROW during 1980-87. Trade with the ROW is generally concentrated in certain product categories — for

imports, in agricultural products and ores/metals; for exports from the EC, in agricultural/industrial machinery and chemicals. However, there are unmistakable signs that between 1980 and 1987 EC imports from the ROW became less concentrated in the traditionally important activities. For example, in 1980 EC imports of agricultural products and ores/metals represented 33% of imports from the ROW, while in 1987 they represented only 25%, with chemicals, agricultural/industrial machinery, and electrical products together another 25%.

Strong increases in exports of chemicals and electrical products during the period 1980-87, together with agricultural/industrial machinery, combined to account for a share of 46% of exports to the ROW in 1987, compared to 42% in 1980. Exports of ores/metals and motor vehicles added another 18% in 1980, compared to only 15% of exports to the ROW by 1987. Ores/metals is the only product category in which both imports and exports with the ROW decreased in real terms between 1980 and 1987.

While EC exports to the ROW increased by only 38% during 1980-87, compared to the 57% increase in imports, the EC still maintained a healthy 34% cushion of exports over imports in 1987, compared to a 53% cushion in 1980.

Interestingly enough, the healthy improvement in performance of the ROW in exporting to the EC has come from strong moves in all sectors except those in which its 1980 exports were most concentrated — agricultural products and ores/metals.

Net trade balances

We will now examine real trade balances between the EC and the other regions treated above in order to determine the overall health of EC trade in 1987, as well as trends during the period 1980-87.

The overall picture — by region

Figure 15 shows the state of overall trade in 1987 between the EC and its trading partners. The large net trade surplus, amounting to some ECU 70 billion (all monetary sums here will be given in constant 1980 ECU), is almost equivalent to the EC's balance of trade with the rest of the world. The surplus from trade with the USA (ECU 19 billion), the components of which have been described above, is of the same magnitude as the combined deficits of Japan (ECU -19 billion) and the NICs (ECU -2 billion), leaving EC trade with the ROW to pull the account back up to a substantial surplus.

Figure 13

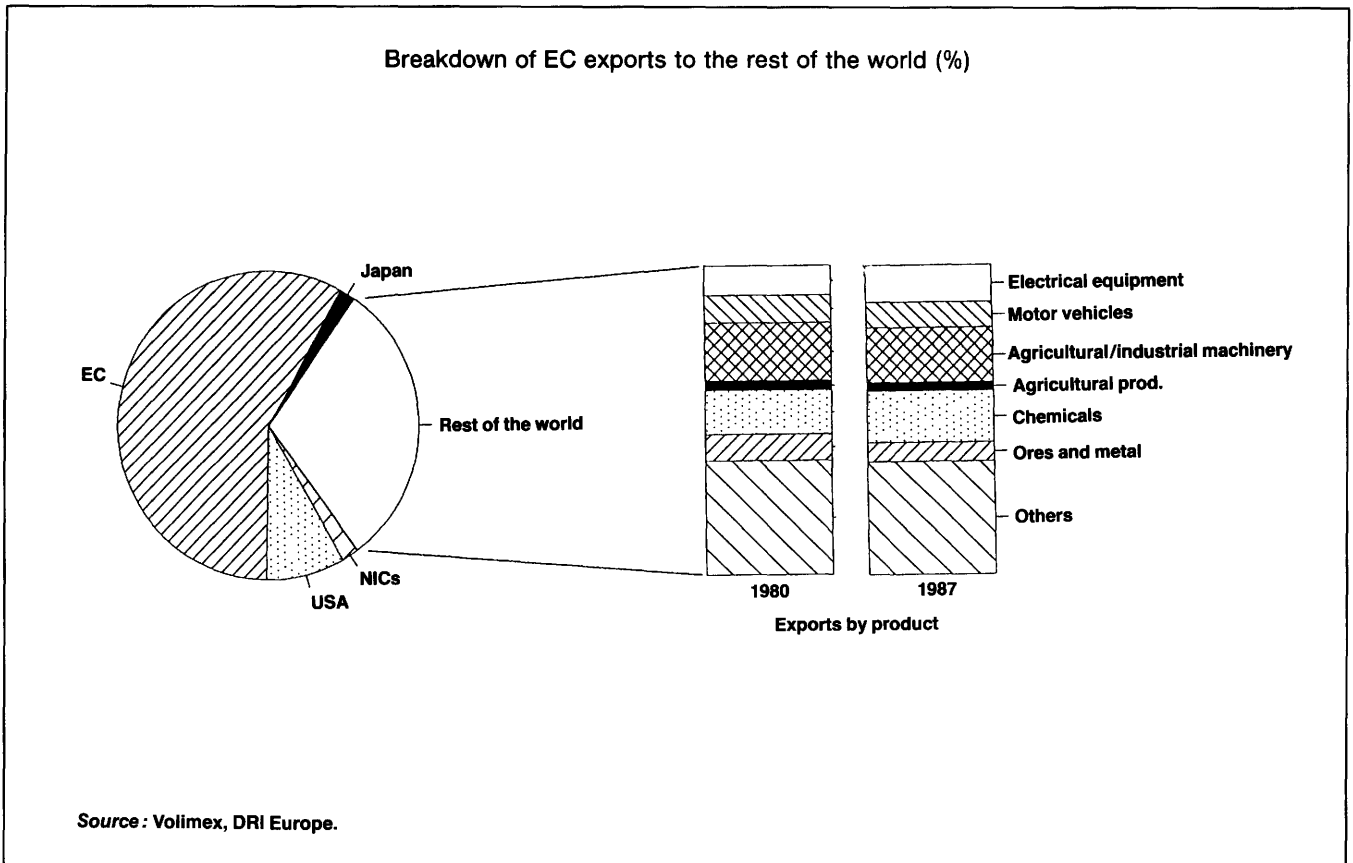
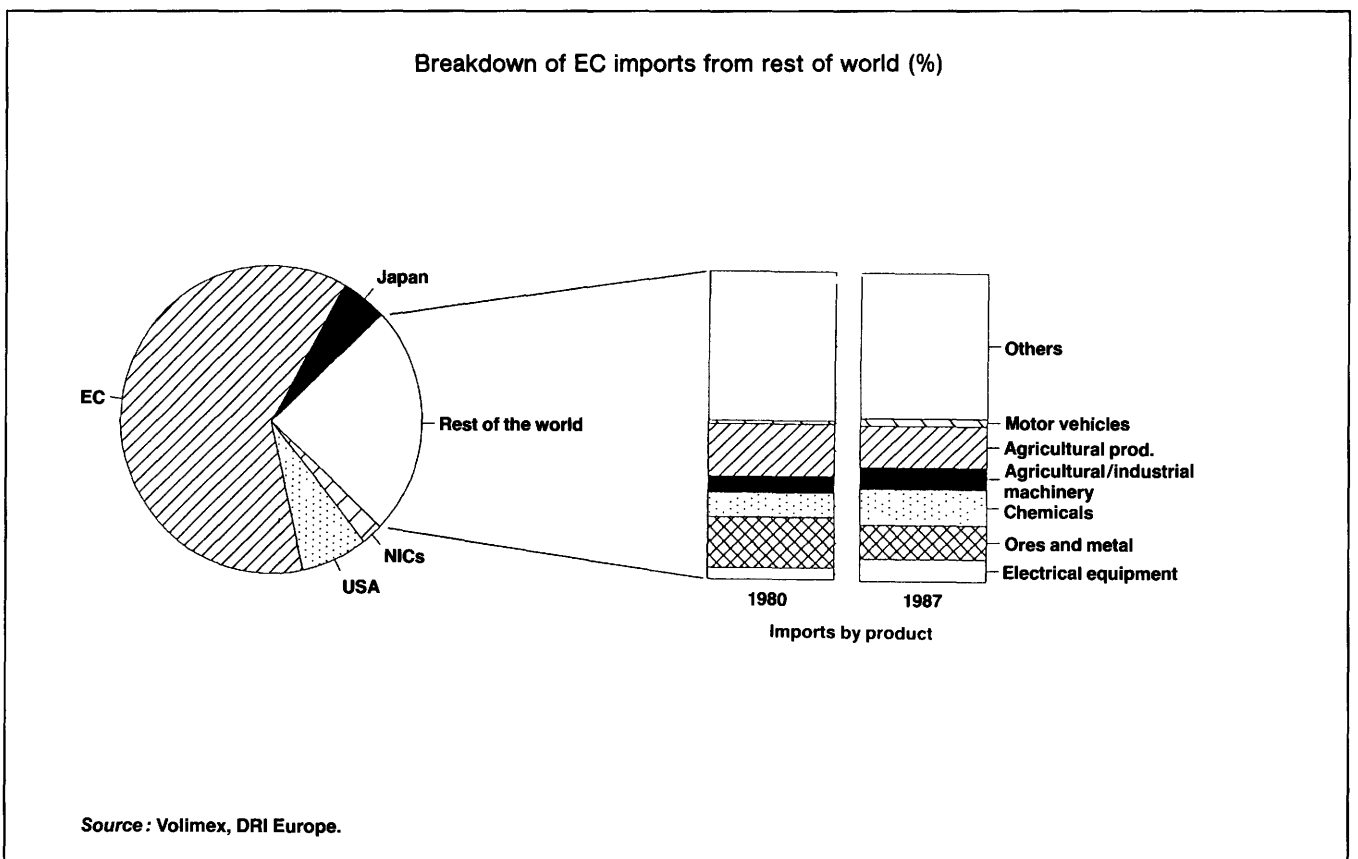


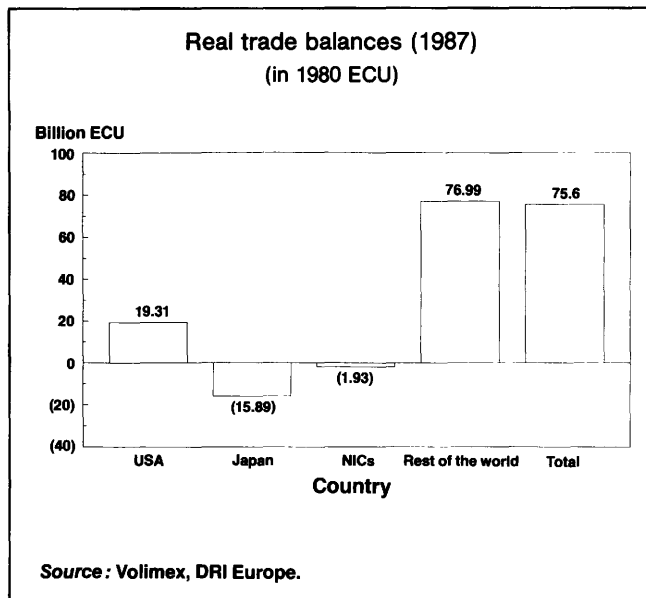
Figure 14



The overall picture — by product

Figure 16 clearly shows which products were responsible in 1987 for the EC's net trade surplus. Exports of chemicals and agricultural/industrial machinery, mostly to the ROW, provided the bulk of the surplus, accounting for ECU 74 billion. A surplus of trade in motor vehicles, especially to the USA and the ROW, also helped. The large trade deficit in agricultural products was due almost entirely to the trade imbalance with the ROW.

Figure 15



Net change in the balance of trade — by region

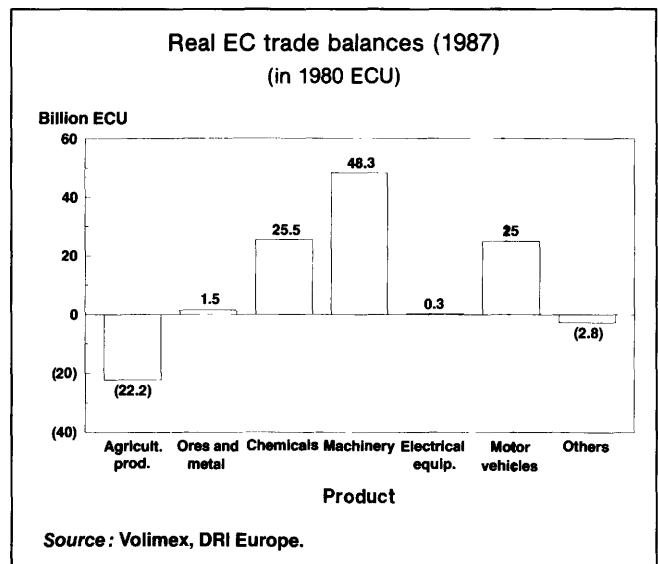
Figure 17 presents a view of the change in trade relationships between the EC and other regions during the period 1980-87. It is immediately evident that while the net balance of trade between the EC and Japan, the NICs, and even the ROW has changed little between 1980 and 1987, the balance of trade with the USA has changed enormously, improving by ECU 36 billion during this period. This is partly due to the strength of the US dollar during the mid-1980s, which made EC exports especially attractive to the US market.

It appears that there was also a general tendency during this period for American corporations to shift manufacturing operations overseas, which reduced overall US exports and helped to make the US market more vulnerable to imports as new US corporate strategies adapted to their environment.

The only negative trend in EC trade found in Figure 17 is in net trade with Japan. On the whole, then, it appears that general European trade policies in force

during the period 1980-87, taken together with other developments beyond their control, have been quite successful.

Figure 16



Net change in the balance of trade — by product

Figure 18 demonstrates which products have been responsible for most of the trade improvement experienced by the EC during 1980-87. At the top of the list is trade in agricultural/industrial machinery (net trade increased by ECU 23 billion), chasing a demand in the ROW and the USA which increased considerably during the period. Second are chemicals (net trade increase of ECU 11 billion), which showed a strong increase in demand in the ROW, and motor vehicles (net trade increase of ECU 11 billion), whose sales improved significantly in both the ROW and the USA. The biggest eight-year decline in EC net trade came in the electrical product category (net trade decreased by ECU 5 billion).

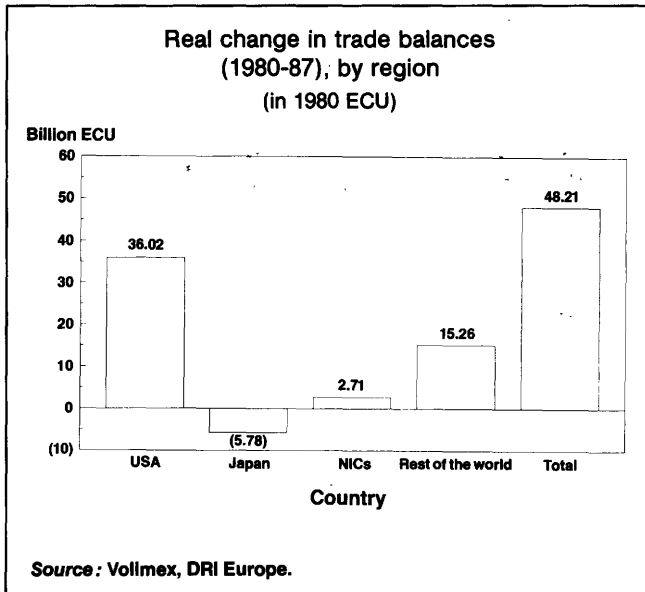
Structure of EC trade as a whole

Trade with the other EC countries

Intra-EC trade as a whole has already been discussed to a large extent in the preceding section, particularly with respect to the key products traded. As regards the trade activities of the individual Member States of the EC, we have seen in the previous chapter that the structure of their trade with each other reflects fairly closely their patterns of trade with the world (including the EC countries). Moreover, their trade with each other forms the bulk of

their trade with the world. In 1980 EC-country imports from other EC countries represented 58% of all EC imports, while this ratio became 61% by 1987. In 1980 EC exports to other EC countries represented 54% of all EC exports, while in 1987 this increased to 58%. The analysis presented below will therefore concentrate on the structure of trade of the EC countries with the world as a whole, reflecting to a large extent their trade with each other as well.

Figure 17



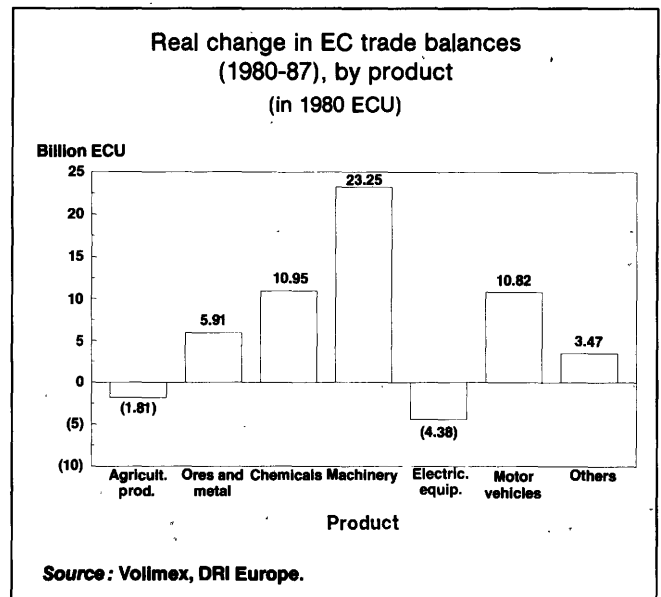
Having made the above observations about the similarities between EC trade with itself and with the world, we should indicate a few notable exceptions.

- With regard to trade by productive sector, we find that the share of chemical products, motor vehicles and agricultural products that came from within the EC was greater than the share of imports from the rest of the world. The difference had shrunk in 1987 in the case of chemical products, but was the same in 1987 as in 1980 in the two other cases (about 2 to 3%).
- With regard to the trade structure of individual countries, notable exceptions include the following:

in 1980 the UK's share of intra-EC imports was about 4% less than its share of EC imports from the world. The UK thus imported relatively less from the other Member States than the other EC countries. By 1987 this gap had decreased to 2%;

in 1980 the Federal Republic of Germany's share of intra-EC imports was about 1.5% less than its share of EC imports from the world. By 1987 this difference had increased to 3%;

Figure 18



in 1980 BLEU's share of EC exports to the EC was about 3% greater than its share of EC exports to the world. In 1987 this difference had decreased only slightly;

in 1980 the Netherlands' share of EC exports to the EC was 3% greater than its share of EC exports to the world. In 1987 this difference had decreased to well under 2%;

in 1980 the UK's share of EC exports to the EC was more than 4% smaller than its share of EC exports to the world. In 1987 this difference had decreased to about 2.5%.

For most countries, it seems that, in 1987, individual countries' share of intra-EC trade reflected slightly better their share of EC trade with the world than in 1980.

Country shares of overall imports and exports with the world have remained remarkably stable from 1980-87. The Federal Republic of Germany has the largest share, reflecting its size, with an average share of imports and exports between 1980-87 of 28%. It is followed by France (16%), the UK (15%), Italy (13%), the BLEU (9%), and the Netherlands (9%). Spain, Denmark, Ireland, Greece and Portugal comprise the remaining 10%. The only changes of more than 1% in country shares of EC/world imports and exports between 1980 and 1987 are:

- The BLEU's share of imports from the world decreased by 1.1%;
- Spain's share of imports increased by 1.3%;
- France's share of exports decreased by 1.4%;

- The Federal Republic of Germany's share of exports increased by 2.6%;
- The UK's share of exports decreased by 3.0%.

We will take a look at individual trade balances below. However, in the overall context, it is interesting to note the situation of Germany. In 1980, Germany had a positive trade surplus with the world of USD 41 billion. It happens that this was the same as the total EC surplus with the world, which could be taken to mean that the Federal Republic of Germany was responsible for the entire EC surplus. By 1987 the surplus of the Federal Republic of Germany with the world had increased by USD 42 billion, while the total EC surplus increased by only USD 11 billion. Furthermore, over USD 26 billion of Germany's additional surplus in 1987 came at the expense of its EC trading partners, which approximates the (USD 30 billion) overall deficit run by the EC countries (not including Germany) with the world. In other words, if trade between the Federal Republic of Germany and the other EC countries (especially the UK) were in reasonable balance, these other countries' combined trade in 1987 would have been in reasonable balance with the world.

Structure of individual EC country trade with the world

This section provides an overview of individual country trade performance during the period 1980-87. For each country, we will first look at the overall trade performance and trade balance. We will then look at trade specialization within the most important trade sectors. Finally, we will look at the combined trade specialization for three sector groups, defined according to their importance to EC trade.

Methodology

Several terms require definition in order to make sense of the rest of this section.

'Export specialization', defined as:

$$ES = 100 [(X80ij/X80j) - (X80i12/X8012)]$$

where: X80 = 1980 exports in constant ecu

i = product *i*

j = country *j*

12 = EC countries

provides an indication of the specialization of country *j* in the export of a specific product *i* relative to the performance of the EC as a whole. While any

export specialization (in moderation) is desirable, we will look especially for specialization in productive sectors with a healthy combination of size and growth.

'Import dependence', defined as:

$$MD = 100* [M80ij/M80j] - (M80i12/M8012)]$$

where: M80 = 1980 imports in constant ecu and *i*, *j* and 12 are defined as above

provides an indication of the dependence of country *j* upon the import of a specific product *i* relative to the performance of the EC as a whole. While no significant import dependence is very healthy unless matched by an export specialization, we will look especially for import dependencies in sectors where the EC as a whole has a tendency to be especially dependent relative to the structure of world trade.

'Trade specialization', defined as:

$$TS = XS80ij - MD80ij$$

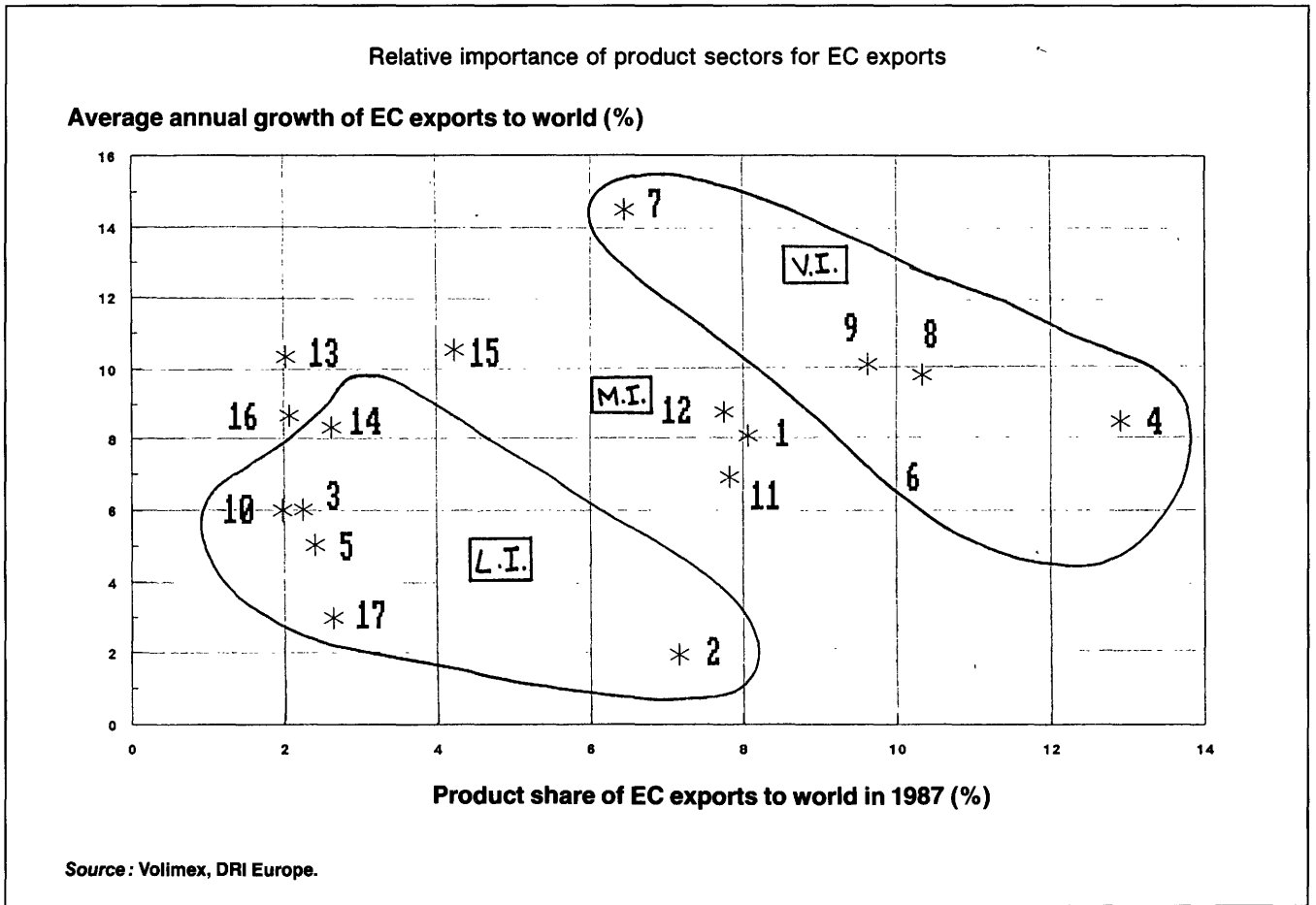
where: XS80ij = 1980 export specialization in product *i* by country *j*; MD80ij = 1980 import dependence upon product *i* by country *j*

provides an indication of a country *j*'s health in the trade of product *i*. By combining import dependency and export specialization, this index shows where the two are mismatched, and thus (in the case of a strongly negative trade specialization number) where a particular import dependency may pose a more serious problem. Since we would prefer as much export specialization and as little import dependency as possible, we look for *TS* to be not only positive but as large as possible, unless it implies a dangerous dependency upon exports of a certain product. It is useful to remember that since the various countries of the EC show relatively consistent import ratios, most of the high or low trade specialization indices are due to particularly strong or weak export trade.

We will refer below to trade specialization as 'high' (over 5.0), 'moderate' (between 2 and 5), and 'low' (between 1 and 2).

Finally, we have divided the 17 trade sectors treated by this analysis into three major categories, defined by their importance to EC trade with the world. We discovered that when the criteria of share of EC trade with the world (in 1987) and growth of EC trade with the world (between 1980 and 1987) are considered, as shown in Figures 19 and 20, the 17 sectors may be fairly readily allocated among three

Figure 19



levels of importance, which we will call 'very important' (VI), 'moderately important' (MI), and 'least important' (LI). It is interesting but perhaps not surprising that the sectors included in each level are the same for imports as for exports. The sectors that will receive the most attention in the analysis below are the VI sectors:

- chemicals;
- agricultural/industrial machinery;
- office equipment;
- electrical products; and
- motor vehicles.

The list of sectors in figures 19, 20 and 21 is the following:

8. Electrical equipment
9. Motor vehicles
10. Other transport equipment
11. Food, drink and tobacco
12. Textiles and clothing
13. Leather and leather products
14. Wood and furniture
15. Paper and printing
16. Rubber and plastics
17. Other manufactured products

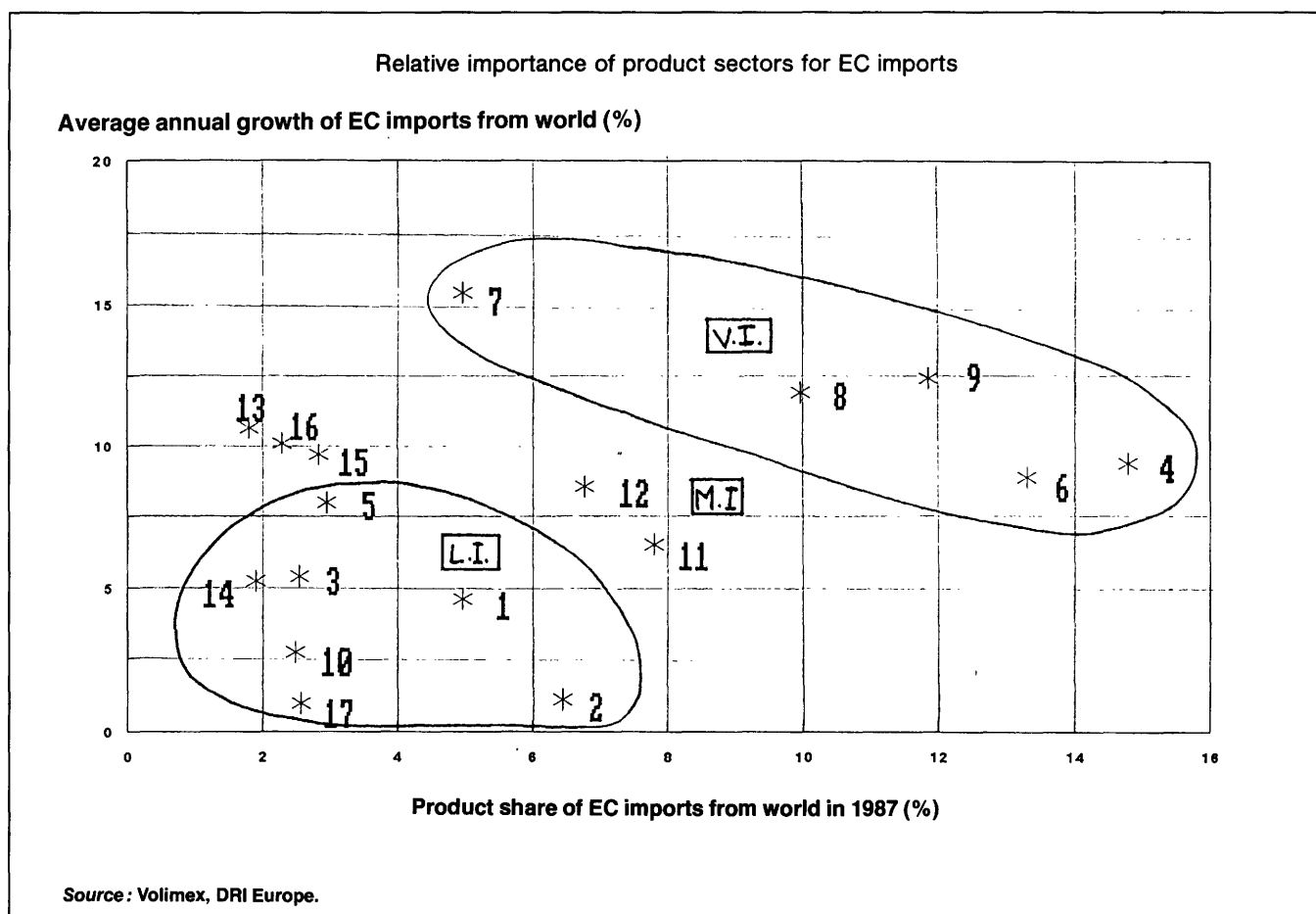
When we mention a country's 'concentration of trade' in the VI, and LI sector groups relative to the EC, we refer to the percentage of a country's trade with the world which is concentrated in a particular group compared to the percentage of EC trade with the world which is concentrated in the same group.

Belgium and Luxembourg (BLEU)

In value, Belgium/Luxembourg's trade has revolved mostly around ores/metals, chemicals, and motor vehicles. The countries' trade has moved from a combined deficit with the world of USD 2 billion in 1980 to a current dollar surplus of USD 1.3 billion in

1. Agricultural products, forestry and fishing
2. Ores and metals
3. Non-metallic minerals
4. Chemical products
5. Metal products
6. Agricultural and industrial machinery
7. Office and EDP

Figure 20



1987. This was done by seriously curtailing imports of ores/metals, and decreasing import shares of agricultural products, food, textiles, and other manufactures as well, while substantially increasing the share of exports of motor vehicles, which reached 16.6% of exports in 1987, compared with 11.7% in 1980. The 1984 devaluation of the Belgian franc certainly contributed to these results. Overall, imports grew by 28% in nominal dollar terms between 1980 and 1987, while exports rose by 34%.

With respect to the important ores/metals sector, the BLEU moved from a very high trade specialization of nearly 9 to a moderate specialization of 4.5 during 1980-87, mostly because of the substantial decrease in ores/metals exports compared to other EC countries. Because this has been one of the least important growth sectors for the EC, this despecialization is seen as healthy, especially if matched by increased specialisation in more important sectors, which in fact was the case in four of the five VI sectors. If we concentrate on the two VI sectors in which BLEU has the most active trade — chemicals and motor vehicles — we find that the BLEU's trade specialization in the chemicals sector was already low in 1980 and had decreased slightly by 1987, while in the

motor vehicles sector it improved during this period but remained negative (i.e., the share of exports of motor vehicles in total exports was lower in the BLEU than in the EC as a whole).

Referring to Tables 1 to 3, among the five VI trade sectors taken together, the BLEU's trade specialization improved between 1980 and 1987, while remaining strongly negative. Among the six MI trade sectors, the BLEU's trade specialization was moderate and changed only little during the period. Among the LI sectors, the countries' trade specialization decreased from high to moderate. Most of this decrease showed up in the corresponding improvement of the VI sectors, which is certainly a healthy trend. In general, more of Belgium/Luxemburg's trade is concentrated in the LI sectors than is the case for the EC as a whole.

Tables 1 to 3 have been prepared to supplement Figures 19 and 20 in the presentation of export/import changes during the period 1980-87. While it is difficult to determine any EC-wide trends from these tables, they do provide a very useful comparison of the trade position of one country with another. The

reader may wish to refer to these tables during the ensuing discussion.

Table 1
Changes in trade specialization (1980-87)
Most important sectors

Country	Trade spec./Performance		Trade spec./Improvement	
	1980	1987	1980-87	Rank
B-L	-9.7	-6.4	3.3	3
Denmark	-18.3	-17.3	1.0	4
France	-5.6	-5.0	0.6	5
FR of Germany	17.2	16.5	-0.6	9
Greece	-34.7	-37.1	-2.4	11
Ireland	-20.3	-4.9	15.5	1
Italy	-9.1	-9.5	-0.4	8
Netherlands	-6.8	-6.6	0.1	6
Portugal	-40.6	-36.2	4.3	2
Spain	-21.2	-21.3	-0.1	7
United Kingdom	4.5	2.3	-2.2	10
EC	-144.6	-125.5	19.1	

Source: Volimex, DRI Europe calculations.

Note: These are indications of country performance by itself, not of the importance of the country in overall EC trade.

Denmark

Denmark's trade surplus with the world varied little from 1980-87, moving from USD 1 billion to USD 0.8 billion. Food products, and, within this category, meat products, are by far the most important export category, accounting for 28.7% of exports in 1980 and 23.7% in 1987. Agricultural products, chemicals, agricultural/industrial machinery, and electrical products are also key trade sectors. Other than the significant decrease in food exports, the only substantive change in trade shares between 1980 and 1987 was the 2.5% increase in motor vehicle imports. Denmark's imports increased in value by 53% during 1980-87, while exports increased by 50%.

Among the sectors most heavily traded by Denmark, it was highly specialized in 1980 in two sectors of moderate importance to EC trade as a whole — agricultural products and food products. In the former, Denmark's specialization, due to strong exports, was even greater in 1987. In the latter, the degree of export specialization remained high in 1987 but was nevertheless considerably smaller than in 1980. In the important chemicals sector, Denmark demonstrates both moderately lower imports than the EC average, and substantially lower exports, although both are trending in a healthy direction. In agricultural/industrial machinery, Denmark's performance has been slightly below the EC average in imports

and exports, but the gradual trends in both have been unhealthy during 1980-87.

Table 2
Changes in trade specialization (1980-87)
Moderately important sectors

Country	Trade spec./Performance		Trade spec./Improvement	
	1980	1987	1980-87	Rank
B-L	3.6	3.2	-0.5	7
Denmark	22.2	19.8	-2.3	9
France	5.8	4.7	-1.1	8
FR of Germany	-14.4	-13.5	0.8	3
Greece	42.3	38.3	-4.0	10
Ireland	26.1	11.8	-14.3	11
Italy	4.4	4.5	0.1	5
Netherlands	9.7	10.4	0.7	4
Portugal	29.0	31.8	2.7	2
Spain	12.2	16.9	4.7	1
United Kingdom	-4.2	-4.5	-0.2	6
EC	136.7	123.4	-13.4	

Source: Volimex, DRI Europe calculations.

Note: These are indications of country performance by itself, not of the importance of the country in overall EC trade.

Taking the VI sectors together, Denmark's trade specialization in 1980 was very negative and improved only slightly by 1987. However, in the MI sectors the situation was precisely the reverse, indicating that Denmark's trade is much more heavily concentrated than the EC as a whole toward the MI rather than the VI sectors. This observation is confirmed by our data, especially as regards exports. Among the LI sectors Denmark's overall trade specialization was moderately negative but improved somewhat during the period.

France

France's overall trade performance was relatively poor between 1980 and 1987, moving from a surplus of USD 8.6 billion in 1980 to a current dollar deficit of USD 1.2 billion in 1987. Significant decreases in imports of agricultural products, and especially ores/metals, were more than offset by increases in imports of office equipment, electrical products, and motor vehicles. Slim increases in exports of several sectors were overwhelmed by the decrease in exports of ores/metals. France's export shares of other key sectors — agricultural/industrial machinery and chemicals — moved little during 1980-87. More telling than anything, France's imports increased by 45% during the period, while her exports increased by only 30%.

Table 3
Changes in trade specialization (1980-87)
Least important sectors

Country	Trade spec./Performance		Trade spec./Improvement	
	1980	1987	1980-87	Rank
B-L	6.1	3.2	-2.9	9
Denmark	-3.8	-2.5	1.2	3
France	-0.1	0.3	0.4	4
FR of Germany	-2.8	-3.0	-0.3	6
Greece	-7.5	-1.2	6.3	1
Ireland	-5.8	-6.9	-1.2	8
Italy	4.8	5.0	0.2	5
Netherlands	-3.0	-3.8	-0.8	7
Portugal	11.5	4.5	-7.1	11
Spain	9.0	4.5	-4.6	10
United Kingdom	-0.3	2.2	2.4	2
EC	8.1	2.3	-6.4	

Source: Volimex, DRI Europe calculations.

Note: These are indications of country performance by itself, not of the importance of the country in overall EC trade.

France maintains a low specialization in the ores/metals sector, the least important in EC trade. With respect to two of the most important sectors — agricultural/industrial machinery and motor vehicles — France performs significantly worse than the EC average in the former, and marginally better in the latter. Taking all of the VI sectors together, France's trade specialization was moderately negative in 1980 and improved very slightly by 1987. Taking the MI sectors together, France's trade specialization dropped a little from high to moderate during the period. Trade specialization in the LI sectors was virtually neutral. France's division of trade among these three groupings, in 1980 as well as 1987, was remarkably close to the division of trade of the EC as a whole.

Federal Republic of Germany

The star performer of the EC, the Federal Republic of Germany improved its trade surplus from USD 41 billion in 1980 to nearly USD 83 billion in 1987, increasing overall exports by 55%, while imports increased by 42%. To the relative exclusion of most other sectors, especially as concerns exports, Germany concentrates most of its trade in the chemicals, agricultural/industrial machinery, electrical products, and motor vehicles sectors. Of these, motor vehicles were most responsible for the increase in exports during the period, moving from a 15.2 to 18.3% share of exports, while imports of agricultural products and especially ores/metals both decreased substantially, the latter decreasing from 12.2 to 8.1% of Germany's exports during 1980-87.

Four of the VI trade sectors comprise large shares of Germany's trade: in chemicals Germany has a low specialization, which has become slightly smaller during the period of our analysis; in agricultural/industrial machinery Germany is highly specialized, although this specialization has also decreased slightly; in electrical products Germany maintains a low specialization, which has also decreased a little; and in motor vehicles Germany was highly specialized in 1980 and was even more so in 1987.

Due to its export activity in the sectors described above, Germany's overall trade specialization in the VI sectors is extremely high, and fell only a very small amount between 1980 and 1987. Surprisingly, Germany's trade specialization in the MI sectors is almost equally poor, rising only a little during the period of our analysis. In the LI sectors specialization is moderately negative and remained virtually unchanged during the period. Not surprisingly, much more of Germany's trade is concentrated in VI sector exports, and much less in MI sector exports than for the EC as a whole.

Greece

Greece's trade deficit moved from USD 3.7 billion in 1980 to USD 5.1 billion in 1987, despite an enormous decrease in imports of other transportation equipment (from 22.1 to 5.6% of imports), coupled with an equally impressive increase in exports of textiles (from 21.5 to 35.7% of exports) during 1980-87. The overall increase in imports during the period was 37%, while exports increased by 40%. Problems were presented in the food and textiles sectors, whose share of imports increased by a combined 15% during the period; meanwhile the share of exports in four of Greece's more important export sectors — ores/metals, non-metallic, chemicals, and food — decreased substantially (a combined total of 17%).

Greece does more than 10% of its trade in only one of the five most important EC sectors — chemicals. Unfortunately its trade specialization in this sector was negative in 1980 and was even worse in 1987. Most of Greece's trade is in the MI sectors - agricultural products, food, and textiles — where its trade specialization has been extremely high (and is still increasing) because of high export shares. The only exception is in food products, where Greece's trade specialization has become slightly negative in 1987 due to high imports. Greece could perhaps be cited as the best example of too much export specialization in too few products. In terms of trade specialization, Greece is an extreme case. Its specialization in VI sectors is extremely negative, while its specializa-

tion in MI sectors is extremely positive. Neither represents a healthy trade mix, although during the period 1980-87 specialization in the MI sectors has taken a step in a more balanced direction. Greece's trade, especially exports, is skewed very heavily in the direction of the MI sectors, to the detriment of the VI sectors.

Ireland

Another star performer in trade balance improvement, Ireland improved its 1980 deficit of USD 1.2 billion to a surplus of USD 2.9 billion in 1987. This occurred through various initiatives during the period to increase outside investment in Ireland, as well as domestic exports, which sent exports of electrical products and especially office equipment shooting upward (in the latter case, from 8.9% of exports in 1980 to 24.7% in 1987). However, another key export sector — food — decreased in share from 32.4 to 26% during the same period. Significant changes in imports were noticed in an 8% increase in the share of office equipment imports, perhaps destined to be inputs for subsequent exports, and 3% decreases in shares of both agricultural/industrial machinery and motor vehicles. Impressively, while Ireland's imports increased by 33% between 1980 and 1987, her exports increased by 89%.

Of Ireland's three key trade sectors, two — chemicals and office machinery — are among the VI trade sectors of the EC as a whole. In the former Ireland has a small negative trade specialization, while in the latter she has a very high specialization which increased from a moderate specialization in 1980 due to the export increases cited above. In food products, while Ireland's specialization remains very high, it has decreased substantially from what was certainly an unhealthy level of specialization in 1980.

Ireland is a prime example of a country that in eight years has dramatically shifted the orientation of its trade from the MI sectors to the VI sectors, so that in 1987 its concentration of trade in VI and MI sectors is very similar to that of the EC, except for its share of exports concentrated in the MI sectors, which considerably exceeds that of the EC as a whole. However, in 1987 Ireland's VI trade specialization was still moderately negative, while MI trade specialization was still very high. The percentage of Ireland's trade in LI sectors is little more than 10%.

Italy

Italy's imports are quite well balanced, with only chemicals reaching a 15% share, followed by agricultural products and motor vehicles, with 10% each.

Exports show only slightly less balance, with agricultural/industrial machinery holding a 17% share and textiles 13%. Italy has improved its trade surplus with the world from USD 3 billion in 1980 to USD 8.6 billion in 1987. This improvement comes from decreases in imports of agricultural products and especially ores/metals (from 13.5% of imports in 1980 to 8.2% in 1987), as well as small increases in exports of chemicals and textiles. In addition, however, it comes from Italy's ability to hold its imports to an increase of 48% during 1980-87, while exports increased by 54%.

Because of the extent of Italy's imports in the chemicals sector, its trade specialization in this sector is solidly negative, while in agricultural/industrial machinery its trade specialization has moved from moderate in 1980 to high in 1987, due to the maintenance of strong exports and a decrease in this sector's share of imports. In two of the EC's moderately important sectors, Italy has a negative specialization in agricultural products because of high imports, and a high and growing specialization in textiles, where exports are strong relative to the EC average.

As seen in Tables 1 to 3, Italy's trade specialization has moved very little in any grouping from 1980 to 1987. Her specialization in VI remains quite negative. In MI, as in LI, it remains moderately positive. This reflects Italy's concentration of trade, where her share of exports in the VI sectors is lower than the EC's as a whole, while her share of exports in the MI and LI sector groups are higher.

The Netherlands

Between 1980 and 1987, the Netherlands' imports from the world increased by 40%, and her exports increased by 44%. She was able to turn the slight 1980 trade deficit of USD 0.5 billion into a small surplus of USD 1.5 billion, primarily by small decreases in import shares of agricultural products, ores/metals, and food products. The latter is also a key export sector, holding 19% of the Netherlands' exports in 1987, compared to the other key sector — chemicals, with 22% of total exports.

The Netherlands maintains a high and stable specialization in the chemicals sector due to the exports noted above. Among secondary sectors, she is also moderately specialized in agricultural products and highly specialized in food products, all due to stronger exports than EC averages.

As in the case of Italy, the Netherlands has changed very little in trade specialization in any grouping

during the period 1980-87, meaning that she has stayed in the same position relative to overall EC trade. Her VI sector specialization is negative, her MI sector specialization is quite high, and her LI sector specialization is moderately negative. Her trade is concentrated considerably more in the MI sectors than EC trade as a whole, and somewhat less in the VI and LI sectors.

Portugal

Portugal's trade deficit of USD 2.7 billion in 1980 increased only slightly to USD 2.9 billion in 1987. Overall exports, however, showed a very healthy trend, increasing by 105% compared to a 70% increase in imports during the period. Substantial decreases in import shares of agricultural products, ores/metals, and chemicals were offset somewhat by increased import shares of motor vehicles, while increased export shares of textiles and leather goods were offset by decreased export shares of agricultural products, food, and wood products. Besides those already mentioned, Portugal imports a considerable amount of agricultural/industrial machinery, while exports are dominated by textiles, which held nearly a 33% share of her exports in 1987.

Portugal has substantial negative trade specialization in the chemicals and agricultural/industrial machinery sectors, not because her imports are so high but because she doesn't come close to EC average exports in these sectors. In other key trade sectors for Portugal, she has an extremely high specialization in textiles, and a negative specialization in agricultural products because of higher-than-average imports.

With regard to trade specialization, Portugal is another extreme case. As in the case of Greece, her VI sector specialization is extremely negative while her MI sector specialization is extremely positive. Unlike Greece, in both groups Portugal has moved in a positive direction between 1980 and 1987; however, the movements are relatively minor in relation to the extremes of specialization or lack thereof. Also like Greece, Portugal's exports are concentrated far more heavily in the MI sectors and less heavily in the VI sectors than are those of the EC as a whole.

Spain

Spain suffered from particularly strong demand for imports between 1980 and 1987, and saw its very small USD 0.6 billion trade deficit with the world expand to USD 8.6 billion by 1987. During this period, overall imports increased by 96%, while exports increased by only 60%. Changes in Spain's

key trade sectors during 1980-87 include agricultural products, whose share of imports decreased by over 9%; ores/metals, whose decrease in imports of 4% was more than offset by a decrease in exports of over 6%; chemicals, whose share of imports decreased and share of exports increased slightly; agricultural/industrial machinery, whose imports increased while exports declined slightly; and motor vehicles, whose increase in share of imports of over 7% was mostly offset by a 6% increase in share of exports.

Of the VI trade sectors, Spain does much of its trade in three. However, in the first two — chemicals and agricultural/industrial machinery — she has a substantial negative trade specialization; while in the third — motor vehicles — a moderate trade specialization is maintained by strong exports. In agricultural products, a high trade specialisation has been produced by the decrease in imports noted above, while in ores/metals the trade specialization has gone from moderate in 1980 to low in 1987.

Spain shows the same, although somewhat less extreme, specializations as does Portugal. In Spain's case, however, there has been no change in VI sector (negative) specialization between 1980 and 1987. Instead, LI sector specialization has decreased moderately and has promisingly shifted to an increase in MI sector specialization. Concentrations of trade relative to the EC in the VI, MI, and LI sector groupings are very similar to those of Portugal.

United Kingdom

The UK acquired the dubious distinction of moving from a small trade deficit with the world (USD 2.6 billion) in 1980 to a deficit of USD 28 billion in 1987! This was due to a comparatively slower growth of its exports (in value) than of imports during the period: imports from the world increased by 42% over the period, compared to a mere 16% increase in exports. The 1986 oil price collapse however largely contributed to this situation. Despite this decrease in exports relative to the rest of the EC, many individual trade indicators were healthy. Among the UK's key trade sectors, the share of ores/metals among UK imports decreased by a healthy 5%, and the share of exports decreased by 1.5%; chemicals' share of imports increased by 2%, while its share of exports increased by 4%; agricultural/industrial machinery's share of imports increased only slightly, while its share of exports decreased by 1%; electrical products' share of imports increased by 1% more than its share of exports; and other manufactures' share of imports decreased by one percentage point more than the decrease in its share of exports.

The three most important sectors to UK trade are also among the most important to the EC as a whole. With regard to chemicals the UK maintains a moderate trade specialization which increased slightly from 1980 to 1987. In agricultural/industrial machinery she also maintains a moderate specialization, which decreased slightly during the same period. In electrical products she has a low but positive specialization which has not changed significantly during the period.

The UK has maintained her moderate VI sector specialization, although it has decreased somewhat from 1980 to 1987. Her negative MI sector specialization has stayed virtually unchanged during the period. And her LI sector specialization has become moderate. Thus we see a small but undesirable shift in trade specialization from the VI to the LI sectors. While UK imports reflect EC shares, in general UK exports are concentrated somewhat more in the VI and LI sectors, and less in the MI sectors, than are overall EC exports.

Comparison of EC country trade performance

The principal objective of this chapter is to determine how the EC countries have fared between 1980 and 1987 in their trade with the world. Two sorts of comparisons should be made. The first is a comparison between countries of their trade performance in 1980 and in 1987 in order to establish how they ranked relative to each other at the beginning and at the end of the period of our analysis. The second is an analysis of each country's change in trade performance between 1980 and 1987 to determine which countries have demonstrated the most improvement. There is a problem in using only the criterion of trade specialization to determine countries' trade performance; while trade specialization figures can be analysed separately for VI, MI, and LI sectors in order to account for different countries' more or less promising concentrations of trade, they do not consider a country's contribution (by trade volume or value) to overall EC trade. A trade specialization index compares a country's trade structure to that of the EC. An additional refinement is needed, however, in order to adequately compare countries with each other. We have proposed a formula below with which to account for this additional consideration in our evaluation.

Methodology

For the reasons described above, we have retained our definitions of the VI, MI, and LI groupings of product sectors, presented here in decreasing order

of attractiveness to the (near) future growth and health of EC trade. We have then calculated each country's import dependency or export specialization for each of these three groupings of product sectors. However, before calculating a trade specialization for each of these groupings, we have multiplied the country's trade dependency or export specialization by the percentage of that country's trade value in each of the groupings of trade sectors. The added advantage of these 'value-weighted' figures is that they give us a feeling for each country's importance to EC trade as a whole. For example, a small country with a highly negative trade specialization may well have less effect on EC trade as a whole than a larger country with a moderately negative trade specialization. At the same time, the smaller country may be more concerned about its trade situation than the larger country is concerned about its situation.

Table 4
Ranking of the EC countries' trade performance based upon their trade specialization in the sectors of most importance to the EC

	1980	1987
Belgium, Luxembourg	8	6
Denmark	6	8
France	4	5
FR Germany	1	1
Greece	9	10
Ireland	7	2
Italy	5	7
Netherlands	3	4
Portugal	11	11
Spain	10	9
UK	2	3

Source: DRI Europe.

While this refinement could well be omitted in an isolated analysis of the trade structure of a given country, as above, we feel that a fair comparison of the performance of the various countries contributing to EC trade benefits greatly from this addition.

Finally, in order to combine the trade indicators for the VI, MI, and LI groupings into one overall trade index for each country, we first calculated a 'value-weighted' trade specialization (VWTS) in each grouping of product sectors for each country, as described above. In order to account for the relative importance of the groupings to EC trade, we then calculated a 'sector-weighted' trade specialisation (SWTS) multiplying the VWTS of the VI grouping by 5, the VWTS of the MI grouping by 3, and the VWTS of the LI grouping by 1, adding them together for each country, and arriving at a useful trade index which permits countries with significantly differing trade structures to be compared. As

might be expected, the SWTS comparison based upon VWTS showed entirely different results from a SWTS comparison based only upon the traditional formula for trade specialization.

Relative trade performance of EC countries

A preliminary comparison of countries' performances based upon trade specialization, and weighted by the amount of specialization within VI, MI, and LI groupings (i.e., a SWTS which does not include value weighting) is presented in Table 4.

It is obvious from the figures already presented that Germany had by far the largest trade specialization in both 1980 and in 1987, especially in the VI sectors. The rankings above reflect that sort of basic observation. However, adding the VWTS to determine overall contribution to EC trade changes the rankings considerably (see Table 5).

Table 5
Ranking of the EC countries trade performance based upon their trade specialization in the sectors of most importance to the EC, and weighted by the value of their trade in each of these sectors

	1980	1987
Belgium, Luxembourg	9	8
Denmark	4	6
France	10	9
FR of Germany	1	1
Greece	3	3
Ireland	5	4
Italy	11	11
Netherlands	7	7
Portugal	6	5
Spain	8	10
UK	2	2

Source: DRI Europe.

The major changes occur with countries such as Greece and Portugal, who may have overall a seriously negative trade specialization, but whose trade values are so low relative to various other countries (with a less negative trade specialization) that once the trade specialization is value-weighted, the other countries weigh a lot more negatively on the EC's overall trade balance. It should be carefully noted, however, that on its own merits Greece is still in a serious trade situation despite recent improvements — and that its internal situation may be far more serious than that of some of the countries that ranked below it in the latter table.

Period improvement of the trade situation of EC countries

In order to determine which countries have done well and which have done less well during the period

from 1980 to 1987, we will look at the changes in trade specialization during the same period, once again comparing the two approaches outlined above (see Table 6).

Table 6
Ranking of the EC countries' trade performance during the 1980-87 period based upon the change in their trade situation during the period

	1980	1987
Belgium, Luxembourg	3	3
Denmark	7	8
France	6	7
FR of Germany	8	1
Greece	11	2
Ireland	1	5
Italy	9	9
Netherlands	5	6
Portugal	2	4
Spain	4	11
UK	10	10

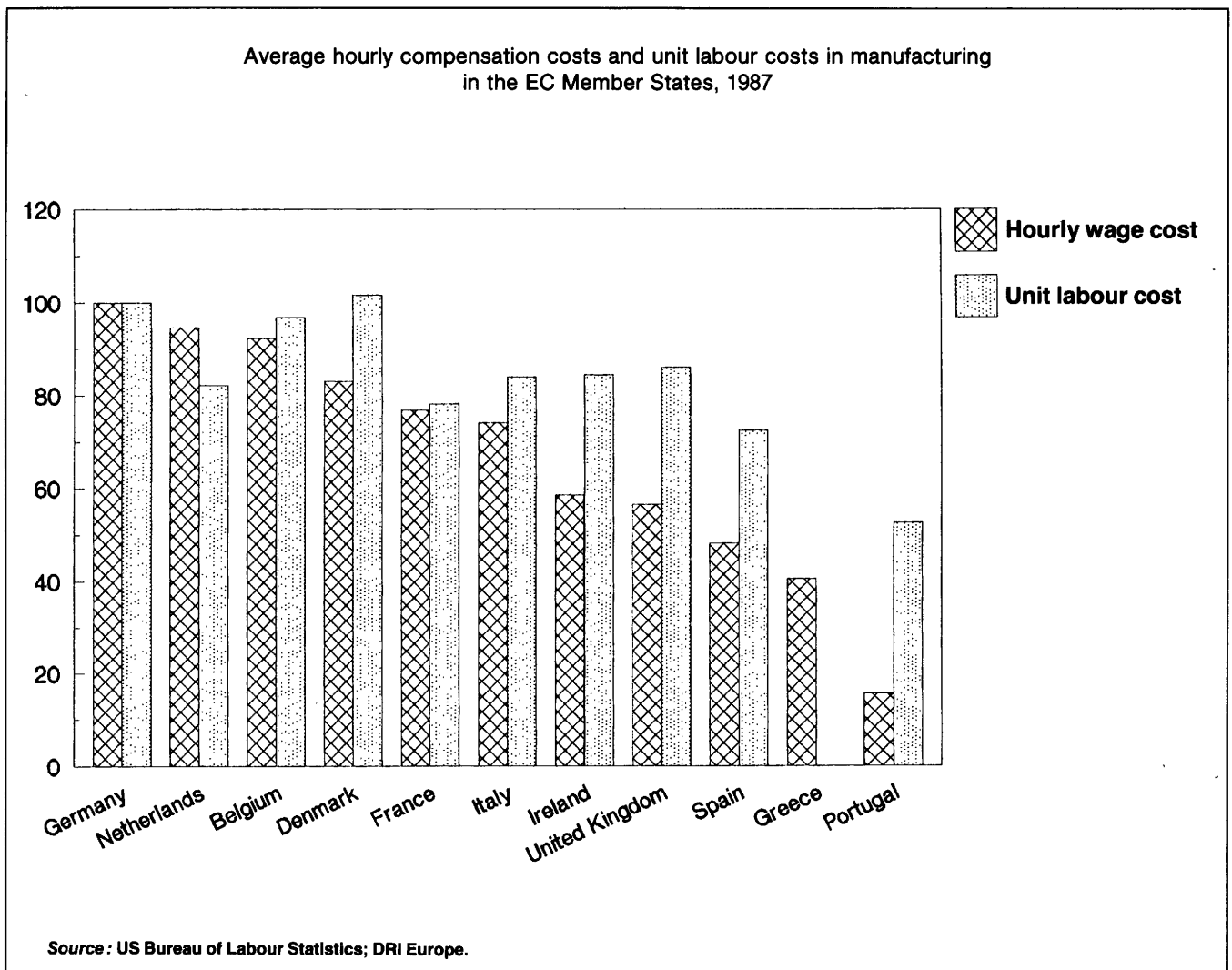
Source: DRI Europe.

Again we see substantial differences in the rankings, depending upon the assumptions and the objectives of the analysis. For their own accounts, Ireland, Portugal, and Belgium/Luxembourg have made the greatest improvements between 1980 and 1987. However, in terms of their contribution to overall EC trade, Germany, Greece, and Belgium/Luxembourg have made the greatest improvements during the period of our study. Because BLEU is the only region that appears within the top three in both of these lists, we could perhaps conclude that BLEU has made the best overall improvement in performance during the period from 1980 to 1987.

Competitiveness of the EC in the world market

In the previous three sections, we described the changes in the structure of the EC's trade with the rest of the world, considering first the EC as a whole, and then comparing the individual Member States' performances. The question is however whether one can reasonably expect the changes outlined above to continue over time, or whether there is reason to believe that there may be a reorientation of trade movements in the coming years, and, if this is the case, in which direction? To try to answer this double question, this section will focus on an analysis of some of the factors that influence the degree of competitiveness of one region, country or sector, and look both at past trends and, whenever possible, likely future developments of these factors.

Figure 21



The factors that influence the degree of competitiveness of a given economy, sector or company can be grouped in two different categories: price competitiveness factors, and non-price competitiveness factors. Both will be analysed in turn below.

Price competitiveness factors

Price competitiveness depends on a number of factors, among which the levels of and trends in relative labour costs, exchange rates, and productivity.

Wage costs and productivity varied widely from country to country during the 1970s and early 1980s, even if, all over Europe, there was a clear rupture in the trend in the beginning of the 1980s. At the time, most governments tried to put a brake on the expansion of labour costs, in an attempt to restore corporate profitability which had been severely hit by the oil price crises and the rise in interest rates. The shift in policy that took place in the UK when Prime Minister Margaret Thatcher came to office is a good

— but maybe extreme — example of this general shift in policy emphasis: absolute priority was now given to restoring productivity growth. Though in the other countries the policy shift was far less pronounced than in the UK, it still resulted in greater importance being given to market forces.

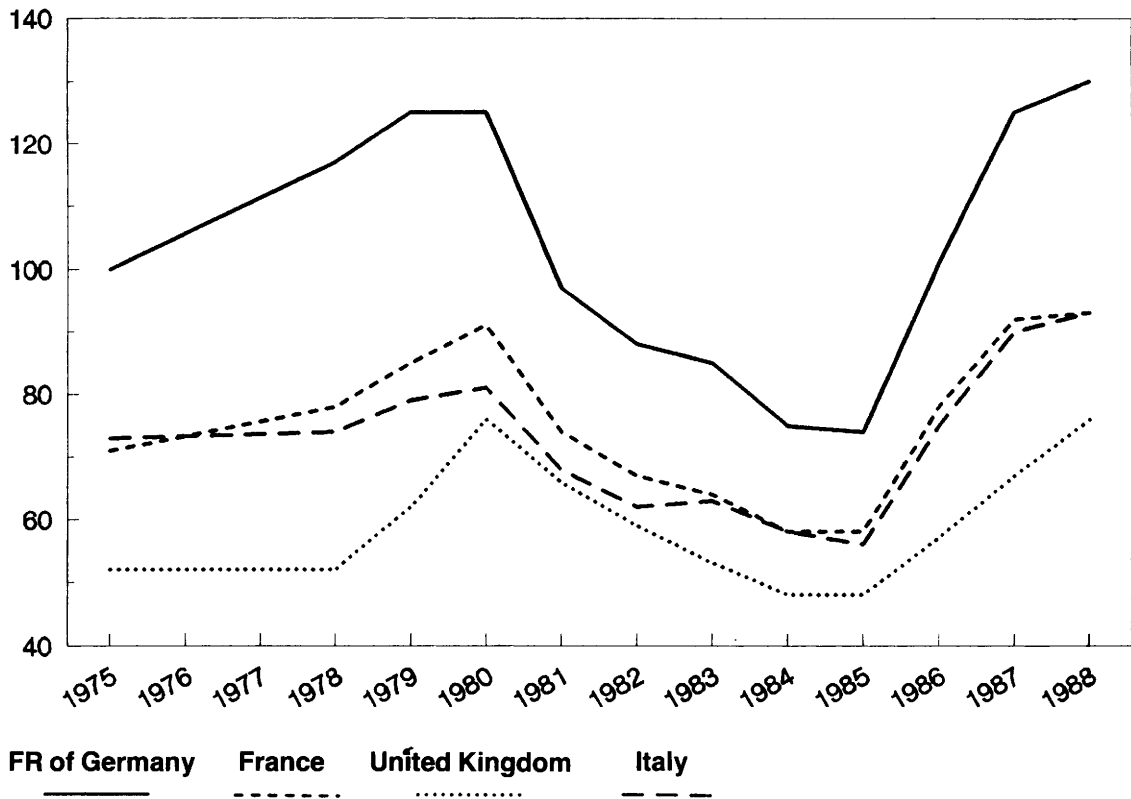
Nominal wages and unit labour costs

Differences in nominal wage growth rates did not however result in a greater harmonization of wage levels in Europe, as Figure 21 and Table 7 indicate. The total hourly compensation costs that are reported in Table 7 were calculated by the US Bureau of Labour Statistics in such a way as to enable cross-country comparisons. The numbers represent the total hourly cost of labour to employers, i.e. including employer social security contributions and any other legal cost to employers, in 1987 USD.

The fact that, among the main six industrialized countries, the United Kingdom is nearly always the country with 'cheapest' labour costs owes much to

Figure 22

Hourly compensation costs for production workers in manufacturing in the main European countries as a % of hourly compensation costs in the US



Source: US Bureau of Labour Statistics; DRI Europe.

the fact that, in 1987, the pound sterling was somewhat undervalued, to the UK's advantage. (The pound's effective exchange rate was, in the beginning of 1987, nearly 25% lower than its average 1980 level.)

More important however than the comparison of total hourly labour costs is that of unit labour costs, i.e. taking account of the fact that productivity levels are not the same across countries.

This is done in Figure 21, where unit labour costs in manufacturing in all the Member States are expressed as a percentage of the level in the Federal Republic of Germany. Here, the ranking of countries does change significantly, with Spain and Portugal in particular who have extremely low labour costs in nominal terms having a much smaller advantage when overall productivity differences are taken into account.

This figure should be viewed with great caution, however, as it is based on the average wage and productivity level in manufacturing as a whole. Labour productivity levels are however very different according to the type of activity, and the share of the different sectors in total manufacturing varies across countries. It would thus be much more correct to compare unit labour costs across countries for each major sector of economic activity, as is done in Table 8 for France, the United Kingdom and Italy. It is unfortunately extremely difficult to gather consistent data on employment, value-added and wages by sector for the other countries, so that the analysis here is limited to these four major European countries, which together account for over two thirds of the EC's GDP.

As we see, France appears to be the country, among the main four industrialized countries, with the

Table 7
Hourly compensation costs in selected sectors in the main industrialized countries in 1987, in USD

Sector	Germany	France	UK	Italy	USA	Japan
Food, bev. & tobacco	14.33	12.31	8.87	12.32	12.36	9.23
Textile mills	12.96	10.06	6.88	10.43	9.01	8.16
Other textile	11.20	9.41	5.43	9.44	7.47	5.74
Leather	11.87	10.08	6.50	9.50	7.89	8.22
Lumber & wood products	15.15	10.62	7.72	10.33	10.45	8.99
Paper & allied products	15.59	13.30	9.75	13.17	15.77	11.93
Printing	17.53	15.99	12.37	14.78	13.27	12.50
Chemicals	19.12	13.98	10.65	13.09	17.10	17.92
Rubber & plastics	15.21	11.95	8.89	12.99	11.97	10.85
Stone, clay & glass	15.66	13.21	8.85	11.64	13.76	11.47
Primary metals	18.61	14.38	10.47	14.59	18.14	15.61
Fabricated metals	15.52	12.27	8.78	12.08	13.57	10.95
Tools and finished metal	14.77	11.60	8.59	11.85	13.32	N/A
Non-electr. machinery	17.60	12.99	9.11	12.59	14.51	12.69
Electr. equipment	16.25	12.27	8.22	12.03	13.56	10.10
Transport equipment	21.16	13.66	10.39	12.80	19.36	13.99
Instruments & related	15.07	11.57	8.76	11.69	13.33	10.77
Miscellaneous	13.43	11.38	7.52	10.63	9.93	9.88

Source: US Bureau of Labour Statistics, DRI Europe calculations.

cheapest labour force in the transportation sector, as well as in the mechanical and electrical engineering and chemicals sectors, while Italy is now the country with the cheapest labour force in paper, printing and publishing sectors, and in the miscellaneous industries (most of which being furniture). These are not necessarily the products for which these countries have the highest export intensity, however, since more than just labour costs influence overall competitiveness.

Before turning to the projected trends in unit labour costs, let us first look at their past trends in more detail, by focusing on the trends in productivity, both in the EC and elsewhere.

Past trends in productivity

As indicated in the first chapter of this Panorama (Highlights), average productivity growth rates have gradually been falling in nearly all countries since the early 1970s, but not at the same pace everywhere. Interestingly, between 1965-73 and even between 1979-86, the average rate of labour productivity growth was significantly lower in the USA than in Europe — at least in the four large European countries. The fastest increases in productivity over the abovementioned sub-periods were observed in Japan, followed by France. The UK bottomed the list, until the situation was reversed in the early 1980s. Productivity-wise, thus, Europe's situation was comparatively good until the beginning of this decade. Since 1980, however, all the European countries but the UK have been outrun by the USA. All

other things remaining equal, and in particular nominal wage increases, this means a deterioration of Europe's relative competitiveness.

Table 8
Unit labour costs in selected sectors as a % of the German level 1987

Sector	Germany	France	UK	Italy
Food, bev. & tobacco	100.0	64.5	53.3	83.3
Textile mills	100.0	81.5	72.4	91.9
Other textile	100.0	88.1	66.1	96.2
Leather	100.0	89.2	74.6	76.9
Lumber & wood products	100.0	93.2	75.7	62.4
Paper & allied products	100.0	93.0	83.5	88.1
Printing	100.0	99.4	94.3	87.8
Chemicals	100.0	49.4	54.3	66.2
Rubber & plastics	100.0	68.3	56.5	93.8
Stone, clay & glass	100.0	84.0	65.6	96.0
Primary metals	100.0	61.7	52.3	92.4
Fabricated metals	100.0	63.2	52.5	91.6
Tools and finished metal	100.0	51.0	91.7	96.6
Non-electr. machinery	100.0	48.1	81.8	86.2
Electr. equipment	100.0	55.4	70.7	89.3
Transport equipment	100.0	45.3	63.1	56.2
Instruments & related	100.0	82.0	69.6	72.1
Miscellaneous	100.0	112.8	83.0	72.4

Source: DRI Europe.

As the investment in fixed capital that was built up at a rapid rate in the past 2 to 3 years is progressively put to use, however, and economic growth continues at a healthy rate of around 3% a year on average, labour productivity growth is likely to accelerate again, reducing the gap with the USA in particular, even if it does not yet catch up with Japan and the NICs.

Exchange rates

Exchange rate movements also have a strong influence on the degree of competitiveness of different sectors/countries. At the individual country level, they can either offset or amplify given rises in unit labour costs in local currencies, causing an improvement or a deterioration in relative labour costs.

Depending on whether the country is a price taker or a price maker on external markets, exchange rate fluctuations influence profitability in companies exposed to international competition in a different way. Indeed, if the price of a given product is set on international markets, a devaluation of the currency of the producing country will not change the selling price on export markets, but will raise the profit of the producer. Inversely, a currency appreciation forces producers to cut margins or lose market share.

When the country/sector is a price maker, a devaluation will lead to a reduction of the product's price in foreign currency, making it more attractive — and to an increase in price in case of a currency appreciation.

Finally, when producers may choose which price they set, they will often adjust their selling price somewhere mid-way, i.e. not by the full amount of the devaluation/revaluation. The role of exchange rates is particularly important in explaining the sound trade performance of some of the EC countries over the past decade or so, despite the fact that unit labour costs had risen comparatively faster than elsewhere (Italy and Portugal, among others).

Outlook for unit labour costs

As indicated in the macroeconomic overview, the outlook for wages is quite promising, at an aggregate level. However, as illustrated in Table 8, since differences across sectors are already extremely important, both within and across countries, even small variations in the rate of growth of nominal hourly wages around this average could significantly modify the sector's overall competitive position.

Turning to the influence of exchange rates, one should note that the remarkable stability that has characterized the EMS in recent years has been very supportive to both intra and extra-EC trade. The moves towards a single European currency and the greater integration of Europe's financial markets requires an even greater stability of exchange rates in Europe, implying that intra-European exchange rate fluctuations will have very little effect on the relative competitiveness of the EC countries with respect to

each other. Competitiveness relative to the USA, Japan or the NICs will however be affected by the rates of fluctuation of these countries' currencies against the ecu.

Although all exchange rate forecasters know how risky it is to make predictions in this area, most agree that the US dollar ought to fall somewhat from its present level to enable the US trade balance to move close to equilibrium. This will have a negative effect on the competitiveness of European industry, which producers will have to offset by improving productivity faster than its US competitors (in order to create a positive productivity growth differential) and/or keeping wages down, in order to maintain a negative wage growth differential.

Non-price competitiveness factors

Having seen that the EC is well equipped to face the challenges of the future as far as price competitiveness is concerned, we still have to consider the non-price competitiveness factors, which in the past have sometimes had a greater influence on the direction of trade flows than price-competitiveness factors. The main 'non-price competitiveness' factors are the following:

- cultural and historical;
- quality;
- customer loyalty;
- technological advance;
- know-how;
- government policy.

Though some of these are quite obvious and do not deserve additional comments, others are less immediate but extremely important and likely to play a determinant role in explaining the changes in EC trade patterns over the coming years.

Customer loyalty

The ability to impose certain standards and the loyalty of customers to given product brands plays a key role in explaining the rapid development of certain industries. Customer loyalty has proved very important in the electronic data processing industry for instance, whereas the ability to impose one's own standards has been the main factor explaining the development of companies in the telecommunications equipment sector, or in the consumer electronics business.

In the telecommunications equipment sector, technical standards evolved independently, i.e. on a

national basis, in the past, mainly in those countries which had their own domestic suppliers. Such development has caused an oligopolistic market structure, and explains why, to date, Community producers tend to export more to established non-EC markets than to other Member States.

Generally speaking, the harmonization of standards in the EC and the progressive abandonment of the 'national champions' policy will open new markets to the existing producers, provided they adjust to the new standards. From the consumers' point of view, the harmonization of standards will also be a plus, as the increased competition that is likely to result will eventually translate into lower prices, and possibly a greater variety of products from which to choose without having 'compatibility' problems.

Technological advance

Technological advance is a key element of a company's overall competitiveness in an increasing number of activities. It explains to a large extent the supremacy of Japan and some NICs in certain key areas, such as consumer electronics, and high-technology products such as electronic data processing equipment. It also explains the EC's strong market position in other sectors, among which the pharmaceuticals industry.

In the pharmaceuticals sector, indeed, technological advances (biotechnology) and the ability to innovate have a crucial impact on the comparative advantage of a given company. Both in the EC and in the USA, R&D expenditure is very important in this sector. In the largest EC countries, the ratio of R&D to turnover is of around to 13 to 14%.

In the consumer electronics sector, technological developments increasingly depend on those in the electronic data-processing equipment sector. Examples of this are the especially digitally-enhanced colour televisions (CTVs), a product in which the Community remains highly competitive, and VCRs and CDs, in which Japan has established a leading position.

Government policies

The influence of government policies on the degree of competitiveness of a given industry in one country can result from several factors:

- development assistance from national administrations via programmes such as defence and space programmes, and those for the development of the semiconductor subsector. This assistance plays an important role in the aerospace industry, but

also in the office and EDP (electronic data-processing) sectors;

- pricing policies, which influence the profitability of the sector. The pharmaceutical industry for instance is extremely sensitive to the regulatory environment for pricing. Pharmaceuticals prices vary considerably across Member States, as the extent of competition from generic products varies greatly. In general, such competition is much higher in the USA, with obvious implications on margins. Although the maintenance of high profit margins on the products is clearly not beneficial *per se*, it enables the companies to undertake the necessary investment in research and development, and new equipment, to keep a competitive edge;
- certification policies and national standards. Indeed, if some standards are the result of a 'natural' process, by which a given company invents a product which becomes widely used and whose characteristics eventually become an 'industry standard' (as is the case with IBM PCs and its huge family of 'compatibles'), other standards or norms are dictated by the public authorities themselves, either to protect consumers or to protect a given industry from its competitors. As indicated above, however, the existence of national standards has generally not favoured the development of those industries, since other countries adopted the same strategy, leading to market fragmentation;
- fiscal policy; though it may seem surprising to find this item under this heading, the indirect tax policies followed by the different Member States can have an important influence on the development and eventually the competitiveness of certain sectors. The levy of a high VAT rate on consumer electronic products in many countries in Europe has somewhat restricted the potential market for these products, preventing European producers from achieving the necessary size and the point on the learning curve where they can successfully compete with more experienced producers such as the Japanese and the Americans.

High research, development and production facilities costs

Production in many sectors requires large capital investments, the amount of which is sometimes such that it constitutes an important barrier to entry in the industry. In this case, established firms have an advantage on others, who have to struggle with large costs and financial charges in the beginning of their

existence, and are thus much more sensitive to 'external' shocks such as interest rate fluctuations or cyclical downturns. Many examples can be found of such sectors, especially in the investment goods industries. In this case, thus, either the industry is protected in its infancy, or it will have the greatest difficulties in acquiring a significant share of the market. All other things being equal, the competitive advantage is enjoyed by the first companies entering the market.

Economies of scale

Somewhat linked to the previous point is the influence of economies of scale on competitiveness. In those sectors where economies of scale can be important, but where European companies have not been able to grow in line with their competitors because either the regulatory environment or general economic conditions were unfavourable, European companies have sometimes had to suffer severe losses in external competitiveness, or have lost ground to their competitors. This is what has happened in many high-technology industries, such as the telecommunications equipment sector.

Conclusion

All these 'non-price competitiveness' factors tend to change much more slowly over time than the price-

competitiveness factors, because of their very nature. Most of the factors described above are thus likely to continue influencing trade patterns in the same way over the coming years as they have done in the recent past. Although the creation of the single European market is leading to a uniformization of standards and norms within the EC, to increased competition and will give access to a greater market in many areas, enabling companies to increase their size and thus come close to the 'optimal' size (i.e. the size at which they fully benefit from economies of scale), this process will take some time.

The favourable development of Europe's price competitiveness over the coming years, and the likely improvement of its 'non-price' competitiveness following the creation of a single European market should enable Europe to increase its share of world trade again. Intra-European trade will probably increase even faster than trade with the rest of the world, however, as intra-European borders are eliminated and goods flow more freely between the 12 Member States.

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INWARD INVESTMENT

The European Community and its partners

A word of caution regarding statistics and definitions

This chapter contains some four dozen tables showing the evolution of inward investment over the last decade in the Community. Yet, each table must be treated in isolation, as each measures somewhat different things. Definitions of what constitutes direct investment vary between countries, and even agencies within countries. The US Department of Commerce uses a 10% equity ownership to distinguish direct from portfolio investment, as does the Japanese Jetro. MITI figures relate to 30% Japanese-owned firms, while for the Federal Republic of Germany the dividing line lies at 25%. These limits are not arbitrary, as they reflect domestic regulatory requirements, but they render any two sets of figures strictly non-comparable.

It is worth noting that the European Community does not use a (single) quantitative criterion for distinguishing DFI from other forms of capital flows but, rather, (a) the establishment of 'lasting and direct links' between the investor and the company receiving the funds; and (b) a level of shareholding or participation which, under respective national laws, allows the investor 'to participate effectively in the management of the company or in its control'. (1) This means that aggregate statistics are composed of non-uniform national components.

Countries also differ in their treatment of reinvested profits; the Netherlands, France and Italy do not register reinvested profits as DFI, while the German Bundesbank and, since 1984, Britain's DTI, do. The effect on absolute figures can be substantial; e.g. more than a quarter of (non-oil) direct investment to Britain between 1983 and 1987 was in the form of reinvested profits.

Even more confusing is the treatment of investments and disinvestments (which may include repatriated profits and sales of equity). Some sources, like the US Department of Commerce, publish net figures, while others, like the Federal Republic of Germany, list investments and disinvestments separately, but not net figures. France publishes all three sets of figures.

Some countries with a history of exchange controls, such as Japan and Spain, list 'approved' rather than

actual investments, as reporting requirements are more precise for the former than for the latter. This may introduce overestimates and distortions as regards allocation to a given year.

Care should be taken to distinguish (annual) flows of direct foreign investment from stocks, a term used in the economists' sense, i.e. the accumulated value of investments, reinvested profits and disinvestments. The term 'stocks', confusingly, also means equity shares; this is never the sense in which the term is used here. On the contrary, stock values in our sense (cumulated net nominal flows) do not reflect current market values of foreign-controlled assets, except where stated. Since, moreover, flow (and hence stock) figures refer to participations which may vary between 10% and 100%, the true value of assets controlled through DFI is certainly several times the amounts stated. For example, the British BAT industries paid a total of DM 74 million for 51% of the German department store Herten, which is presently valued at DM 1.4 billion on the stock exchange. (2)

For all these reasons, the information value of the tables lies less in the absolute figures than in the ratios between sources, destinations and sectors, and the development of these ratios over time.

One large but persistent distortion of figures stems from a rather formal — and out of date — definition of 'nationality'. Statistics on DFI are mostly found under the heading of 'balance of payments' and still largely reflect monetary rather than industrial policy concerns. Meanwhile, the internationalization of the world economy is progressing rapidly. A transaction in which an Anglo-American holding registered in the Netherlands takes up a credit in Luxembourg to finance an acquisition in Spain will be recorded as a Dutch direct investment. If the credit is long-term, it will be recorded as Luxembourg investment as well.

Introduction

Broad trends

According to a recent study, direct foreign investment (DFI) from the five major OECD countries grew by over 30% in real terms between 1983 and 1987, as against less than 5% for world trade. (3)

The importance of DFI in Western economies can be gauged from Table 1.

Table 1
Share of foreign-owned manufacturing companies
in major economies, mid-1980s (1)

(%)	D	F	UK	USA	Japan
Sales	19	27	20	10	1
Value-added	N/A	24	19	N/A	N/A
Employment	8	20	14	4	0
Assets	17	N/A	14	9	1
Investment	N/A	19	13	8	N/A
Exports	24	32	30	23	2
Imports	N/A	N/A	N/A	34	15

(1) France: manufacturing and petroleum; Germany: non-financial corporations; Japan: all companies.

Source: Adapted from D. Julius and S. T. Thomsen, 'Inward investment in foreign-owned firms in the G-5'.

This chapter deals above all with US and Japanese direct investment, although the latter, in quantitative terms, is probably less important than, say, DFI from the EFTA countries. This reflects on the one hand the great political and strategic interest in investments by the EC's major world competitors, and on the other the fact that both these countries publish statistics with the requisite breakdown.

An even more regrettable shortcoming is a systematic ventilation of intra-EC investment for some of the same reasons: lack of comparable data, and the often misleading nature of the data.

As the individual country sections will show, much of intra-EC direct 'foreign' investment is in fact national capital, reconstituted in holdings in Luxembourg, the Netherlands or London to take advantage of fiscal and/or regulatory regimes, and then reimported to the country of origin under a new flag. Both the outflow and the inflow appear as DFI operations in the statistics.

The discrepancy in the two sets of figures in Table 2 illustrates the lack of standardization in this area. Nevertheless, the flows are rather modest when compared with, for instance, US net flows to EC 12 of some USD 12 billion in both 1985 and 1986. Partial data for subsequent years (see country chapters below) show, however, a substantial increase in cross-border direct investment in the EC.

As will be argued more fully below, the exercise of control over local assets is the key element distinguishing DFI from other forms of long-term interna-

Table 2
Intra-EC direct foreign investment

(billion ECU)	1980	1981	1982	1983	1984	1985	1986
As reported by:							
Receiving country	4.5	5.8	4.7	5.2	1.4	8.2	11.3
Source country	3.1	3.4	2.7	3.7	5.6	10.4	14.4

Source: Eurostat (Internal working paper, March 1989).

Table 3
Inward and outward direct foreign investment: EC, USA and Japan

(billion ECU)	1980	1981	1982	1983	1984	1985	1986
Outward DFI by:							
EC	11	18	12	15	18	21	26
USA	14	8	-2	0	4	22	29
Japan	2	4	5	4	8	8	15
Inward DFI to:							
EC	10	8	9	11	9	10	10
USA	12	22	14	13	32	25	25
Japan (1)	0	0	0	0	0	1	0
Balance							
EC	-1	-10	-3	-4	-9	-11	-16
USA	-2	14	16	13	28	3	-4
Japan	-2	-4	-5	-4	-8	-7	-15

(1) 1980 less than ECU 0.5 billion.

Source: Eurostat global balance of payments database.

tional capital flows. If so, the Community has done comparatively well in the 1980s. In most years it invested significantly more abroad than the US and much more than Japan. On the other hand, a far lower share of its assets pass into foreign hands than those of the US, even if it does not match Japan's record of virtually excluding DFI.

Table 3 also confirms the relative weakness of intra-EC DFI, running at about one third of extra-EC DFI.

Table 4
Distribution of Japanese and US investment in the EC
Breakdown by country (1)

(million USD)	USA		Japan	
	Value	Share (%)	Value	Share (%)
EC	122 247	100	27 972	100
Belgium	7 078	6	1 027	4
Denmark	1 114	1	26	0
FR of Germany	24 450	20	2 364	8
Greece	215	0	96	0
Spain	4 037	3	1 045	4
France	11 478	9	1 764	6
Ireland	5 484	4	432	2
Italy	8 449	7	370	1
Luxembourg	723	1	4 729	17
Netherlands	14 164	12	5 525	20
Portugal	381	0	40	0
United Kingdom	44 678	36	10 554	38

(1) The figures for USA refer to stocks, 1987; the Japanese figures to cumulative investment, 1951-88.

Source: Survey of current business (USA); Ministry of Finance (Japan).

DFI from the USA and Japan in Member States

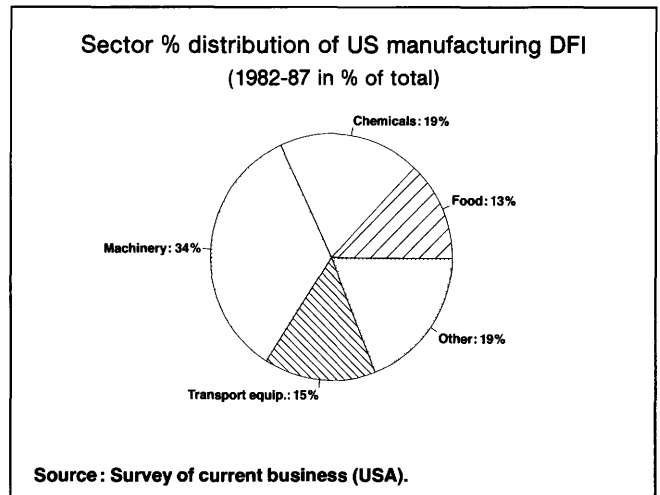
The distribution of US and Japanese DFI among Member States shows marked differences only as regards Japan's relative neglect of the Federal Republic of Germany and Italy, and its substantial engagement in Luxembourg. France and Italy receive a small share of DFI from both, while the shares of Ireland and the Netherlands are well above their relative GDPs. Greece and Portugal are for the time being totally neglected by both major OECD partners.

A major difference between US and Japanese DFI in Western Europe is the share of manufacturing in the total: 63% of the stock US investment in the EC, but only about 16% of Japanese DFI (in 'Europe'), had gone to manufactures by 1988.

As regards the distribution of US and Japanese investment among the Community's manufacturing

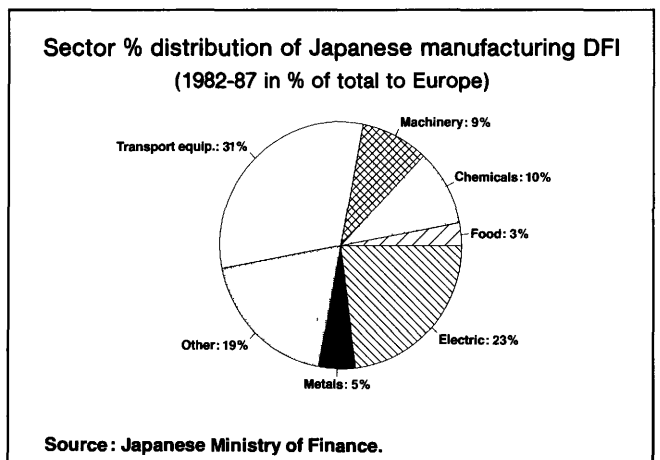
sectors, the differences are striking, especially as regards electrical equipment. Since there is a substantial US presence in Europe in this sector — IBM to cite only one example — the nil figure shows that the US companies in this sector have long since repatriated their original investment and financed growth from retained earnings or capital raised in Europe.

Figure 1



The sector distribution of Japanese world-wide investment is shown in Figure 2, for comparative purposes. It shows that Europe gets a greater than average share in automotive investment, despite Japan's substantial engagement in the USA.

Figure 2



US and Japanese presence in the EC

When comparing the absolute amount of stocks of DFI by the United States and Japan, it becomes clear that the US investment, even when measured by the undervalued index of book value, stands at 13 times the Japanese figure. A comparison with Japan's global investment, moreover, shows the

Table 5
US and Japanese manufacturing DFI by sector, Europe 1982-87 (1)

(million USD)	USA		Japan (Europe)		Japan (World)	
	Value	Share (%)	Value	Share (%)	Value	Share (%)
Food	3 592	13	68	3	818	4
Chemicals	5 360	19	226	10	2 393	11
Metals	32	0	111	5	3 164	15
Machinery	9 592	34	200	9	2 183	10
Electric	132	1	531	23	5 099	24
Transport equipment	4 313	15	700	31	3 851	18
Other	5 043	18	432	19	3 651	17
Total (2)	28 064	100	2 268	100	21 159	100

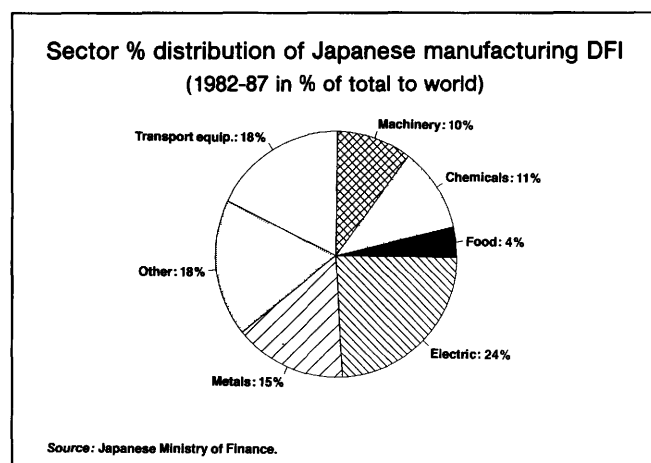
(1) USA: EC 12; Japan: Europe. Figures for USA are a sum of net investment flows. Japanese figures were derived by subtracting 1981 stock figures from 1987 stock figures.

(2) Country breakdown only available for a limited number of countries.

Source: Survey of current business (USA); Ministry of Finance (Japan).

relative lag of Japanese manufacturing investment in Europe.

Figure 3



Mergers and acquisitions

Once the figures for 1988, and even more for 1989, become available, they may well show a very different picture. Given the approach of 1992 on the one hand and increased DFI activity by American and Japanese firms on the other, major European firms are becoming obsessed with size as a competitive asset. Since there is no time to expand quickly enough through internal growth, mergers and acquisitions are the solution. In 1988 there may have been 1 200 major operations of this kind; in 1989, this figure may have doubled. (4)

An increasing proportion involves cross-border mergers and acquisitions. Although these may be financed through exchanges of equity or locally raised debt, they nevertheless also cause substantial DFI flows. Table 6 provides interesting insights into national patterns of M&A activities.

Table 6
Cross-border mergers and acquisitions in Europe, first half of 1989

(million ECU)	Value	Share (%)	Number
Origin			
Denmark	219	1	10
FR of Germany	300	2	46
Spain	298	2	11
France	4 149	27	86
Italy	1 071	7	28
United Kingdom	3 289	21	160
Finland	500	3	15
Sweden	757	5	46
USA	3 615	23	69
Japan	531	3	24
Others	709	5	94
Destination			
Belgium	180	1	28
FR of Germany	1 174	12	90
Spain	1 084	7	65
France	2 299	15	91
Italy	2 039	13	52
Netherlands	511	3	48
Portugal	310	2	12
United Kingdom	5 956	39	101
Finland	316	2	9
Sweden	205	1	16
Others	761	5	75

Source: Adapted from the 1992 M&A Monthly, as reproduced in the Financial Times, 26.7.1989.

The picture that emerges only partially confirms general DFI trends. As might be expected, the UK — with its open equity market and popularity with foreign investors — is the prime target of acquisitions, but France and the Federal Republic of Germany are almost equal regarding the number of deals. This suggests that in the latter case a larger proportion of small specialist companies are being bought up.

As regards the origin of M&A activities, France's first-place ranking in terms of value may reflect the relative head-start of French companies in taking '1992' seriously. British acquisitions, however, are the largest in number and are almost equal in value. The Federal Republic of Germany appears as a passive player, reflecting export-oriented technological niche strategies requiring a lesser reliance on low production costs, scale economies or market share.

Foreign Investment — promises and problems

The current world-wide rise in DFI is in part linked to the huge current account imbalances between the US and Japan, fear of protectionism in the US and Europe, and companies' search for size as competition becomes increasingly global.

More fundamentally, however, DFI is a more sophisticated vehicle of international exchange than arms-length trade — the international equivalent of the 'network' economy which is becoming typical of advanced countries in general.

DFI allows 'trading' values other than final products. A traditional export of goods and services combines output derived from different assets — labour, management skills, technology — in a single package. No sale takes place unless the sum of these assets is superior in terms of quality and price. Inversely, all domestic assets (factors of production) may lose a share of their market to imports, although only one factor (incompetent management, costly labour, insufficient technology) may be responsible for the lack of competitiveness.

Direct foreign investment makes it possible to disaggregate the 'package' of inputs, factors of production, etc. represented by traditional exports and, indeed, nationally generated (import competing) production in general and to move toward more sophisticated forms of international exchange. The key instrument allowing such exchanges is not the ownership conferred by DFI as such, but control. This control allows management to combine a wide variety of assets at its disposal in both the home and the host country or countries, to produce an output which is optimized in terms of cost, quality and suitability for different markets.

The assets which can be recombined include:

- finance itself;
- a labour force with different cost and skill characteristics;

- technology available from company sources or its local (or national) environment;
- organization and management skills;
- the sourcing of components, raw materials and services;
- market access, e.g. through physical proximity, brand names or established distribution networks.

The problem

If DFI is an efficient form of optimizing resources on an international scale, why then is inward DFI strongly discouraged in Japan? And why are both outward and inward DFI the object of sometimes anxious scrutiny in the USA and the European Community?

The 'neutral' economist's view of DFI is often qualified by a strategic view which stresses the market power conferred by DFI and the long-term implications for individual sectors and society as a whole which may flow from such power. Both views are valid, explaining the ambivalent attitude to DFI in most advanced countries — and the diversity of approaches within the European Community.

One reason for this ambivalence is that inward investment involves the sale of national assets — notably key industrial plant and technology — and is more permanent than the generally welcomed sale of the output generated by the same assets in the form of exports. The element of control, so crucial to the efficiency of DFI, becomes a liability.

Moreover, these domestic assets are felt to have been created, to some extent, by an effort of the national community as a whole — through the educational system, publicly supported R&D, public investment incentives, publicly supplied infrastructure, etc. In a seeming paradox, outward investment may be resisted on similar grounds: the profits generated by nationally developed technology with support from the public (tax concessions) and workers are transferred abroad to create growth, employment and economic dynamism in other countries.

Such 'political' objections to DFI are sometimes used by private companies (including established subsidiaries of foreign companies) to resist DFI by newcomers. In sectors such as the automobile and

electronics industries concerns fall broadly into two categories — overcapacity and ‘historic handicap’.

In mature industries dominated by a few large companies, overcapacity can often result from a desirable response to market pressures. Thus, in the automobile industry, the switch to highly automated factories and heavy R&D investment in both product and production technology require large production runs to be amortized. If all companies simultaneously engage in competitive reinvestment, overcapacity results.

In Japan, rationalization cartels have routinely been used to cope with the — temporarily — negative consequences of an otherwise welcome investment in the future. In Europe, import measures favoured by the continued fragmentation of the market have allowed the automobile industry to survive quite profitably a potentially risky period of overcommitment; overcapacity was estimated at 1.5 million units in 1989. But, with the prospect of internal and external barriers to competition coming down by 1992, such industries are worried about additional capacity being created by newcomers.

In addition, these industries see themselves working under an ‘unfair’ handicap comprising their historically developed commitments to workers regarding wages, manning and working rules and their commitments and obligations to State and local communities as regards taxes, etc. Japanese (and other) newcomers can and do strike new deals.

This advantage is exacerbated by outright preferential treatment of foreign over national investors in terms of fiscal advantages, union contracts, etc. — simply because such advantages are granted to ‘new’ investment but not to the modernization and rationalization of existing plant.

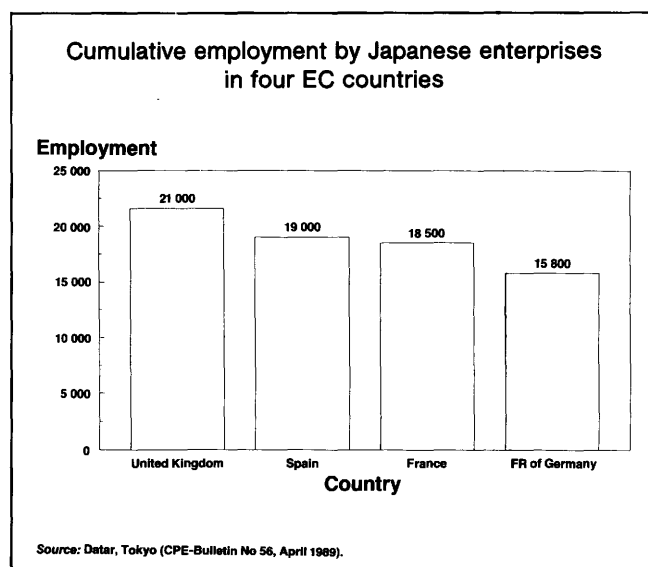
Since the newest robot halls at VW or Fiat are as advanced as anything in Japan, they too could move into other European countries to establish greenfield sites and outperform national competitors. But they are constrained by fears of exacerbating overcapacity — and of protests at home. Thus, Japanese investors are singled out for critique from industrialists because, in pursuit of long-term strategies, and with the benefit of low-cost conditions offered by European public authorities and worker representatives, they can invest in the face of overcapacity at no risk to themselves and great risk to their established competitors.

Resistance by the European electronics industry to Japanese DFI shows some parallels to the automobile case, although here an infant industry argu-

ment dominates. The infants in question are not, of course, Europe’s giant electronics firms as such, but key components (semiconductors) and advanced products. Only the rapid build-up of (world) market shares makes it possible to recoup R&D costs and hence to finance subsequent generations of advanced products. A combination of arms-length Japanese imports and production from subsidiaries located in Europe will, so the argument runs, smother the European infants in their cradle. US firms escape much of this critique because they transfer technology and R&D activities to Europe, contributing to a strengthening of Europe’s technological base.

Such arguments are resisted by other industries (e.g. high-tech industries relying on the availability of low-cost commodity chips), although some user industries also favour a genuinely European source for semiconductors — albeit as ‘second source’. However, the strongest resistance against restrictions on DFI comes from public authorities seeking to attract employment-creating investment.

Figure 4



Employment

Gross job creation by Japanese DFI in the four major recipient EC countries has been estimated at around 75 000, referring to the situation of 1987 and using the MITI definition ($\geq 30\%$ participation). These small figures contrast with the great efforts made by countries such as the United Kingdom to attract Japanese DFI, Ireland’s shift from the USA to Japan as the major target of investment promotion, and the reversal of France’s previously hostile position.

Net job creation is both smaller and larger than these figures suggest. This depends partly on the geographical definition of the relevant labour market. The local/region effect is magnified not only by the usual secondary employment effects of any economic activity, but more particularly by the 'educational' effect on local and regional suppliers having to match more stringent Japanese quality criteria — with long-term positive effects on their competitiveness. While Japanese production management standards have been introduced in the Federal Republic of Germany or Sweden without such direct education, just-in-time, O-defects, worker involvement, etc. have spread in countries such as the United Kingdom thanks to supplier relationships with Japanese plants. There is also evidence that Japanese (and US) DFI in a given locality confers a 'seal of approval' likely to attract other investors.

Against this local effect must be set the job displacement effect at national and, even more, Community level. The net effect of any investment in a non-expanding market will normally be negative as more recent and hence efficient technology is introduced. This becomes problematical, in political terms, if Member States which may only have to consider gross employment effects (since the industry in question is either in decline or poorly represented at national level) subsidize investment which displaces otherwise viable jobs in other Member States.

The equation is complicated at the Community level by the net trade effect. As far as Japanese DFI is concerned, the (bilateral) trade effect of any single industrial investment can be represented by a J-curve, with a deteriorating Community trade (and hence employment) balance in the initial years. In the first years of the life of an investment, imports of Japanese investment goods on the one hand, and trade expansion in components which jump trade barriers more easily than finished products on the other, lead to a net increase in imports. It is only when local content increases that direct imports from Japan may be substituted. Even this prospect presupposes that the industry in question has not been fatally weakened in the meantime, so that a given product line — as has happened in the USA — becomes dominated by Japanese firms, with high-value items being exported directly from Japan while more mature products are produced locally.

However, taking not the bilateral Euro-Japanese but the Community's total trade balance into consideration, Japanese DFI in the Community displaces some US, Scandinavian and Swiss imports. (5) As far as exports are concerned, Japanese plants tend to be characterized by high national export ratios. But,

since these exports tend to be directed to other Member States, their contribution to Community exports is virtually nil.

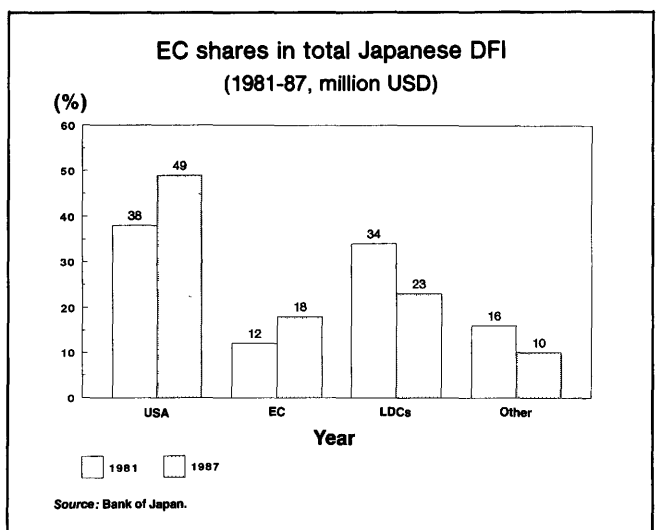
A recent careful study, from which some of the above remarks have been drawn, concludes that Japanese DFI in Europe 'has improved the EEC's trade balance by 15 to 20% of product value and has added a number of jobs equivalent to 35% of workforces in Japanese plants in Europe'. (6)

Japanese DFI

There is every reason to believe that Japanese DFI in Europe will grow substantially in the future. By mid-1988, Western Europe's share in Japanese manufacturing DFI was an estimated 10 to 14% of such investment world-wide, and only about one third of Japanese investment in the USA. Japanese manufacturing DFI in Western Europe amounts to little over one tenth of US DFI in Europe.

While Western Europe's share in total Japanese DFI, including services, cumulated 1951-87, was 15%, its share of new Japanese outward investment in fiscal 1987/88 rose to 20%. The amount invested that year — USD 6.6 billion — approached twice the amount of the preceding year and was more than one third of the cumulated total of the preceding 27 years. First estimates of growth in 1988/89 suggest a more moderate but still substantial growth rate of 37%. (7)

Figure 5



While in dollar terms Japanese DFI in the Community doubled between 1984 and 1985 and had doubled again by 1987, its share in world DFI by Japan has grown only moderately. Even a further doubling by 1988 to USD 6.6 billion (ECU 5.58 bil-

Table 7
EC shares in total Japanese DFI

(million ECU)	1981	1982	1983	1984	1985	1986	1987
USA							
Value	1 672	1 652	1 490	3 912	3 351	8 101	8 355
Share (%)	38	36	36	52	39	55	49
EC							
Value	509	622	678	975	2 010	2 792	3 115
Share (%)	12	13	16	13	24	19	18
LDCs (1)							
Value	1 486	1 771	1 568	2 385	2 468	3 062	3 830
Share (%)	34	38	38	32	29	21	23
World							
Value	4 384	4 634	4 057	7 560	8 455	14 713	16 916
Share (%)	100	100	100	100	100	100	100

(1) Other countries in the original non-OECD and non-Communist bloc.

Source: Bank of Japan, *Balance of payments monthly*.

lion) (as suggested in the abovementioned estimates) only gives a share of 20% in total Japanese DFI. Even more recent figures for fiscal 1988/89 released by the Ministry of Finance (8) report a world-wide flow of USD 47 billion (ECU 39.7 billion), with Europe receiving 9.1 billion (ECU 7.7 billion) or 19.4% (USA: 46.2%).

Table 8
Shares of Japanese DFI in EC member countries
Annual flows, 1978 and 1988

(%)	1978	1988
Benelux	20	31
FR of Germany	13	5
France	12	4
United Kingdom	21	57
Others	33	3

Source: Japanese Ministry of Finance (rounded figures).

From the remarkable stability of Europe's world share in Japanese DFI despite dramatic absolute increases, it would appear that Japanese DFI to Europe is pushed by internal Japanese forces — the yen, the Japanese surplus, labour shortage and maturing technology — as much as pulled by EC-specific factors such as concerns about market access or the growing dynamism of the European economy. This may be an overstatement, however, as some of the same political and economic forces were at work in the USA, which posted a substantial gain.

Japanese DFI in Member States

Much of the growth of Japanese DFI in Europe was accounted for by the UK, which — according to

some sources — received 57% of the Community total in 1987-88, raising its share of the stock of Japanese investment in the Community to well over one third. Benelux came second — reflecting, among other things, the heavy bias of Japanese DFI in Europe towards non-industrial sectors. The shift in the relative importance of individual EC Member States since 1978 appears in Table 8.

Table 9
Stock of Japanese DFI in Europe, 1988

(billion USD)	Value	Share (%)
EC (1)	21.3	100
FR of Germany	2.1	10
Spain	0.9	4
France	1.4	7
Italy	0.3	1
Luxembourg	4.4	21
Netherlands	3.6	17
United Kingdom	8.6	40
Switzerland	1.2	
Norway	0.2	

(1) Includes only EC countries listed.

Source: MITI.

However, Tables 9 and 10 suggest a more modest share of around 40% for the UK in the stock of Japanese DFI in the Community. The first is based on the MITI definition with its threshold of 30% equity stake as defining DFI, the second on Ministry of Finance statistics. It is above all the absolute amounts which differ.

Not too much should be made of these figures. The large stocks accumulated by Luxembourg and the

Table 10
Japanese cumulative DFI in the EC
Breakdown by country and sector, 1951-88

(million USD)	Manufacturing		Non-manufacturing		Other (1)		Total	
	Value	Share (%)	Value	Share (%)	Value	Share (%)	Value	Share (%)
EC	4 642	100	22 126	100	1 204	100	27 972	100
Belgium	325	7	556	3	147	12	1 027	4
Denmark	2	0	23	0	0	0	26	0
FR of Germany	468	10	1 508	7	388	32	2 364	8
Greece	95	2	1	0	0	0	96	0
Spain	800	17	119	1	126	10	1 045	4
France	544	12	949	4	271	23	1 764	6
Ireland	168	4	262	1	2	0	432	2
Italy	162	4	131	1	76	6	370	1
Luxembourg	4	0	4 726	21	0	0	4 729	17
Netherlands	938	20	4 582	21	5	0	5 525	20
Portugal	30	1	9	0	0	0	40	0
United Kingdom	1 107	24	9 258	42	188	16	10 554	38

(1) Refers to establishing or enlarging branches, or acquisition of real estate.

Source: Japanese Ministry of Finance.

Netherlands, and even by Britain, are a combination of the heavy share of financial and 'headquarters'-type investment on the one hand, and the result of special advantages in tax and legal regimes offered by these countries on the other. The true destination of this investment is in many cases 'European' rather than country specific (i.e. they result in outflows of 'Dutch', etc. direct investment to other Community countries). Moreover, it reflects the fact that Japanese investment in Europe is, compared with the USA or Asia, at an early stage: a continent-wide services infrastructure (marketing, headquarters, etc.) is being created in countries offering favourable conditions, in preparation for a more substantial engagement in the future which will be more evenly distributed on the Community territory.

As shown in Table 11, half of all Japanese DFI in Europe has occurred in the banking and insurance sector. As a result of accumulated balance-of-payments surpluses, and benefiting from a supply of low-cost savings at home, Japanese banks have become a major force in the world. But, according to the *Far Eastern Economic Review*, 'unlike their innovative industrial counterparts, they have been unable to dominate their markets ... they are seen by many as technological also-rans, cosseted at home and lumbering hulks abroad, only good at grabbing market share at any price'. (9) In banking, and even more in the more modest insurance ventures abroad, one aim is clearly to 'buy foreign talent' for the world-wide recycling of Japanese surpluses. Serving Japanese clients in the manufacturing sector is likely to provide additional stimulus for expansion in the future.

Japanese DFI in manufacturing

Stocks of DFI in manufacturing amounted to a modest 15.7% of total Japanese investment in Europe, as against 28% in the USA. World-wide, the share of manufacturing in total Japanese DFI increased from 23.5 to 29.4% in fiscal 1988/89, with electronics (USD 3 billion) and transport equipment (USD 4 billion) accounting for half of the total. (10)

Table 11
Japanese DFI (stocks) in Western Europe and the USA by sector, 1988

(billion USD)	Western Europe	USA
Food industries	122	724
Textiles	245	397
Timber and pulp	2	952
Chemicals	347	1 499
Metals (all)	276	1 650
Machinery	365	1 716
Electrical equipment	704	4 451
Transport equipment	799	2 221
Other	462	1 142
Total manufacturing	3 310	14 753
Commerce	3 374	9 277
Banking and insurance	10 508	9 149
Real estate	1 158	11 063
All DFI	21 047	52 763

Source: Exim Bank of Japan.

There are both technical and political reasons for expecting substantial growth of Japanese industrial DFI in Europe. For one thing, many Japanese

investments in Europe are very modest in size, employing between 50 and a few hundred people. While this small size partially reflects the character of many such operations as 'screwdriver plants' involving highly automated assembly of largely Japanese components, these operations can also be conceived as 'pilot plants' which will reach their full scale only after local conditions have been fully tested and, at least as important, the EC's internal market fully realized.

Table 12
Japanese manufacturing plants in Western Europe, 1989

	Number
EC	
Belgium, Luxembourg	23
Denmark	2
FR of Germany	67
Greece	4
Spain	41
France	85
Ireland	17
Italy	24
Netherlands	27
Portugal	7
United Kingdom	92
Total	389
EFTA	
Sweden	8
Austria	7
Switzerland	4
Finland	2
Norway	1
Total EFTA	22
Total Western Europe	411

Source: *Far Eastern Economic Review*, 18.5.1989 (on information supplied by Jetro offices in Europe).

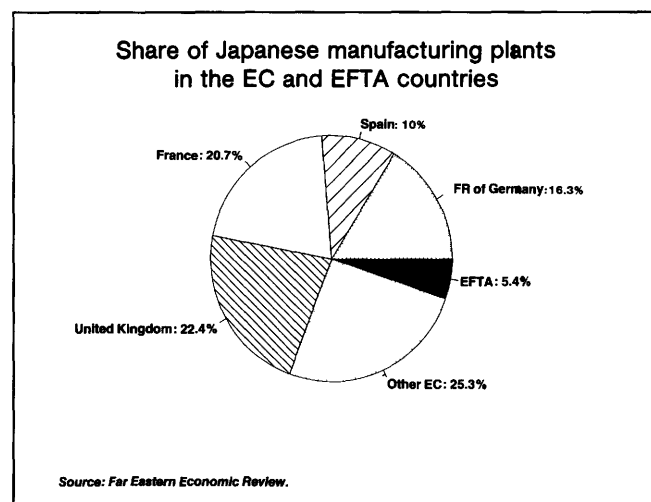
Another reason to expect a substantial expansion of Japanese manufacturing DFI is the growing shortage of skilled labour in Japan. As the technological sophistication of Japanese (and world) manufacturing increases, these labour shortages cannot easily be made up by moving to low-cost Asian locations. Moreover, that same sophistication requires closeness to the customer, especially for non-consumer products. Europe's own shortage in skilled labour — unless remedied by training — will of course limit its attractiveness of Japanese investment in the medium term.

The inevitable further appreciation of the yen will also serve to push companies to seek further growth through investment rather than direct exports. Last, but by no means least, industrial DFI is seen as pro-

tection against possible import restrictions. As a Mitsubishi executive put it: 'The [EC] anti-dumping penalties forced many manufacturers to locate in Europe. That's the basic reason why many decided to come'. (11)

While total Japanese DFI in Europe shows a heavy concentration in the United Kingdom (Figure 6), a rather more even geographical distribution of Japanese industrial DFI in the European Community emerges if the number of plants is used as an indicator.

Figure 6

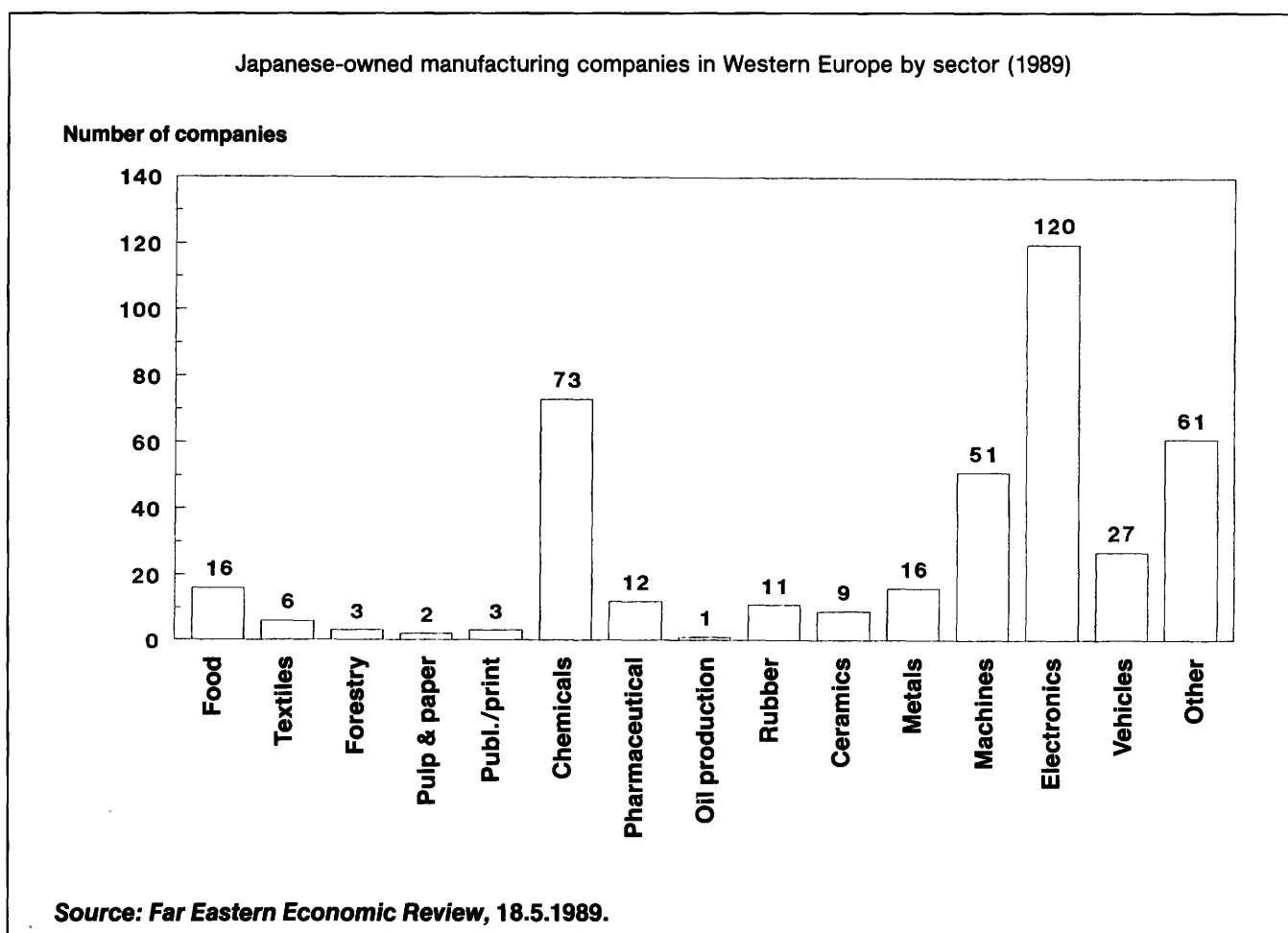


As regards the Community, the relatively high score for the Netherlands probably relates to headquarters operations of manufacturing companies rather than manufacturing activities as such. But the Federal Republic with its large domestic manufacturing sector is clearly under-represented, as is, for different reasons, Italy. As regards France, a change in government attitudes, and the abolition in September 1988 of the requirement of prior approval for foreign investors, should lead to a larger French share in the future.

Recent figures on a sector breakdown of Japanese manufacturing investment in Western Europe show a predictable concentration in electronics (120 ventures), but the second-place ranking of chemicals (73) may be more surprising (see Figure 7). The latter are generally specialized operations supplying European industry with high-quality, high value-added inputs without, however, challenging Europe's overall world leadership in this sector.

The small number of operations in the 'vehicles' sector is not an indication of its true importance, given the inherently larger scale of such plants. This

Figure 7



is confirmed by (somewhat more dated) MITI statistics which show the number of plants (not companies, as in the previous table) established between 1951 and 1985, and the cumulative value of these investments.

Table 14 reveals that, contrary to widespread perceptions, growth of investment in the electrical and electronics sector in Western Europe has only matched the growth of manufacturing investment in general. By 1988, electronics had reached 21% of total industrial DFI — equivalent to the sector's share in Japanese domestic investment.

Outlook

Despite its modest size, Japanese industrial investment has attracted considerable attention by policy makers, analysts, and private industry. Some of these are merely related to trade effects — the 'screw-driver' issue — others to concerns over Europe's technology base. The small size of Japanese investment itself is not enough to reassure observers: the future can be observed in the USA; and the investable surpluses generated by Japan's domestic underconsumption will need a home.

One response — at local, national, and Community level, has been to induce Japanese companies to raise local content, both quantitatively (value-added) and qualitatively (technology content). This, as the USA experience shows, may induce Japanese companies to attract their domestic component (and services) suppliers to Europe, potentially adding to overcapacity problems and, worse, weakening the local/European industrial base on which competitive excellence is based.

In order not to repeat the US experience in Europe, MITI is reported to have advised Japanese component manufacturers to set up joint ventures or conclude technical cooperation agreements with European companies.

The touchstone of a possibly radically different approach in Europe will be automotive engines. Without locally producing engines, it is difficult to achieve 80% local content which, at present, is the informal benchmark for 'good behaviour'. On the other hand, engines cannot be produced economically at less than half a million per model — well above the 200 000 units planned by automakers such

as Nissan and Toyota for the early 1990s. This suggests that either the 80% 'rule' must be abandoned, or Japanese penetration be limited to present entrants, (12) or, more likely, co-production agreements with 'friendly' European companies — essentially Austin Rover at present — must be extended. Thus, in the spring of 1989 Toyota launched European sales of the pick-up truck it jointly produces with Volkswagen at a VW plant.

Table 13
Japanese investment in manufacturing sectors, 1951-85

(million USD)	No of plants	Value
Food industries	39	73
Textiles	121	193
Pulp and paper	2	0
Chemicals	96	216
Metals (all)	309	261
Machinery	158	214
Electric/electronic	138	400
Transport equipment	33	419
Other	144	312

Source: CPE-Bulletin No 56, April 1989.

Matsushita, the diversified electronics giant, is seeking to enter the automotive electronics market through an alliance with Bosch, which will supply its technology in return for a transfer of telecom technology from its Japanese partner.

While moves like these do not involve substantial new DFI, they help to ensure the expansion of existing operations by addressing the local content issue. Another approach to the same problem is furnished by Sony: an American-style transfer of integrated operations. Sony, which already has eight European plants in the 'brown goods' sector, is planning a big expansion of its European activities involving investments of several hundred million dollars in other areas, notably semiconductors, telecommunications, computers, robotics and medical electronics. Mindful of the European mood against 'screw-

driver operations', these will involve the production of components as well as R&D laboratories. (13)

Similarly, Matsushita has created an ASICs design (and marketing) centre in Munich. (14) The depth of the Japanese commitment to chip manufacture in Europe is also demonstrated through the acquisition of 'up-stream' capacity in Europe, such as Mitsubishi's purchase of a (previously US-owned) resin production plant in Italy — Mitsubishi's first manufacturing base in Europe.

United States

The United States and the European Community are each other's most important partners for direct foreign investment. According to Eurostat, in 1986 the EC 12 invested some USD 19 billion (net) in the USA, or 73.5% of total US inward investment from its two major competitors, while Japan accounted for just 16%. (15)

Taking stocks rather than flows as an indicator, by 1988 the EC share in total DFI in the USA was 58%: USD 177 billion as against USD 132 billion of cumulative US investment in Europe. The market value of US investment in Europe, however, greatly exceeds that of European DFI in the USA, as US investments have been made over the past 40 years and more, while half of DFI in the US has occurred during the past five years. (16)

In spite of a rise in total US DFI in advanced countries of almost 70% in current dollars, the figures show a great stability in its distribution between different world regions. Western Europe receives two thirds of US DFI, with the Community increasing its share by three percentage points.

The shift of US economic interest from the Atlantic to the Pacific is thus not confirmed by the DFI data. This appears even more clearly if we compare the

Table 14
Growth of Japanese DFI in the electrical and electronics sector (Western Europe), cumulative 1983-88 (1)

(million USD)	Electric/ electronic	Growth (%)	Total manuf.	Growth (%)
1983	228		1 181	
1984	296	30	1 428	21
1985	353	20	1 765	24
1986	401	14	2 088	18
1987	566	31	2 458	18
1988	704	34	3 310	35

(1) End fiscal year: 31. 3.

Source: MITI.

Table 15
EC share in US DFI in advanced countries (stocks) (1)

(billion USD)	1985		1986		1987	
	Value	Share (%)	Value	Share (%)	Value	Share (%)
EC	84	49	98	50	122	52
Western Europe	105	61	122	63	149	64
Canada	47	27	50	26	59	25
Japan	9	5	11	6	14	6
Total	172	100	195	100	233	100

(1) Stocks, not flows.

Source: Calculated from survey of current business (total includes figures from Australia, New Zealand, S. Africa).

relative shares of Western Europe and the Pacific Rim countries — Japan, Australia, New Zealand, the 'four tigers' and the (other) Asean countries (minus Indonesia) — taken together (Table 16).

Table 17 shows that, contrary to Japanese DFI in Europe, two thirds of US DFI is devoted to the manufacturing sector. The share has increased at a time when in the rest of the world the USA has tended to invest relatively more in other activities. Most major Community countries, with the exception of the United Kingdom, have seen around 70% of US investment go to the manufacturing sector.

Table 18 seems to show a certain volatility in US investment. Unlike the tables above, it shows net flows of US direct investment in the Community. In fact, relative to the accumulated USD 148 billion of US investments, even the disinvestment of 1983 represents less than 1%. At the individual country level, perceptions may differ, especially when there may be a political element, as in the heavy disinvestments in France (1983) and the Federal Republic of Germany (1984).

The striking feature, however, is the early pick-up of US investment from 1985 onwards — well ahead of the general improvement in European investment since 1987. This surge in investments introduces a new element in the nature of US DFI in the Community. While for the past several decades, US investment in Europe could be described as mature, in the run-up to 1992 and following the 'rediscovery' of Europe by American business new players are entering the market and old players are enlarging their stake.

The other significant feature is the sudden pre-eminence of the United Kingdom which had yielded second place to Ireland in the early 1980s, but in 1985 and even more in 1987 secured the largest share of US DFI in the Community. Like those for the Netherlands, however, British figures are distorted by the heavy influence of oil investments and disinvestments on the one hand, and financial investments on the other.

As to the sectoral breakdown of US industrial investment in Europe, the clear favourite has been the machinery sector, with chemicals in second place.

Table 16
Europe and Pacific Rim
Relative shares of US direct foreign investment

(billion USD)	1985		1986		1987	
	Value	Share (%)	Value	Share (%)	Value	Share (%)
Pacific Rim (1)	28	21	37	23	42	22
Western Europe	105	79	122	77	148	78
Total	133	100	159	100	190	100

(1) Japan, Australia, New Zealand, Hong Kong, Philippines, Singapore, South Korea, Taiwan, Thailand. Indonesia has been omitted because nearly 90% of US investment is in the oil sector.

Source: Survey of current business.

Table 17
Share of manufacturing in total US non-oil investment
Breakdown by EC, world and country (stocks)

(%)	Manufacturing share			Investment (billion USD) 1987	
	1985	1986	1987	Manufacturing	Total non-oil
EC	59	62	63	58.5	89.4
Rest of world	52	47	44	51.2	210.1
Belgium, Luxembourg	58	54	51	3.0	6.2
Denmark	29	21	20	.3	.9
France	71	71	76	7.3	9.5
FR of Germany	76	75	76	13.9	18.3
Greece	50	100	100	.1	.2
Ireland	73	75	74	3.6	4.8
Italy	69	72	72	5.2	7.2
Netherlands	61	51	48	4.6	9.6
Portugal	45	45	50	.2	.1
United Kingdom	53	52	54	15.8	23.0

Source: Calculations from Department of Commerce, Survey of current business, August 1988.

Table 18
Flows of US direct investment to the European Community (1)

(million USD)	1982	1983	1984	1985	1986	1987
EC	1 527	-838	-121	12 061	12 825	20 869
FR of Germany	259	-182	-520	1 920	3 357	3 333
France	-346	-609	-404	1 504	1 263	2 049
Ireland	310	390	394	721	699	983
Italy	322	239	138	985	419	1 357
Netherlands	-159	-250	-690	1 241	4 410	2 439
United Kingdom	73	126	891	4 831	2 252	7 950

(1) Country breakdown only available for a limited number of countries.

Source: Survey of current business.

Table 19
Net US direct foreign investment in EC manufacturing
Sector destination

(million USD)	1982	1983	1984	1985	1986	1987
Food etc.	318	48	287	908	974	1 057
Chemicals	288	7	-127	1 034	1 380	2 778
Metals	136	-182	-139	162	210	-155
Machinery (1)	134	-88	96	3 214	2 960	3 276
Electric/electronic	107	-58	278	329	-1 367	843
Transport equipment (2)	N/A	736	-815	611	974	2 807
Other	166	-281	-232	1 307	1 441	3 056
Total	1 091	172	-653	7 220	6 572	13 662

(1) Excluding electric machinery.

(2) 1982 figure withheld (USD + or -60 million).

Source: Survey of current business.

The electrical/electronics sector makes a surprisingly poor showing, although anecdotal evidence suggests that this may have changed by 1989 (e.g. General Electric's plans for major acquisitions in Europe).

Community Member States

Belgium (BLEU)

The Belgian Banque Nationale issues a single set of statistics for the Belgo-Luxembourg Economic Union (BLEU). This aggregation is awkward for direct investments, since two very different economies are involved, and both are heavily dependent

on direct foreign investment. Luxembourg is one of three preferred locations for bank, insurance and industrial holdings (together with the United Kingdom and the Netherlands) but receives very little DFI for its manufacturing sector (the steel sector is, of course, part-owned by capital from the three surrounding Member States).

Belgium, while receiving substantial flows of DFI in the financial and real estate sectors, is the first Community country to have based its industrial rejuvenation, since the 1950s, on a policy of attracting inward investment. Unfortunately, the most interesting data on sector concentration and national origin of DFI in manufacturing do not seem to be published nationally.

Table 20
Japanese cumulative DFI in Belgium and Luxembourg, 1951-88

(million USD)	Manufacturing	Non-manufacturing	Other	Total
Belgium				
Value	325	556	147	1 027
Share (%)	32	54	14	100
Luxembourg				
Value	4	4 726	0	4 729
Share (%)	0	100	0	100

Source: Japanese Ministry of Finance.

Table 21
US cumulative DFI in Belgium and Luxembourg, 1951-88

(billion USD)	Manufacturing	Non-manufacturing	Petroleum	Total
Belgium				
Value	3 486	3 045	547	7 028
Share (%)	49	43	7	100
Luxembourg				
Value	193	541	-11	723
Share (%)	26	75	-1	100

Source: Survey of current business.

Table 22
Direct foreign investment flows in Belgium and Luxembourg by origin, 1985/86 (1)

(million ECU)	1985			1986		
	I	D	N	I	D	N
USA	327	31	292	155	194	-39
Japan	94	2	91	126	32	94
FR of Germany	347	234	114	726	381	345
France	53	29	24	110	7	103
Italy	22	11	11	57	37	21
Netherlands	178	22	156	215	210	5
United Kingdom	423	27	396	116	66	50

(1) I = gross investment; D = disinvestment; N = net investment.

Source: *Bulletin de la Banque Nationale de Belgique*, II, 4 October 1988.

Table 23
Inward investment and disinvestment in Belgium and Luxembourg (1)

(million ECU)	1984			1985			1986			1987			1988
	I	D	N	I	D	N	I	D	N	I	D	N	N
Formation or dissolution of companies	1 006	394	612	1 082	258	824	1 457	708	749	1 768	590	1 178	2 418
Acquisition/sale of equity	187	128	59	345	116	229	336	158	178	934	400	534	N/A
Loans	0	213	-213	214	0	214	0	283	-283	316	0	316	N/A
Total direct investment (2)	1 312	744	458	1 897	630	1 267	1 847	1 203	644	3 195	1 166	2 028	N/A
Transactions of Luxembourg holdings	N/A	N/A	361	N/A	N/A	-60	N/A	N/A	683	N/A	N/A	1 452	N/A
Total of foreign investment (3)	2 154	902	1 252	2 665	857	1 808	3 916	1 276	2 639	6 852	1 334	5 500	N/A

(1) I = gross investment; D = disinvestment; N = net investment.

(2) The definition of the Belgian Central Bank excludes real estate.

(3) Includes smaller equity purchases, bonds and loans.

Source: Banque Nationale de Belgique, 1988 report (February 1989).

The contrast between the two economies as regards DFI appears clearly from Japanese and US stock figures. For Luxembourg, 100% of Japanese and 75% of US-origin DFI is invested in the non-manufacturing sector (Tables 20 and 21).

It is against this background that the following two tables, covering BLEU as a whole, must be read. As regards countries of origin, shown in Table 22, the only steady elements seem to be the level of Japanese investment and the relative importance of the Federal Republic of Germany. The USA, the second largest net investor in 1985, drops to last place in 1986, with the UK showing a similarly large variation.

More recent data, reproduced in Table 23, show a fourfold increase in both overall foreign invest-

ment and net DFI to BLEU between 1984 and 1987, with the largest part devoted to the formation of new companies.

France

Net inward investment to France doubled in nominal terms between 1981 and 1987. Yet, while investment in services increased steadily throughout the period to triple the 1981 figure, industrial inward investment in manufacturing stagnated until 1986. Then, in a single year, it more than doubled. In 1987, therefore, manufacturing and services received equal shares of DFI.

The relative stagnation of industrial DFI for much of the decade — and its relatively modest level — is in large part due to the institutional context in which

Table 24
Net flows of DFI in France, by sector

(million ECU)	1981	1982	1983	1984	1985	1986	1987
Industry	1 038	498	674	1 012	819	761	1 745
of which:							
metals	473	213	232	48	92	39	149
chemicals	339	134	281	277	127	56	598
electric and electronics	N/A	N/A	N/A	115	64	16	201
Services	578	572	678	1 186	1 290	1 354	1 727
of which:							
distribution	373	370	487	461	605	411	491
finance	110	158	112	462	397	659	867
holdings	14	9	49	86	102	119	11
insurance	7	8	9	26	30	29	16
Real estate	432	454	330	477	548	450	391
Total (1)	2 189	1 608	1 848	2 808	2 936	2 818	4 021

(1) Includes agriculture, energy, transport and other.

Source: Banque de France, Annual report, Annexes (1982-88).

Table 25
Net Inward Industrial Investment in France, by origin

(million ECU)	1981	1982	1983	1984	1985	1986	1987
EC	570.7	327.0	172.9	567.0	327.4	251.9	616.9
USA	234.4	-1.2	266.4	243.3	260.2	279.9	842.6
Japan	3.0	9.2	16.1	34.6	30.2	55.3	23.2
World	1 037.6	498.2	674.2	1 011.5	818.8	761.4	1 744.8

Source: Banque de France.

it takes place, notably the blurred dividing line between State and private ownership and/or tutelage of enterprises which deters foreign investors. Until recently, moreover, there was a certain official distrust, if not hostility, towards foreign investment in general. The recent abolition of the requirement to obtain prior government approval for industrial DFI, and a generally more favourable attitude by the government towards industrial DFI, can be expected to lead to further rapid growth.

Table 26
Stock of US Investment in France, by sector, 1987

(million USD)	
Manufacturing	8 374
food etc.	543
chemicals	1 703
metals	163
non-elec. machinery	3 384
electric/electronic	306
transport equipment	436
other manufacturing	1 837
Wholesale trade	1 726
Banking	274
Other financial/insurance	244
Other services	93
Petroleum	531
Total	11 478

Source: Survey of current business, August 1988.

As to sector breakdown, a surprisingly large share of inward investment went to chemicals and metals, while the electrical and electronics industries remained largely a national preserve.

As to the origin of French inward investment, Table 25 shows the EC and the USA together accounting for 76% of the total over the period 1981-87, the EC, with a 43% share, being the major source. Japan accounts for an insignificant 2.7%.

Data on US investment in France confirm the relative importance of chemicals and machinery in manufacturing — and the virtual absence of electro-

nics. As regards services, the small amount invested in a subcategory named 'services' in US statistics is surprising. For here we would expect to find the new multinationals in courier services, advertising and accounting.

Table 27
Japanese direct foreign investment in France

(million USD)	Manu- facturing	Non- manu- facturing	Other	Total
1951-76	48	63	10	121
1977	10	8	3	21
1978	18	18	1	36
1979	10	35	1	36
1980	20	46	0	66
1981	54	50	3	107
1982	4	49	11	64
1983	16	86	24	126
1984	8	52	11	71
1985	27	46	11	84
1986	25	16	9	50
1987	15	10	45	70
1988	69	77	17	164
1951-88	325	556	147	1 027
Share (%)	32	54	14	100

Source: Japanese Ministry of Finance.

In Table 27, Japanese figures — which differ from the French ones because, among other things, they are based on fiscal rather than calendar years — show virtual stagnation in industrial investment until 1988, at a time when Japanese investment elsewhere in Europe quadrupled. On the other hand, an above-average share of Japanese investment in France is destined for the industrial sector — 32% as against 16.5% to the EC as a whole. The recent growth from a low base of the item 'other' may be significant, as it refers to investment in branch offices and real estate and thus to a 'leading indicator' of Japanese DFI.

The Federal Republic of Germany

As Table 28 shows, the Federal Republic of Germany is above all a capital exporter, even in the field of direct investments. Indeed, the Federal Republic

Table 28
German outward and inward direct foreign investment by region (flows)

(million ECU)	1985		1986		1987		1988	
	Outward	Inward	Outward	Inward	Outward	Inward	Outward	Inward
EC	1 646	567	3 684	1 206	2 153	446	3 214	1 163
Rest of Western Europe	654	219	548	204	548	483	964	887
USA	3 421	-401	5 057	-323	4 018	501	3 922	-1 603
Total	6 352	776	9 808	1 108	7 840	1 676	8 798	1 374

Source: Bundesbank.

of Germany received only ECU 4 934 million worth of (net) inward investment from the rest of the world between 1985 and 1988 — while acquiring assets abroad for ECU 32 798 million — seven times as much. Of this, the EC received only ECU 10 697 million worth of DFI, or a third of the total.

Table 29
German direct foreign investment
Direct and indirect balance of corporate holdings

(million ECU)	1976		1986	
	Value	(%)	Value	(%)
World	17 190	100.0	70 200	100.0
Europe (1)	9 160	53.2	33 460	47.7
EC 10	6 070	35.4	26 640	37.9
France	1 670	9.8	5 500	7.8
Netherlands	1 420	8.3	4 460	6.4
United Kingdom	500	2.8	3 430	4.9
USA	2 340	13.6	19 690	28.0
Latin America	2 240	13.0	6 250	8.9
Asia	850	5.0	3 710	5.3
Africa (2)	920	5.5	1 970	2.8

(1) Including Turkey.

(2) Including Canary Islands.

Source: Deutsche Bundesbank: *Die Kapitalverflechtung der Unternehmen mit dem Ausland nach Ländern und Wirtschaftszweigen*. Frankfurt/M.

One also notes a relatively modest increase of German outward investments between 1985-88, and a similar stagnation, at a much lower level, of inward investment. This pattern holds irrespective of source/destination, except for 'other Western Europe', which steadily increased its investment in German assets.

Table 29 shows the stability of German outward investment between two decades, with, however, a

significant shift away from Western Europe towards the USA. The EC improves its share somewhat, with a greater concentration in the chief recipient countries: France, the Netherlands and the UK.

The following two tables show the sectoral pattern of both new (gross) and net inward investment from the world and the European Community during this decade. In looking at these figures, it is worth recalling that the term 'net' is not the sum of inward and outward investments, but refers to operations by non-German companies only. The disinvestment in the manufacturing sector which occurred in both 1986 and 1987 is therefore particularly significant.

The European Community was responsible for over half of net inward investment. As regards manufacturing, the 'world' disinvested to the amount of ECU 676 million between 1983-87 while the Community Member States invested ECU 465 million net. In services, the Community share was 44% between 1983-87.

The weakness of inward investment to the Federal Republic of Germany is partly due to a structure of ownership — large companies protected by 'friendly' cross-holdings, including house banks — and small, independent entrepreneurs. Greenfield investments, on the other hand, are relatively unattractive, owing to high labour costs which can only be recouped with advanced products and production technology where German firms are generally strong, especially in the domestic market. In services, however, greater inward investment in the run-up to 1992 can be expected.

Ireland

Given the size of its home market, Ireland has had to base its industrial development increasingly on exports, especially of components, and on the assembly of components produced elsewhere. This has meant heavy reliance on inward investment by

Table 30
Total world new and net inward investment in the FR of Germany (1)

(million ECU)	1983		1984		1985		1986		1987		1988 (2)	
	New	Net	New	Net	New	Net	New	Net	New	Net	New	Net
Manufacturing	1 266	169	1 194	96	828	44	1 209	-303	1 498	-682	N/A	N/A
of which:												
chemicals	93	-55	297	208	362	211	218	-398	98	-56	N/A	N/A
machinery	148	66	141	17	41	-41	103	13	67	-128	N/A	N/A
electric goods	225	146	134	35	68	-4	213	24	136	-205	N/A	N/A
transport equipment	294	46	97	-177	39	-160	178	114	20	-342	N/A	N/A
food etc.	29	-5	208	93	60	-82	74	-26	743	244	N/A	N/A
Services	2 031	1 170	1 672	790	1 745	665	3 722	1 895	2 396	726	N/A	N/A
of which:												
distribution	765	572	639	378	375	227	547	153	396	154	N/A	N/A
credit and insurance	233	-63	291	266	447	371	455	97	629	430	N/A	N/A
Total (2)	3 972	1 980	3 151	895	2 985	882	5 826	1 561	4 402	-21	3 940	2 281

(1) Net of investment and disinvestment by foreigners only.

(2) Total includes energy, building and construction, and other.

(3) Source: Bundesbank, *Monatsberichte*.

Source: Eurostat (Gbp), Bundesbank.

Table 31
New and net inward investment in the FR of Germany by the European Community (1)

(million ECU)	1983		1984		1985		1986		1987		1988 (2)	
	New	Net	New	Net	New	Net	New	Net	New	Net	New	Net
Manufacturing	380	76	479	241	317	140	415	-124	419	132	N/A	N/A
of which:												
chemicals	4	-70	124	104	252	140	-52	30	-17	N/A	N/A	N/A
machinery	31	20	52	38	11	2	33	13	7	-2	N/A	N/A
electric goods	89	63	38	-4	3	-2	51	-31	80	59	N/A	N/A
transport equipment	88	8	58	58	3	3	0	-2	0	0	N/A	N/A
food etc.	11	-7	60	55	3	1	1	-21	24	18	N/A	N/A
Services	736	367	827	388	566	534	2 085	1 022	787	-12	N/A	N/A
of which:												
distribution	165	99	341	278	115	86	221	23	141	56	N/A	N/A
credit and insurance	128	20	98	79	141	108	294	97	195	142	N/A	N/A
Total (2)	1 730	1 038	1 542	732	1 190	549	3 312	1 264	1 702	124	N/A	1 163

(1) Net of investment and disinvestment by foreigners only.

(2) Total includes energy, building and construction, and other.

(3) Source: Bundesbank, *Monatsberichte*.

Source: Eurostat (Gbp), Bundesbank.

multinationals. Given language and ethnic ties, these were originally largely of US origin. A strongly pro-inward investment policy proved successful, at least in certain sectors. The Irish Development Authority became a model for such agencies in Europe in the 1970s. For most of the present decade, however, a certain disillusion with such investment has set in, as plant closures by US firms make the headlines.

Surprisingly, Figure 8 shows little growth in net DFI over the past decade and a half.

A similar picture of stagnation extending to 1988 emerges from data on US investment. Table 32 con-

firms the heavy concentration on manufacturing (75%) in total US DFI. What is surprising, however, is the heavy concentration in the chemicals sector, with electronics only accounting for about 10% of industrial investment.

Although the Irish authorities now make major efforts to attract Japanese investment, the figures so far reveal great caution. Moreover, the relative share of manufacturing and services is almost the reverse of US investment in Ireland. Japanese industrial DFI stands at 1/25 of the US figure.

Figure 8

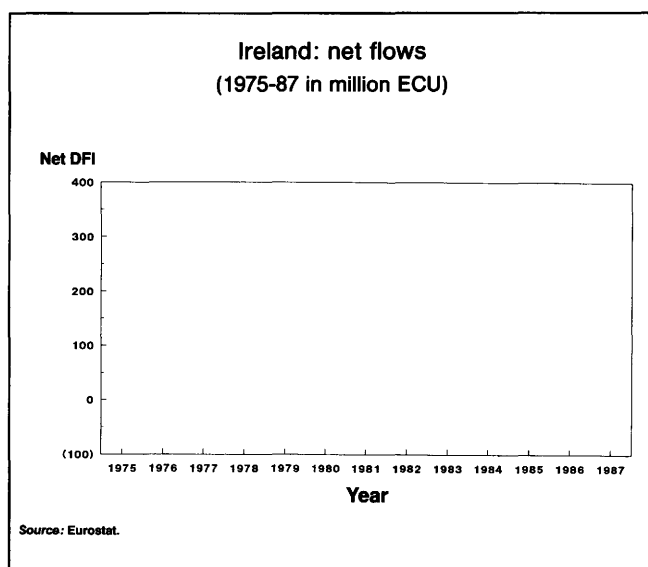


Table 32

Stock of US Investment in Ireland, by sector

(million USD)	1987		1988	
	Value	Share (%)	Value	Share (%)
Manufacturing	4 111	75	4 138	72
food etc.	641	12	N/A	N/A
chemicals	1 038	19	N/A	N/A
metals	121	2	N/A	N/A
non-elec. machinery	761	14	N/A	N/A
electric/electronic	368	7	N/A	N/A
transport	6	0	N/A	N/A
other	1 176	21	N/A	N/A
Services				
wholesale trade	66	1	16	0
banking (1)	N/A	N/A	N/A	N/A
other finance/insurance	1 389	25	1 662	29
other services	-70	0	N/A	N/A
Other industries (1)	N/A	N/A	N/A	N/A
Petroleum	-23	0	-9	0
Total	5 478	100	5 743	100

(1) Suppressed to avoid disclosure of data for individual companies.

Source: Survey of current business.

Italy

Until recently, Italy did not present an easy target for inward investment. Its large industries were either State-owned or firmly controlled by the 'friendly' bank and industrial cross-holdings which also characterize the Federal Republic of Germany. Small industry was, and is, based on entrepreneurial control by owner-managers and largely outside the capital markets. As regards greenfield investment, regional authorities — in contrast to the United Kingdom, Ireland and Spain, for instance — have

failed to develop special programmes to attract foreign investment. Central government does provide substantial subsidies to the Mezzogiorno. But, albeit on a less systematic scale than France, 'strategic' sectors are largely protected from foreign incursion. Recent privatization moves, especially of IRI, and the perceived need by Italian multinationals to strengthen their European and international base in the run-up to 1992 have led to an increase in inward investment.

Table 33
Japanese DFI in Ireland

(million USD)	Manu- facturing	Non- manu- facturing	Other	Total
1951-76	16	20	0	36
1977	12	0	0	12
1978	69	3	1	74
1979	12	1	0	14
1980	13	0	1	14
1981	21	0	0	21
1982	6	0	0	6
1983	3	0	0	3
1984	0	0	0	0
1985	1	80	0	81
1986	6	66	0	72
1987	0	58	0	58
1988	8	34	0	42
1951-88	168	262	2	432
Share (%)	39	61	0	100

Source: Japanese Ministry of Finance.

Indeed, both new and net inward investment increased steadily throughout the past decade — by a factor of 20 in lire terms.

However, in manufacturing, unlike many other Member States, and in spite of an otherwise above-average growth performance, Italy benefited from the general upsurge of international DFI only late in the decade. In manufacturing, no net capital inflow occurred in the two years 1986-87 taken together. When comparing absolute figures with those of other major EC countries, however, it should be noted that Italian statistics do not include reinvested profits as DFI.

A rather balanced picture of Italy's DFI position emerges from Table 35, which compares the 1988 value of accumulated inward investments with the accumulated holdings of Italians abroad (stock of outward investments). The global figure for both stocks is around ECU 31.3 billion which represents about 14% of the value of Italian DFI. The ratio for

manufacturing, however, is almost 3:2, and with the EC 12 5:2.

Table 34
Inward investment and disinvestment in Italy

(million ECU)	Gross investment	Dis-investment	Net investment	
			Total	Manufacturing (1)
1978	553	152	401	240
1979	492	227	264	122
1980	686	263	423	196
1981	1 290	258	1 032	493
1982	1 106	456	650	428
1983	1 851	466	1 339	1 022
1984	1 997	355	1 641	1 069
1985	2 888	1 565	1 323	253
1986	4 495	4 511	-16	-1 309
1987	4 302	780	3 522	1 469
1988	9 157	3 367	5 791	2 631

(1) For manufactures: author's calculations.

Source: Banca d'Italia.

EC-origin DFI is evenly divided among five countries, with Luxembourg and the Netherlands joining the other 'big three' of the Community. All are out-classed by Switzerland and Liechtenstein, with twice the quota of the EC countries. The USA emerges as a relatively modest source of DFI — less than one-third of EC 12 — and Japanese investment is insignificant.

The role of the smaller countries in Italian DFI suggest that most of this capital really has a different national origin as regards ultimate control; much of

it may indeed be Italian capital previously expatriated to escape stringent capital controls.

Noteworthy is the relationship with Spain, which receives Italian industrial DFI on the scale of the established EC majors, but has not begun to reciprocate at all.

As regards the sectoral breakdown of inward investment, the sale of IRI assets, among others, is reflected in relatively strong increases in chemicals and engineering. Noteworthy also is the increasing interest of foreign capital in the credit and insurance sectors, a development which has created some worries in these sectors which until now have been highly protected by regulation.

Portugal

Although Portugal has a reputation for attracting investment intended to benefit from the country's low labour costs, the share of industrial investments in total direct foreign investment was lower than average in the 1980s. Moreover, adjusted for inflation, direct foreign industrial investment does not seem to have increased substantially, at least until the mid-1980s.

On the other hand, in response to the gradual liberalization of the finance sector, inward investment in this sector increased 24 times in terms of escudos. Thus, the structure of total inward investment to

Table 35
Stocks of Italian inward and outward investment by country and sector, 1988

(million ECU)	Total		Manufacturing		Services		Energy	
	Inward	Outward	Inward	Outward	Inward	Outward	Inward	Outward
World	31 328	31 348	16 428	10 171	13 686	18 068	1 176	3 042
USA	4 851	3 868	2 961	1 951	1 335	1 282	276	635
Japan	261	141	107	45	144	96	9	0
EC	16 891	16 752	8 614	3 676	7 645	10 844	624	876
FR of Germany	2 828	1 778	1 653	1 103	1 087	638	87	36
Spain	42	1 458	14	881	28	573	1	4
France	3 446	2 429	1 250	656	1 992	1 453	202	321
Luxembourg	3 029	4 517	1 166	51	1 687	4 421	36	45
Netherlands	3 697	3 029	2 480	364	1 073	2 368	143	296
United Kingdom	3 366	1 815	1 675	1 103	1 613	638	78	36
Switzerland and Liechtenstein	7 051	4 023	3 226	395	3 737	3 547	70	80

Source: Banca d'Italia.

Table 36
New direct foreign investment in Italy by sector

(million ECU)	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Manufacturing	256	358	626	687	1 435	1 302	1 436	2 103	1 857	4 315
metals and minerals	34	29	120	52	63	117	125	191	113	163
chemicals	40	64	122	168	855	160	585	648	342	1 443
engineering	112	171	227	279	264	816	448	1 027	601	1 830
food	28	40	75	113	61	97	170	65	201	460
textiles	22	17	23	31	29	40	30	40	98	78
Market services	150	208	344	221	244	522	1 102	2 003	1 681	4 073
distribution	32	53	107	64	79	131	151	155	282	1 067
transport and communic.	10	13	22	13	38	21	101	34	33	163
credit and insurance	102	134	197	134	106	340	811	1 789	1 298	2 660
Total (1)	492	686	1 290	1 106	1 851	1 997	2 888	4 495	4 302	9 157

(1) Total includes sectors omitted from this table (agriculture, energy, public works).

Source: Banca d'Italia.

Table 37
Major areas of inward investment in Portugal (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Manufacturing	52.1	61.6	66.6	68.8	76.0	128.4	80.1	87.9
Distribution	14.5	34.5	17.4	27.2	72.1	45.5	44.4	40.1
Credit and insurance	11.7	12.1	17.4	19.1	35.5	74.9	29.8	116.5
Real estate	33.4	39.0	40.2	42.8	54.1	81.6	88.1	44.4
Total (2)	124.3	171.6	164.1	177.6	270.3	365.7	258.4	320.1

(1) Sum of new investment, reinvested profits, and long-term loans (> 1 year).

(2) Total includes some additional items.

Source: Calculations on basis of Eurostat data.

Portugal shows much the same pattern as in other EC countries, with a heavy concentration on services. Due to further privatization, foreign investment (including Spanish) in the financial sector is likely to intensify in 1989 and 1990. With the lowest labour costs in Europe and a growing liberalization of the equity market, industrial investment is also likely to increase sharply in the run-up to 1992. (17)

Spain

The Spanish economy represents a particularly promising field for DFI. It has a large and rapidly growing domestic economy; key economic sectors are not yet saturated by established local companies; and relatively low-cost and abundant labour, combined with membership in the EC, make it an attractive location from which to export to the rest of the Community.

Table 38 shows the phenomenal growth of DFI since 1975, with a notable acceleration after 1981. The figures refer to 'authorized' investment rather than actual flows and are thus an overestimation. On the

other hand, a restrictive definition of DFI (participations above 50%) is used.

Table 38
Authorized foreign investment in Spain

	1 000 ECU
1975	392
1976	181
1977	322
1978	584
1979	879
1980	857
1981	766
1982	1 700
1983	1 241
1984	2 110
1985	2 169
1986	2 917
1987	5 115
1988	6 174

Source: 'The Spanish economy' — monthly report, Caja de Pensiones 'La Caixa', March 1989.

What is striking about current investment patterns is the heavy preponderance of EC-origin DFI in total

Table 39
Authorized investment in Spain by country of origin

(1 000 ECU)	1987		1988		Change (%)
	Value	Share (%)	Value	Share (%)	
EC	2 511	49.1	3 395	55.0	35.2
Belgium	236	4.6	185	3.0	-21.7
Denmark	74	1.4	26	.4	-64.6
FR of Germany	188	3.7	456	7.4	142.1
France	352	6.9	473	7.7	34.3
Italy	472	9.2	77	1.3	-83.7
Netherlands	861	16.8	1 355	22.0	57.5
United Kingdom	319	6.2	810	13.1	153.6
Rest of EC	8	.2	12	.2	46.3
Other OECD countries	1 058	20.7	801	13.0	-24.3
United States	282	5.5	247	4.0	-12.4
Japan	234	4.6	96	1.6	-59.0
Sweden	75	1.5	73	1.2	-1.5
Switzerland	428	8.4	379	6.1	-11.6
Canada	39	.8	6	.1	-85.2
OPEC countries	13	.3	114	1.9	745.8
Tax haven countries	112	2.2	265	4.3	136.9
Rest of world	103	2.0	164	2.6	58.1
Indirect investment (1)	1 315	25.7	1 433	23.2	9.0
Total	5 114	100.0	6 174	100.0	20.7

(1) Indirect investment refers to reinvested profits, etc.

Source: 'The Spanish economy' — monthly report, Caja de Pensiones 'La Caixa', March 1989.

new OECD-origin investment: 70% in 1987, rising to 81% in 1988. (Percentages in Table 39 are lower, mainly because the item 'indirect investment', which in effect refers mostly to reinvested profits, has not been broken down by country of origin.) Surprisingly, the Netherlands by far outperforms all other countries. Again, this probably reflects invest-

ment by holding companies registered in the Netherlands and which are themselves subsidiaries of non-Dutch companies.

Another striking fact is the importance of Switzerland as a source of investment, almost twice the Japanese figure in 1987 and four times that figure in

Table 40
Authorized direct foreign investment in Spain, by sector, 1987-88

(1 000 ECU)	1987		1988		Change (%)
	Value	Share (%)	Value	Share (%)	
Agriculture, etc.	75	1.5	73	1.2	-1.5
Energy and water	15	.3	124	2.0	678.9
Non-energy minerals, chemical industry	1 452	28.4	659	10.7	-54.6
Metal transformation machinery	578	11.3	559	9.1	-3.3
Other industrial manufacturing	660	12.9	1 046	16.9	58.5
Construction	12	.2	35	.6	191.8
Wholesale and retail trade, tourism	968	18.9	759	12.3	-21.5
Transportation and communications	33	.6	105	1.7	219.5
Finance, insurance, real estate	1 248	24.4	2 699	43.7	116.3
Other services	74	1.4	114	1.8	54.7
Total	5 114	100.0	6 173	100.0	20.7

Source: 'The Spanish economy' — monthly report, Caja de Pensiones 'La Caixa', March 1989.

Table 41
Direct foreign investment by autonomous community

(1 000 ECU)	1986		1987		1988	
	Value	Share (%)	Value	Share (%)	Value	Share (%)
Andalusia	134	4.6	254	5.0	467	7.6
Aragon	28	.9	58	1.1	248	4.0
Asturias	6	.2	3	.1	12	.2
Balearic Islands	41	1.4	85	1.7	87	1.4
Canary Islands	59	2.0	76	1.5	80	1.3
Cantabria	11	.4	18	.3	11	.2
Castile-La Mancha	65	2.2	23	.5	49	.8
Castile-Leon	74	2.5	106	2.1	32	.5
Catalonia	487	16.7	1 675	32.7	1 463	23.7
Extremadura	34	1.2	8	.2	6	.1
Galicia	54	1.8	33	.6	64	1.0
La Rioja	3	.1	94	1.8	24	.4
Madrid	782	26.8	1 656	32.4	2 863	46.4
Murcia	4	.2	4	.1	12	.2
Navarre	24	.8	9	.2	92	1.5
Basque country	100	3.4	111	2.2	144	2.3
Valencia	34	1.2	64	1.2	157	2.5
Non-classified	976	33.5	837	16.4	364	5.9

Source: 'The Spanish economy' — monthly report, Caja de Pensiones 'La Caixa', March 1989.

1988. This is probably related to the surge of investment in financial services and buildings which occurred in recent years, again with much of this money of non-Swiss origin.

Since 1986, when restrictions on foreigners were removed, some 10% of the Spanish insurance market has come under foreign control. (18) Since this market was very badly developed, foreign participations and/or competition are bringing the Spanish insurance industry to a modern standard much more quickly than would have been possible without DFI.

The sector breakdown in Table 40 is unsatisfactory as regards industry, but reveals a sharp rise in non-industrial investment — from a quarter to almost half of DFI between 1987 and 1988.

Figure 9

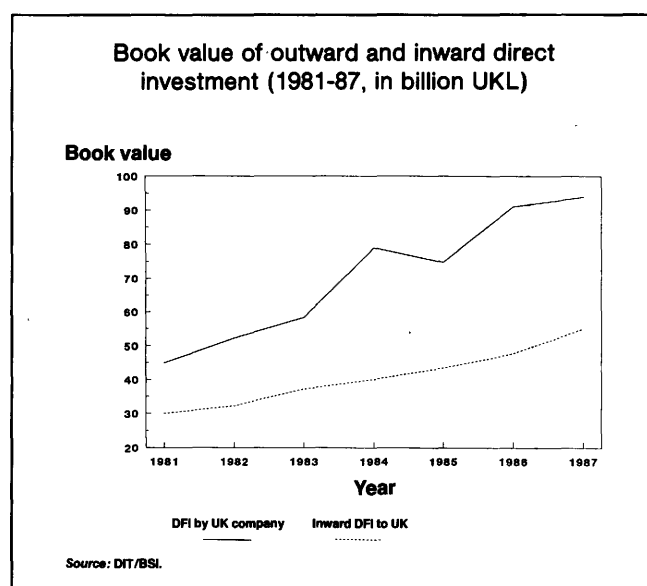


Table 42
UK shares in world inward and outward investment flows, 1970-86

(%)	Germany	France	UK	USA	Japan
Inward investment					
1970-74	14.7	9.9	23.6	21.2	1.3
1975-78	7.4	11.8	25.0	31.9	.7
1979-82	2.5	8.0	22.5	55.0	.9
1983-86	3.2	7.6	14.1	62.4	1.0
Outward investment					
1970-74	8.0	3.4	17.9	51.7	6.2
1975-78	8.8	5.1	15.7	46.7	6.7
1979-82	8.8	7.1	24.5	29.3	8.4
1983-86	10.9	5.8	22.2	24.7	15.3

Source: Banca d'Italia.

The same phenomenon — the increase in financial and real estate investment — has also (further) distorted the geographical pattern of DFI in Spain, with Madrid (46.4%) and the Barcelona region (23.7) increasing their share to 70%, while even such industrialized regions as the Basque country, with an active policy of seeking foreign investment, received only 2.3% of total DFI in 1988.

Table 43
Characteristics of foreign-owned multinationals
in the United Kingdom, 1985

	% of UK average
Net output/capita	135
Operatives' wages/capita	120
Investment/capita	157

Source: DTI, Business Statistics Office.

United Kingdom

The pre-eminence of the United Kingdom as a destination for foreign investment, notably from the USA and Japan, has been shown earlier on. In recent years, about half of Japanese and one third of US DFI to the Community has gone to the UK.

Table 44
Contribution of DFI to UK output
by level of technology and sector, 1985

	%
More technology-intensive sectors (MTI)	23.5
Chemicals	35.4
Mechanical engineering	22.0
Electrical engineering including office machinery	18.7
Transport equipment including motor vehicles	22.3
Less technology-intensive sectors (LTI)	13.1
Food, drink and tobacco	14.5
Metal manufacture	12.2
Paper	18.2
Other, including textiles, footwear and clothing	9.8
Total manufacturing	18.3

Source: Business Monitor MA4, BSO.

The United Kingdom is also the largest investor abroad of any Community country. Fifty-three per cent of all EC 12 direct investment outside the Community was undertaken by the United Kingdom — and 76% of manufacturing DFI. By end-1987, the book value of British direct investment abroad was estimated at UKL 94 billion, with inward investment at UKL 55 billion (Figure 9).

These high levels of both inward and outward DFI have a long tradition, as the comparisons in Table 42 make clear. The UK appears more in the same league as the USA than of comparable Community countries.

Table 45
Share of gross output in UK manufacturing
of foreign-owned companies, 1985

	%
FR of Germany	2.5
France	2.7
Netherlands	3.7
USA	67.0
Canada	7.6
Switzerland	4.1
Australia	2.1
Japan	1.0
Other	9.3
Total	100.0

Source: BSO.

One explanation of these high levels of both inward and outward investment is clearly the position of the City in international finance and the efficiency of the British stock market, which greatly facilitates transfers of ownership. But going back to the concept of DFI offered in the introduction — as a means of disaggregating national factors of production and recombining them internationally, it would also appear that both British management and labour sometimes do better when combined with foreign labour and management. This is the exact reverse of the German situation, at least as regards inward investment.

Table 46
Japanese DFI to UK, 1951-88

	Manu- facturing	Non- manu- facturing	Other	Total
(million USD)				
1951-76	36	1 583	21	1 640
1977	5	43	2	50
1978	29	32	5	66
1979	20	42	4	67
1980	38	144	5	186
1981	30	78	3	110
1982	15	158	3	176
1983	45	106	1	153
1984	57	253	9	318
1985	83	290	2	375
1986	126	855	2	984
1987	289	2 066	118	2 473
1988	335	3 607	14	3 956
1951-88	1 107	9 258	188	10 554
Share (%)	10	88	2	100

Source: Japanese Ministry of Finance

Other reasons linked more particularly to the 1980s are the heavy investment needs of the oil sector, and high levels of industrial employment, concentrated in certain regions, providing both opportunities for investors and a political incentive for public authorities to welcome them.

The Department of Trade and Industry (DTI) demonstrates the contribution of inward investment to the national economy with the figures in Table 43 (a comparison with UK activities in the sectors where DFI is concentrated might have shown different results).

Table 44 shows that, in fact, direct foreign investment tends to be concentrated in the more technology-intensive sectors. It also shows that very substantial parts of the UK manufacturing base are now foreign-owned.

By the mid-1980s, American DFI accounted for an astounding two thirds of UK foreign-owned manufacturing. The UK's partners in the EC played a minor role.

This situation may however be changing somewhat, although detailed statistics are not available for recent years. The factor 'reinvested profits' from the large existing US investment will make it difficult for the EC 12 to match US figures consistently.

While Japan's position may have improved somewhat since 1985, most Japanese DFI in the UK is directed to non-industrial sectors. Major new investments such as those announced by Japanese car manufacturers will not come on stream until the early 1990s, keeping the Japanese share limited for the present.

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INDUSTRIAL COMPETITIVENESS AND THE ENVIRONMENT

Introduction

The aim of constraints imposed on industry by environmental policies is:

- to limit nuisance caused by industries operating at normal conditions, nuisance which can have an effect on the work place as well as outfalls outside the company (water, air, soil);
- to prevent processes from degrading to accident-prone conditions;
- to control production and the use of products harmful to man and the environment.

The changes imposed on industry by environmental policies are none the less in line with the principles of industrial efficiency.

Policies for the protection of the environment outside the company, the working environment, as well as the control of dangerous products were initiated at different periods, but it is clear today that these policies are integrated components of one and the same system.

The means to be implemented in order to achieve the objectives set out by the environmental policies can be summarized in a few principles very much in tune with those geared towards the improvement of industrial efficiency.

Objectives:

- to limit polluting waste;
- to limit dangerous products;
- to ensure the safety of systems.

Means:

- to improve output (materials balance; energy balance);
- to concentrate on the notion of the quality of products;
- to regulate processes and the quality of products.

The relation between management of the environment and technological change is complex, progressive and affected profoundly by the strategy of companies.

Even though environmental protection requires technical actions *a priori* in line with the principles of industrial efficiency, the relation between the environment and technological change has not always evolved in a very harmonious context, for a variety of reasons:

- Anti-pollution know-how has for a long time remained the exclusive domain of specialists outside the manufacturing industry;
- The very dynamic buttressing of emission standards has not always induced industrialists to conduct in-depth reviews of their manufacturing technologies, but rather to improve gradually their end-of-line operations;
- The economic situation of certain polluting branches (steel, leather, textiles) has hampered their research and development efforts.

As an OECD study ('Environmental policy and technological changes', OECD 1985) underscores, the conditions for technological change are created by the company's own characteristics such as its capacity for innovation, its economic situation, investment programmes, its size and position in the branch.

In practice, industrial behaviour patterns continue to contrast widely and the strategies of companies are organized around two basic, schematically representative movements, namely a defensive (or passive) behaviour, and an offensive (or innovative) behaviour.

Consequently, the relation between environmental policy and industrial competitiveness draws particularly close every time strong dynamics are introduced, either through regulation or political pressure, or by the innovative strategy of the industrial protagonists.

We shall examine various aspects of this relation in succession, namely:

- the development of 'clean' or 'integrated' technologies;
- emerging technologies favoured by environmental policies;

- the development of clean products and substitution policies;
- European research and development programmes in the environment field;
- the cost of environmental protection in industry.

Clean or integrated technologies

Clean technologies have a positive impact on the competitiveness of industry.

Environmental protection has often been perceived as a burden on industry. Hence, this new preoccupation is rarely initiated by the company itself, but is most often in response to policy constraints or initiatives by the public authorities.

A possible reply to this external constraint is the so-called 'end-of-pipe' pollution control. This entails additional investments and operating costs, which usually have a negative economic impact on the company: they entail added complexity for the facilities, require manual labour and weigh heavily on efficiency and competitiveness.

Clean technologies on the other hand aim to integrate the environmental constraints into the company itself and its processes. This is no longer a case of added charges, but rather of productive investments and operating costs. The purifying technique is now included in the know-how of the branch. The

production-purification chain as a whole becomes more efficient, as the opposition between production and de-pollution constraints is diminished. Working conditions improve most often in terms of both comfort and safety.

According to the United Nations Economic Commission for Europe, 'Low-polluting technology is a production method (process, facility, territorial-industrial complex) in which all raw materials and energy are used in the most rational and integrated manner in the cycle: raw material resources, production, consumption, secondary material resources — in such a way as to prevent any impact on the environment which would disturb normal operation.'

In a wider perspective, we may also consider that the concept of clean technology covers a series of more or less preventive actions, among which we may classify, in increasing order of preventive intensity:

- the treatment of pollutants;
- waste upgrading actions;
- reorganization of production workshops;
- improvements in production processes;
- actions relative to the design of new production processes;
- actions relative to the design of ecological products.

Table 1
Example of a 'technical' classification of clean technologies

	Actions/means
1. Actions on the carrier fluid	
Isolate the pollutant	Separation at source of effluents
Concentrate the pollutant	Systematic re-examination of all air or water inlets Seek possible uses in cascades of the fluid which reduces the inlets of clean water by as much Replace the carrier fluid by another agent performing the same function Recycling Limit the losses on loops and fight useless dilutions
2. Actions on polluting substances	
Reduce or eliminate the emission of pollutant	Change the process Increase the efficiency of the process Recycle the pollutant in the product itself Introduce the pollutant in the regeneration cycle which already exists
Extract pollutant for upgrading or recycling	Seek the most cost-effective extraction process Search for outlets Design new products using waste as raw materials

Gains on the pollution balance

The different pollution balances carried out on programmes of clean technologies are amply positive. Thus, the ultrafiltration process used in tannery divides the toxicity of liquid effluents by 35. The deodorization of vegetable oils by distillation reduces DBO and DCO by more than 90%. Chromium passivation with recycling eliminates 99% of waste chromium. Overall, these summaries show that pollution is reduced by at least 40%, and often by much more.

Furthermore, clean technologies are less likely to lead to secondary pollution (incineration ashes and smoke, solid waste, deposits, etc.).

Gains on the materials balance

The gain on the materials balance is very sizeable. By recycling products or by optimizing processes, the quantities of raw materials and products used can be reduced significantly.

For aluminium varnishing, solvent absorption on active carbon can yield a 70% recovery of the solvent. The regeneration of moulding sand recycles 80% of the sand and leads to a very fast return on investment.

In other cases, the balance is positive thanks to the upgrading and marketing of by-products: the recovery of wastes in the production of dimethyl terephthalate makes it possible to obtain methanol and metals. Fats recovered in pasta production are resold.

Another case of material gain appears when the entire process is revised and uses less expensive raw materials. High-frequency generators for heat treatment eliminate by their very nature the control gases of conventional furnaces (methanol, nitrogen). Solvent dehydration in the production of chloral eliminates all use of oleums.

In nearly all the cases studied, the materials balance improved by at least 10 to 15%, sometimes by much more (90% of the products recovered in the recycling of esterification effluents).

Table 2 shows the results of 720 clean technology programmes in France. As can be seen from this table, in 95% of the cases the programme enabled the reduction of water pollution, in 5% air pollution, and in 8% of the cases it reduced waste.

Table 2
Balance sheet of 720 clean technology projects in France

Pollution reduction	
Water	95% of cases
Air	5%
Waste	8%
Savings on consumption	
Water	70%
Raw materials	60%
Energy	13%
Upgrading of waste	26%
Reduction of accident risks	25%
Improvement of working conditions	30%

Source: Clean Technologies Task Force — France.

Improvement of quality

The control of integrated purification is more perceptible because it makes it possible to play on a greater number of parameters and in particular on the composition of the effluent — which is impossible when the purification is separate from the process.

The purification capacity automatically follows the production capacity and thus the frequent situation where purification equipment is saturated as soon as it is started up is avoided.

Similarly, the reliability of the purification is greater because the quality of the finished product is linked to that of the purification. Now the quality of the product is considered to be the top priority.

In addition to the improved efficiency of the overall production-purification, the process itself is often improved as well. Thus, ion bombardment with iron nitride instead of hard chromium plating makes parts more resistant to wear and oxidation. The 'ion vapour deposition' process is clearly better than electronic cadmium plating. Catalytic hydrogenation for the production of white mineral oils is clearly much more efficient than the former process (90% efficiency instead of 50%). In this case, this improvement alone justifies the use of the clean process.

Financial gains

As to the financial aspect, the use of a clean technology can result in extra costs for:

- Investments:
 - recycling of residual waters in the processing of starch;
 - automation of washing in sausage production (+70%);
 - cold drilling (+100%); etc.
- Operating costs:
 - chrome tanning (+10%); —SO₂ treatment in the production of zinc (+30%);
 - reduction of vinyl chloride waste in the plastics industry (energy and maintenance); etc.

Moreover, R&D expenditure for design and development are considerable as well.

Nevertheless, this balance is positive in a large number of cases. Even though it is difficult to assess the differential of investments and operating costs between the clean and conventional process, a few significant examples can be easily isolated:

- Investments:
 - oxidation of polluted squaring gases (-50%);
 - deodorizing of vegetable oils (-60%).
- Operating costs:
 - oxidation of polluted squaring gases (-25%);
 - recycling of kieselguhr in breweries (-80%);
 - treatment of fluonitric baths for stripping stainless steel (-60%);
 - process for anti-corrosion coating (-50%);
 - autoclave dyeing (-23%);
 - upgrading of acids (savings in materials).

Savings in investments appear essentially in two situations:

- A complete redesign of the process with new, lighter equipment;
- Savings in 'end-of-line' purification equipment.

For operating costs, the economic conditions converge much more often:

- savings in materials;
- energy efficiency (optimization or recovery);
- less manual labour and maintenance;
- drop in the pollution rate;
- savings in the removal of solid wastes, sludge, etc.;
- easier stock control (fewer products, fewer production phases);
- cuts in safety expenses (gloves, masks, filters for toxic gases, tight casks, etc.).

Though the economic advantage of clean technologies is at times clearly identifiable, certain obstacles to their distribution occur at other times:

- the need to amortize existing equipment;
- R&D costs for design, development and implementation;
- apprehension about a prototype technology; etc.

Once the clean technology has been adopted, the return on investment can be very fast:

- recovery of precious metals: six months;
- anti-corrosion coating, process without water: 18 months;
- recovery of HCl in chloric solvents: less than two years; etc.

Table 3
Example of financial balance sheets on recent operations in the chemistry sector in France

		Investment (million FF)	Return time (years)
Rhône Poulenc Chalampé	Upgrading by concentration of water effluents in the production of adipic acid with the manufacture of new, marketable compounds	86.8	4
Hoechst-Cuise La Motte	Recovery and recycling of micro-pollutants by liquid-liquid extraction	4.5	2.4
Rohm & Haas	Recycling of effluents on an esterification operation	0.8	2

Source: France — Department of Clean Technologies and Wastes — Seminar on 'Clean technologies in chemistry' — June 1987.

Sale of technologies — patents

Clean technologies that are efficient and reliable from the economic point of view can lead to marketing either by research organizations (the Centre of Leather Technology, for example), or by industries themselves. In this regard, it is worth underscoring that companies which like to proceed with such a marketing strategy are most often big corporations with sizeable R&D resources (Rhône Poulenc, Sanofi, Orkem, Alsthom, etc.) or they are SMEs geared towards innovation. The safety of a high technology from the environmental point of view is an additional commercial asset for its resale.

Other resultant advantages

Climate of technological innovation

The introduction of a clean technology is most often accompanied by an important R&D effort. This may well lead to improvements in existing processes. The effort to reduce waste leads to an improved use of materials, and thus greater efficiency.

Quality

In many cases, the new processes tend to improve the quality of the finished product. For example, automatic washing in the sugar-making industry, the automated manufacture of sausage paste emulsifier, ion bombardment for wear and oxidation resistance.

In the food sector, these technologies are usually accompanied by improved hygiene.

Improved conditions and relations at work

Clean technologies lead to fewer gas emissions, hence less inhaling of dangerous products. This increase in safety is particularly felt in the paint industry (evaporation of solvents) and in chemistry (difficult to identify chloric products). Ionitriding improves the safety of workers considerably, as does multi-station cold drilling.

Corporate image

The improvement of worker safety and the reduction of effluents in sensitive regions (the Rhine, for example) gives a positive image to a non or little polluting company. This impact is considerable for producers of phosphates, fertilizers and chloric solvents, as well as in the agri-foodstuffs sector (nuisance caused by odour).

Nevertheless, clean technologies still account for only a small part of anti-pollution investments.

The share of clean technologies in investments for environmental protection made in industry are 10 to 20% depending on the fields, sectors and countries.

Table 4
Relative size of investments in clean technology

United States — 1985 (million USD and %)		France — 1986 (million FF)	
Air	1 292	Air, water, waste	4 200
of which:		of which:	
at end of line	909 (70%)	at end of line	3 630 (87%)
change of process	383 (30%)	change of process	570 (13%)
Water	1 018		
of which			
at end of line	892 (70%)		
clean technologies	126 (12%)		

Contexts which favour the promotion of clean technologies in certain countries include:

- the decay and current renovation rate of the production tool;
- subsidies granted to national R&D programmes;
- the size of industries and their R&D capacity;
- the integration level of environmental policies inside companies.

Emerging technologies, promoted by environmental policies

The environment markets are likely to accelerate the emergence of new 'clean' industries which will constitute important foundations in the technological landscape after the year 2000.

These new industries pertain to a large range of sectors:

- Electric technologies in processes, as for the example electron torch;
- New energy vectors, e.g. hydrogen;
- Clean transport vehicles;
- Sophisticated control systems;
- Dry surface treatment.

Figure 1

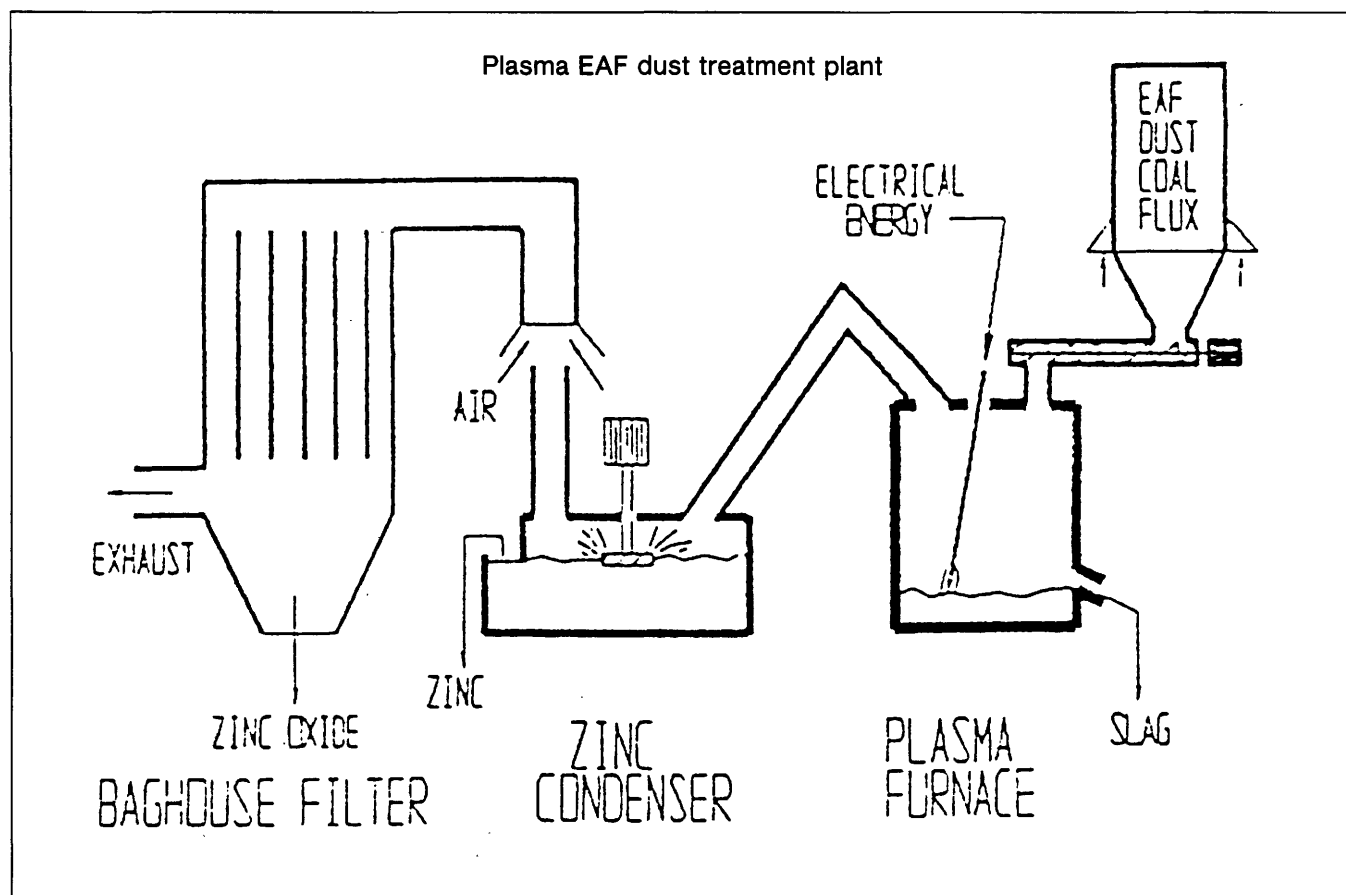


Table 5

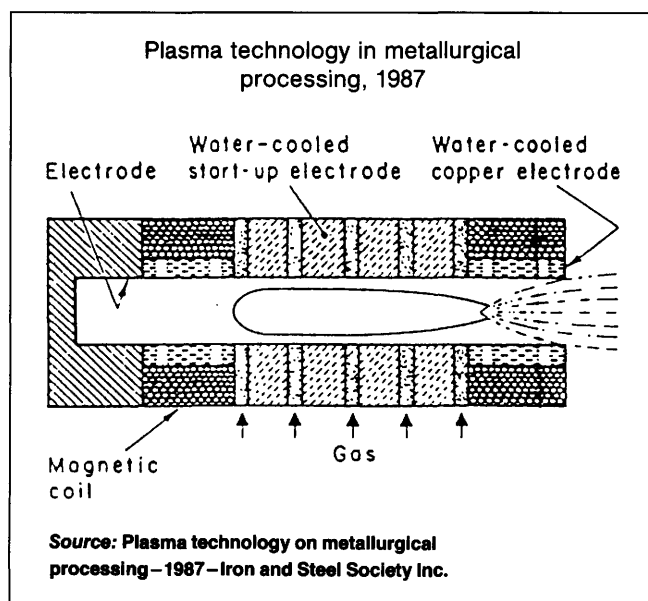
Electron torch applications	Products concerned
Fusion and refining of metal mixtures (or metal scrap) for the purpose of separating undesirable pollutants	Metal scrap, scrap iron, etc.
Upgrading of industrial by-products that are difficult to use with conventional technologies, the storage of which is becoming increasingly problematic and hazardous for the environment	Dust from electric furnaces, blast furnaces, rich in Cr, Ni and Zn Clinkers and incineration ashes
Destruction of toxic waste with a very stable molecule	PCB, chloric products likely to emit dioxins when incinerated

Some of these technologies are presented below.

Conversely, new technologies now emerging could be slowed down by new nuisances they might develop:

- biotechnologies;
- the electronic component industry;
- technologies using ionizing radiation.

Figure 2



Electric technologies in processes: the example of the electron torch

The potential areas of application of electron torches, capable of producing sizeable gas streams at very high temperatures (greater than 10 000°C) with

an electric arc generated between two electrodes, have multiplied these last few years. The regulatory measures (such as the 'Resource Conservation and Recovery Act' in the United States, which forbids the disposal of plasma EAF dust) appear to favour the development of processes for toxic waste treatment.

The field of application of electron torches could be extended in the next few years to various fields, such as the upgrading of under-water polymetallic nodules.

Today, there are a few very powerful electron torches installed in the world, chiefly in metallurgy. The 'environmental' applications are among the most high-growth niches likely to boost this technology, where the European industry enjoys a certain advantage:

- Tetronics United Kingdom
- Davy Mac Kee United Kingdom
- Aerospatiale France
- Krupp Federal Republic of Germany
- Leybold Federal Republic of Germany
- Voest Alpine Austria
- SKF Sweden

The new energy vectors: the hydrogen, fuel or combustible systems

Hydrogen is the only product whose combustion cannot create any pollution nor contribute to the greenhouse effect because the residue of combustion is water.

Current uses of hydrogen

Today, the chemical activity of hydrogen is used much more than its calorific value.

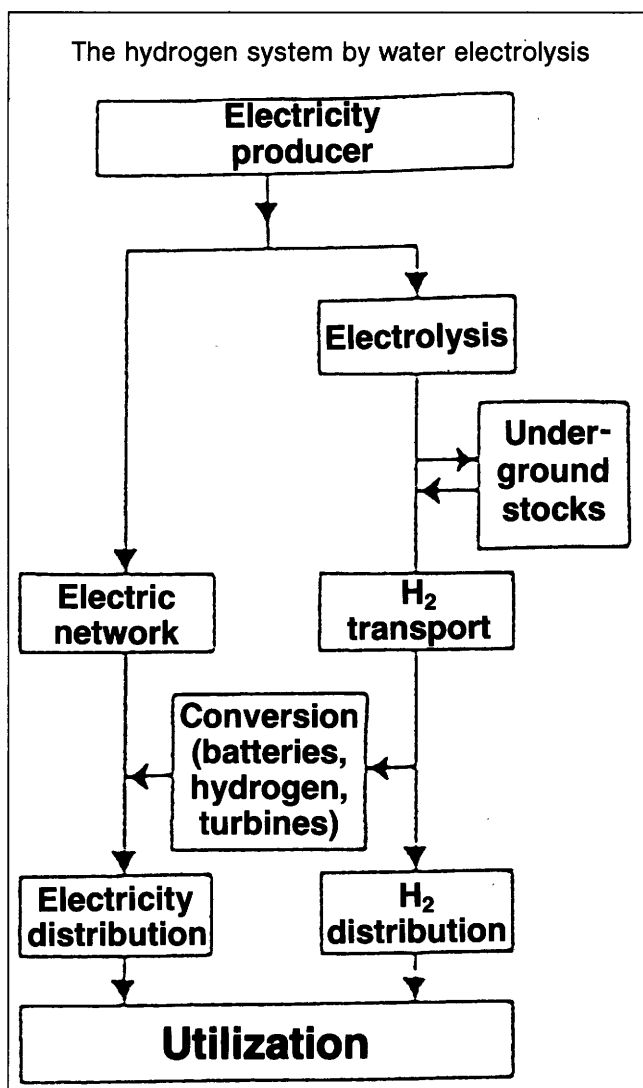
The petroleum and petrochemical industries are big consumers of hydrogen. Nevertheless, most of the need is met by fatal or captive production of hydrogen near the consuming plants. The hydrogen 'market' therefore represents only 5% of the current consumption in the world.

The hydrogen production systems

Three production systems can be used:

- The reforming of natural gas: 5 kWh GCV are needed to produce 1 m³ of hydrogen. The cost is about ECU 0.15 per m³;

Figure 3

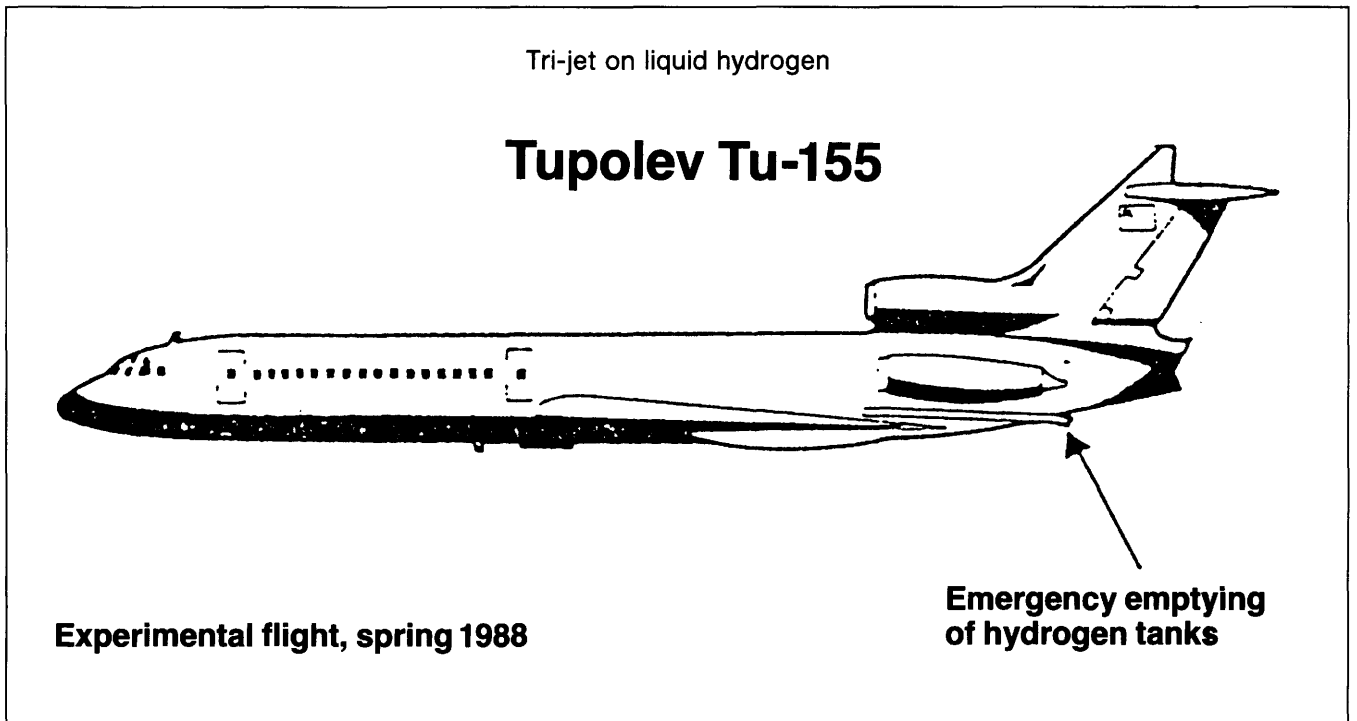


- The gasification of carbon (oxivapogasification): 5.5 carbon thermal units are needed and the cost is the same;
- The electrolysis of water: it is estimated that 1 m³ of hydrogen can be obtained from 4.3 to 4.5 kWh, using the most powerful electrolyzers. At an established electricity price for using the surplus peak-period production of nuclear power plants, the cost could be reduced by as much as 30%.

Possible applications of hydrogen fuel

Following experimental flights in the USA in 1956, then in the UK, the flight of a Tupolev Tu-155 took place in the spring of 1988 with three turbojet engines running on liquid hydrogen: although the turbojets are installed in the original underwing pods of the plane, half of the rear part of the fuselage had to be replaced by hydrogen tanks.

Figure 4

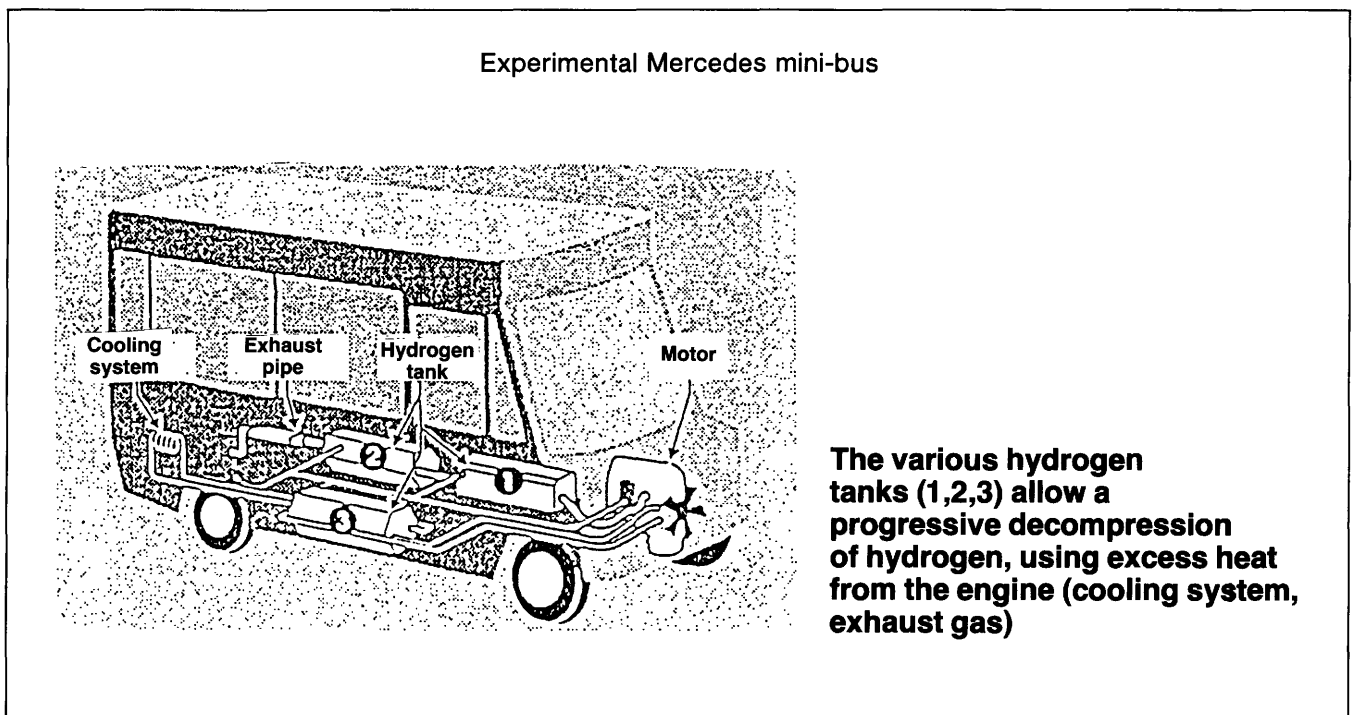


The Mercedes-Benz mini-bus started circulating in Germany in 1980, and circulated in Berlin from 1985 to 1988. Hydrogen was stored in the form of metal hydrides: iron/titanium at low temperature and nickel/magnesium at high temperature, the second with a clearly greater storage capacity. Despite the storage constraints of liquid hydrogen, either because of too low a temperature (equal to -253°C),

or because of high pressure levels, it seems that this solution is now being considered by several car manufacturers.

Another form used to produce energy for automobiles from hydrogen is the system of fuel batteries. A conventional electric motor is then used to move the vehicle.

Figure 5



Application of hydrogen fuel

The development of the direct reduction of iron ore as an alternative to the conventional blast furnace and converter system opened up new opportunities for hydrogen, provided that at equal reducing power, its price is competitive with that of the natural gas or coal that it could replace.

Medium-term prospects

In the current state of technologies, hydrogen appears to be an alternative likely to replace hydrocarbons provided the following three conditions are met:

- a certain rise in the price of hydrocarbons;
- a rise in the operating cost of vehicles or a drop in the tax on fuel to offset the social cost of environmental protection;
- users would be ready to accept lower performance in means of transport (run on hydrogen fuel).

Membrane techniques and filtering or chelating media

The major membrane techniques

Like 'end-of-tube' purification techniques, clean technologies are making increasing use of membrane techniques from such applications as haemodialysis or desalination of sea water:

- purification of drinking water and residual water in ultrafiltration membrane plants (e.g. Brite, which groups DDS/Lyonnaise des eaux, whose main results are used in the Eureka 'membrane' project (DDS/Degremont)), which are going to cause a profound change in the industrial approach to water treatment;
- recycling of concentrated pollutants such as chloric solvents of acid baths charged with metallic particles;
- use of microfiltration, reverse osmosis and ultrafiltration membranes in clean processes in the chemistry and agri-foodstuffs sectors to replace such techniques as hydro-extraction, evaporation, decantation and distillation;
- purification and upgrading of effluents from the surface treatment industry using membranes, combined with electric techniques if necessary: electro dialysis, electro-electrodialysis;

- use of media filters (textile, organic or mineral medium), grafted or non-grafted with chelating substances for the selective filtering of certain substances to be eliminated or upgraded (zeolites).

Table 6
New processes competing for the treatment of surface effluents

Electrolysis

An oxidation-reduction process which, in the case of salts, makes it possible to recover the metal at the cathode, with electrochemical reactions taking place at the electrodes.

Existing processes (disperse cathode, high-speed cathode, etc.) differ in the means used to increase the contact surface (volume reactions) and in density of current, as well as in the concentration of the solutions:

- Use of nodules between anodes and cathodes
- Use of porous cathodes in graphite
- Use of disperse electrode in circulation
- Anode-cathode stacking
- Fractionation of the cathodic surface using glass beads
- Use of fluidized bed as cathode

Electrodialysis

Electrochemical process used to extract ions contained in a solution via migration through selective membranes under the effect of an electric field.

Electro-electrodialysis

Process combining electrolysis and electro dialysis, with chemical reactions taking place at the electrodes.

Reverse osmosis

Process based on the passage of the solvent from the most concentrated solution through a semi-permeable membrane under the effect of pressure greater than the osmotic pressure.

Polyelectrolyte

Direct complexing of metals in solution by complexing polymers (acrylic polyacids, etc.), ultrafiltration and regeneration of the complexing agent.

Silicate gel

Mineral absorption of metals in solution.

Furthermore, new competing processes are being used more and more for the treatment of surface effluents (see Table 6).

Current use of membrane techniques

Membrane separation techniques are already widely used at industrial level for all industries for various mediums to be separated: liquid, liquid vapour or gas, gas.

There are three predominant technologies on the market: Microfiltration, ultrafiltration and reverse osmosis for concentration, separation, purification and/or sterilization (see Table 8).

These separation techniques are used in four different sectors:

- recovery of products with high added value;
- recycling of effluents.

Table 7
Main types of membranous separation by environment

Liquid environment	Liquid vapour or gas environment	Gas environment
Microfiltration	Pervaporation	Gaseous permeation
Ultrafiltration	Liquid gas exchanges	Gaseous diffusion
Reverse osmosis		
Dialysis		
Electrodialysis		
Extraction by liquid membranes		

- pharmacy, to purify or concentrate serums and vaccines;
- the food sector, to purify drinks and also to separate the constituents of milk or to extract proteins;

The membrane market

The world market of membranes amounts to about USD 750 million (ECU 634.3 million), and applications of separation technologies represent nearly 50% of this figure, with a predominant use in the treatment of effluents and desalination of sea water, apart from therapeutic uses (see Table 9).

The main manufacturers of membranes

Pioneers in the field, the Americans have a 40% share of today's market. The Japanese and the Europeans share the rest pretty much equally, but the leading industrial manufacturer of ultrafiltration membranes, DDS, is Danish.

Table 10 gives the main companies involved in the design of membranes and membrane systems. There are four types of companies:

- big manufacturers of equipment, such as Alfa Laval;

Table 8
Applications and roles of the main types of membrane separation techniques

Main types of membrane processes	Main applications				Pore diameter (μ)	Role of membranes	Examples of industrial applications
	Concentration	Separation	Purification	Sterilization			
Microfiltration	X	X	X	X	≥ 0.1	Retains substances in suspension particles and microorganisms	* Absolute sterilization of certain gases and liquids * Bacterial purification of alimentary liquids in place of more conventional heat treatment processes
Ultrafiltration	X	X	X		Varies between 0.1 and 0.01	Retains viruses and organic macro-molecules like proteins	* Ultra filtration under pressure in the extraction of enzymes and active fermentation processes * Residue dialysis rich in macro-molecules, as for example concentrates
Reverse Osmosis	X	X			Varies between 0.001 and 0.0001	Retains salts dissolved in water and small molecules	* Desalination of sea water

Table 9
World membrane market
Type of technology

(million ECU)	1980	1983	1988 (1)
Separation technologies	124.3	213.4	296.0
Desalination of sea water	17.2	37.1	50.7
Water and other product purification	7.2	16.9	33.8
Effluent treatment	23.7	52.8	101.5
Gas separation/enrichment	3.6	11.2	16.9
Electrochemical	0.7	5.6	25.4
Therapeutic dialysis	71.8	89.9	67.7
Support technologies	59.6	153.9	338.3
Issuing of medicines	57.5	148.3	317.1
Biotechnological and other applications	2.2	5.6	21.1
Total	183.9	367.3	634.3

(1) Sema Group estimates.

Source: Business Communications/Sema Group.

- big gas groups, such as Air Products and Air Liquide;
- chemical corporations, such as Dow Chemical, Dupont, Rhône Poulenc;
- specialized companies, rarely independent, often subsidiaries of big multinational groups.

There are numerous research and development projects in Europe and the United States aimed at designing new membranes.

The 'environmental' outlets of membranes

The 'environmental' applications which concern the processes, purification treatments, and the upgrading of waste in liquid and gas form, represent considerable volumes relative to existing applications in consideration of the waste to be treated. As a result, the environment market of membranes and other filtering media are likely to cause a considerable reorientation in the activity of the current protagonists among the different sectors (mineral chemistry, organic chemistry, the metal industry, textile industries, etc.).

Furthermore, the development of membrane and filtering media activities will be very closely linked to the development of two extremely innovative products/technologies: new materials and biotechnologies.

Clean transport vehicles

In most industrialized countries (the European Community, the USA and Japan), vehicles and car traffic

Table 10
Main manufacturers of membranes in the world

Europe	USA	Japan
France	Dupont de Nemours (*)	Fuji Filter
L'Air Liquide (*)	Air Products (**)	
Techsep (Rhône Poulenc)	Allied Corp.	
Elf	Dow Chemical (***)	
	Millipore	
Denmark	Permca (Monsanto)	
De Danske	Abcor	
Sukkerfabrikker (DDS)	Rhom & Haas	
	WR Grace	
United Kingdom	Celanese	
ICI		
BOC Group (***)		
Netherlands		
Akzo (**)		
Germany		
Bayer		
Enka AG (Akzo)		

(*) (**) (***) Associations between companies.

account for at least half the nitrous oxide emissions caused by man. Lead pollution, on the other hand, varies widely and sometimes comes nearly exclusively from vehicles, as for example in France (90%).

Table 11
List of some membrane development projects

Participants	Membrane type	Application
NV (Nederlandse Gasunie) (NL)/Ircha (F)/Gerth (*) (F)	Polyimide	Purification of hydro-carbons
Elf Aquitaine (F)/Akzo (NI)/ Twente University (NL)	Polyimide	Separation/prepurification of dry gases
Monsanto (USA)	Asymmetric membranes in poly-sulphur, coated with silicone	Treatment of cracking gases for a recovery of hydrogen
Dow Chemical (USA) Fluid System (USA)		
Bend Research (USA)		(On contract with the EPA and the National Science Foundation)
DDS (Denmark)/Degremont (F)	Cellulose acetate	Water treatment

(*) Association between Total and IFP (Institut Français du Pétrole) [French Institute of Petroleum].

Pressure from governments and the ecologists in the main industrialized countries have compelled the adoption of anti-pollution standards and have thus re-awakened the interest of manufacturers to develop de-pollution methods that are more

satisfactory and especially less costly than filtration by a special exhaust silencer. The different anti-pollution techniques or innovations are summarized in Table 12.

Table 12

Technique/ innovation	Environmental consequences	Anticipated deadline
Catalytic muffler	Reduced emissions	1989 to 1994 (all vehicles)
Ethanol/methanol engine	Elimination of CO emissions	Already in partial use
Clean engine + low consumption vehicle (3 l/100 km).	Reduced emissions	1995 — 2005
Electric vehicle	Total elimination of emissions	2000 — 2010 (urban/inter- urban use)
Hydrogen-powered vehicles		
* Thermal engine	Total elimination of emissions	Beyond 2020-2030
* Hydrogen-fuel battery		

Source: Sema Group Management Consultants.

Catalyst containers

The adoption of two directives by the Ministers for the Environment of the 12 countries of the European Community in 1988 should result in a considerable reduction of pollution caused by cars run on petrol and by heavy road vehicles with diesel engines.

The European standards and the effective dates of these directives vary depending on the cubic capacity of the vehicles, but it is now established that

the triple-bed catalyst containers will be generalized much faster than scheduled for all vehicles.

There are in fact two main types of catalyst containers;

- double-bed catalyst containers
- triple-bed catalyst containers which eliminate the three pollutants: CO, NO_x and hydrocarbons (with a fuel-injection engine of course).

The main manufacturers of catalyst containers plan to increase their production programmes and their investments to keep abreast with the sizeable growth of the markets, both in Europe (EC and non-EC) and the United States, where standards require three-channel silencers for all cubic capacities.

Every year, more than 10 million new cars will have to be equipped with a catalyst container or equivalent system.

The clean engine

The generalization of unleaded petrol is forcing car makers to think about new engines: the drop of the octane index from 98 to 95 requires accompanying reductions of composition rates and increases of cubic capacity to compensate for the loss in power. Nevertheless, this requires that more expensive materials be used, especially for the valves.

Most engine specialists at the major car manufacturers are working without interruption on a new generation of lean-mixture engines to be able to satisfy the new standards. In these types of engines, electronic injection systems will increasingly replace carburettors, because they provide accurate control of combustion.

Table 13

Cubic capacity (litre)	≤ 1.4	1.4 to 2	> 2
Maximum emission levels (1)			
* CO ₂	45 then 30	30	25
* HC + NO _x	15 then 8	8	6.5
* NO _x	6 then 0	-	3.5
Effective dates			
* New cars	01.10.91 then 01.10.93	01.10.93	01.10.89
* New models	01.10.90 then 01.10.92	01.10.91	01.10.88
Type of anti-pollution equipment	Catalytic muffler or use of weak mixture fuel		Electronic control of air inlet + catalytic muffler

(1) Maximum quantity of toxic substances registered during a test conducted on a roller testing bench on an overall distance of 4 052 km for 195 seconds.

Source: EEC, Luxembourg Compromise, 1988.

Ethanol/methanol engines

Methanol is a possible replacement fuel for petrol because it has a certain number of advantages such as:

- good compatibility with fuels currently in use with respect to performance (pure or mixture);
- its production is possible, indeed well mastered.

Table 14

Impregnators	Monoliths	Casing and assemblers
* Degussa (FRG)	* NGK (Japan)	* AG Rochester
* Johnson Matthey (GB)	* Corning Glass (USA)	General Motors (Europe/USA)
* Allied Signal (USA)		* ECIA (Peugeot/F)
* Englehard (FRG)		* Wimetel (Gillet/USA)

Ethanol could also be used to a lesser degree in certain countries, pure or in a mixture, because it is easy to obtain, especially through biomass processes, but the production cost continues to be too high despite recent improvements.

The electric vehicle

Most major car manufacturers have launched research and development programmes concerning electric vehicles which have a plethora of advantages and weaknesses as outlined in Table 15. The market for this type of vehicle is very promising for urban/inter-city use with a view to 2000-2010, provided cost problems are solved.

The hydrogen vehicle

Hydrogen, used as a substitute fuel for petrol and other substitute fuels (gasoil, LPG, methanol/ethanol) is characterized by:

- higher thermal yield at a low rate of polluting exhaust emissions;
- technical conditions of distribution and storage that have not been completely solved yet, and not very cost competitive at present in relation to, in particular, an electric engine with accumulator.

Consequently, the actual emergence of the hydrogen engine remains uncertain. Nevertheless, certain programmes are under way:

- a joint project by CEA and Renault in which EDF and Mercedes are showing interest;
- the Daimler-Benz (see chapter on hydrogen) and PSA projects.

A European programme is being created to harmonize all of these research efforts.

Table 15
Advantages and drawbacks depending on the type of feed

Advantages	Drawbacks	
	Accumulators	Fuel batteries
* Runs smoothly and very quietly	* Expensive and heavy	* Numerous problems persist, though progress under way
* Very low exhaust emissions	* Limited autonomy	
* Instant start and acceleration	* Recharging points needed	
* Easy to drive		
* Completely free of all the usual petrol engine problems: pinking, evaporation		

Clean products and substitution policies

Clean products and the accompanying substitution policies are changing the technological systems and strategic positioning of the industrial protagonists.

The Task Force on Clean Technologies of the French Ministry of the Environment defines an 'eco-product' or a 'clean product' as 'a product which respects the environment during its production, consumption and disposal after use'.

Essential criteria which make up the profile of a clean product and which are part of its ecological balance sheet include:

- Criteria for the elimination of nuisances:
 - water, air and soil pollution,
 - noise and other nuisances,
 - waste production.
- Criteria for the conservation of natural resources:
 - consumption of raw materials and energy,
 - durability of the product.

- **Danger criteria:**
 - job safety,
 - reliability.
- **More general criteria linked to the quality of life:**
 - saving of time,
 - appearance,
 - easy to use.

The Federal Republic of Germany was the first country to develop ecological products under the 'Blue Angel' label which covers some 30 000 products.

In the Federal Republic of Germany, consumers are asking increasingly that a product be 'ecological' before they decide to buy it. Manufacturers are reacting to this trend through commercial ads which emphasize such criteria more than the price, design or quality.

Other countries have also created such an ecological label, i.e. Canada, Sweden, Norway, Finland, Denmark and Japan.

An 'Eco-product Prize' was created at the European level and awarded in 1988 to the first battery in the world without any mercury whatsoever.

Table 16
'Towards a better environment prize'

Winner: 'Green power' battery, marketed under the Wonder and Mazda brands; manufactured by the Cipel/Wonder group.

Innovative advantages

Mercury (previously used in all batteries) is replaced by Forafac 1110, a product with very low toxicity for marine and non bio-accumulable life. A patent application has been filed for this innovation at world level.

The positioning of the product on the market (price, performance, stress of its non-polluting nature) is indicative of the will to anticipate the requirements of public authorities and of consumers with regard to environmental protection.

The stakes for the environment are high: the quantity of mercury contained in batteries sold in France is estimated at 54 tonnes / year.

The most useful category among clean products which is the subject of major research efforts concerns substitutes for toxic products (e.g. organo-halogens, heavy metals, various carcinogenic products).

Recent examples listed below show that, in addition to advantages regarding nuisances, these substitution policies can lead to important innovations.

Substitution of asbestos

The extremely toxic properties of asbestos have lead industrialized countries to take strict measures concerning its extraction and use (EC directive: 0.1 mg/m³, effective on 1 January 1987).

More than 10 years of intensive research have led to the development of numerous substitution products:

- graphite fibres
- carbon fibres
- glass fibres
- aramid
- PBI
- PTFE
- ceramics
- mica.

Taken separately, none of these products attains the performance level of asbestos, but equal and even superior properties can be obtained by combining two or three of these materials. Between 1973 and 1985, asbestos consumption dropped from 795 000 to 155 000 tonnes in the United States, while in Europe (excluding Scandinavia) it dropped from 991 000 tonnes in 1976 to 478 000 tonnes in 1984.

The example of protective clothing

The need to replace asbestos in protective clothing contributed to the development of high-efficiency textile fibres. PBI (Polybenzimidazole), a fireproof organic fibre, developed for space exploration, can obtain the same protection effect as asbestos, but with 50% less weight. Moreover, this fibre has an extraordinarily high insulating effect. Its textile structure is preserved, even during contact with flames, without becoming fragile or any considerable loss of resistance. Furthermore, PBI absorbs more humidity, like cotton for example, and this leads to interesting physiological properties.

For high levels of heat protection, aluminized glass fibres are being used more and more in complexes with fire-resistant fabrics.

CFCs and their substitutes

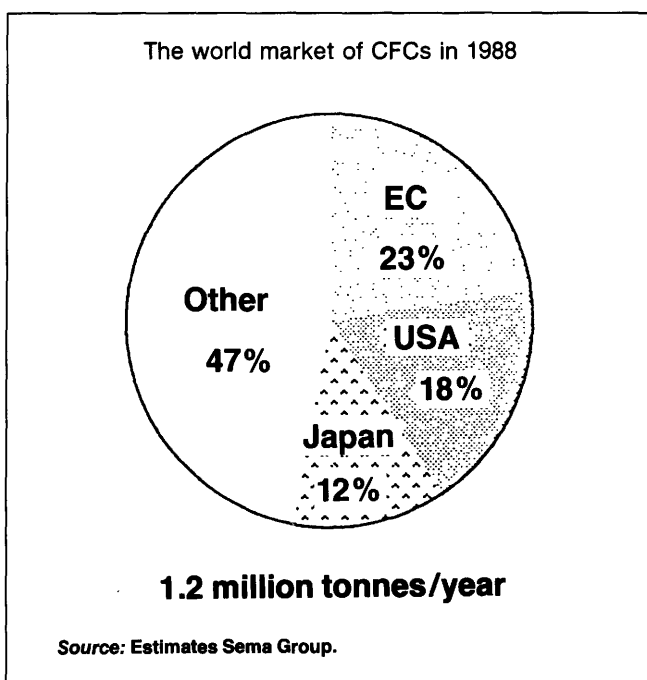
The so-called 'ozone hole' above the Antarctic has led industrialized countries to take a number of measures:

- the Vienna Convention signed by 28 countries in 1985 within the framework of the United Nations Environment Programme (UNEP);
- the Montreal Protocol relative to substances which harm the ozone layer signed in 1987, aimed at reducing the consumption of certain CFCs.

The main measures of the protocol are as follows:

- industrialized countries agree not to increase their consumption of CFCs until 1989, and then to reduce it by 20% by 1993, and by half by 1998; certain trade unions have adopted stricter policies than those set out in the Montreal Protocol. The Federation Europeenne des Fabricants d'aérosols for instance has decided to reduce by 90% the amount of CFCs in aerosols by January 1991;
- developing countries are granted a period of 10 years to conform to this reduction programme, provided their annual consumption does not exceed 0.3 kg/inhabitant. They are thus allowed to continue increasing their consumption until they reach this level.

Figure 6



Given the considerable tonnage of CFCs produced and consumed every year in the world (more than 1 million tonnes), and the deterioration in the ozone layer, the stakes for current substitutes to CFCs are high.

Most of the CFC substitutes are HCFCs, which do not contain the hazard of chlorine for the strato-

sphere; being much less stable than CFCs, they decompose at low altitudes.

Table 17
CFC consumption by principal application in the major industrialized countries, 1988 (1)

(%)	USA and Canada	Japan	EC
Expansion agents	20	20	25
Freezing agents	45	30	20
Aerosols	1	15	40
Solvents	15	34	10
Other	19	1	5
Total	100	100	100

(1) Estimated.

Source: Sema Group Management Consultants.

The CFC markets

Of the 1.2 million tonnes of CFCs consumed every year in the world, the incriminated products represent about 970 000, i.e. 80%. These are essentially CFC 11, 12, 113, 114 and 115, all of which concern the following applications:

- insulation, where CFCs are used as inflating agents (in particular in rigid polyurethane foam);
- cold, as a refrigeration agent;
- solvents;
- aerosols.

The use of CFCs varies widely depending on the main industrialized areas:

- in Europe, it is primarily used as an aerosol agent;
- in the USA and Japan, most tonnage is used for refrigeration.

The main producers of CFCs

The main producers of CFCs in the world include Dupont, with 25% of the world capacity, then Atochem, Penwalt, Allied and ICI.

Table 18
Main CFC manufacturers in the world

USA	Europe	Japan
Du Pont Co.	Atochem (France)	Daikin
Pennwalt Corp.	ICI (United Kingdom)	Asahi Glass
Allied Signal	Kali Chemie (FRG)	
Racon	Akzo (NL)	
	Montedison (Italy)	

Table 19
Main possible CFC substitutes and their current applications

	CFC used at present		Possible substitutes	Problems posed
Insulation (hard polyurethane foam)	11		141 b 123	Lower insulating capacity (- 10%)
Cold				
Large air-conditioning	11 & 12		22	Redesign of installations
Household air-conditioning	12 & 22		Ammoniac 22	Toxicity Redesign of installations
Cold chain (household refrigerator)	12		134 a 134 a	Reforming of lubricating oil
Solvent				
Electronic	113	Mixture of 113 with other solvents		Less efficient
Mechanic	113		Terpene Alkaline lye	Toxicity polluting waste water
Aerosols	11 & 12		DME Butane, propane 22, 142 b	Flammable More expensive
Flexible foam (furniture; automobile, etc.)	11		141 b CO ₂ generated in situ	Twice as expensive Hardening effect on the foam
Packaging (polystyrene expanded into sheets)	11		22, 142 b Pentane	Twice as expensive

Source: Usine nouvelle.

The main substitutes for CFCs

There are already several substitutes for CFCs in use today, in particular certain HCFCs which are at pilot production stage, e.g.:

- HCFC 134, developed by Atochem and by Dupont;
- HCFC 141 b, with certain pilot production runs getting under way;
- HCFC 142 b, already industrially available, in particular from Atochem;
- HCFC 22.

Table 20
Use of mercury in alkaline battery production

(% of weight)	1984	1986	1988	1990	1992
Major European battery manufacturers	1	0.5	0.025-0.15	0.025	0.025
Europile forecast (1)	1	0.5	0.3	0.1	0.025
EC Directive	N/A	N/A	N/A	0.1	0.025

(1) Using Europile's figures for major European battery manufacturers.

Source: Sema Group Management Consultants.

The large-scale marketing of substitutes can be envisaged before the years 1995-2000.

In order to accelerate the process of developing and putting on the market new products, the 14 largest producers of CFCs in the world have set up an annual programme, 'Programme for alternative fluorocarbon toxicity testing' (PAFTT), launched in 1987.

The elimination of mercury in saline and alkaline batteries

Two years ago, a major European manufacturer of batteries eliminated mercury completely from its saline batteries and reduced the rate of mercury by a factor of four in its alkaline batteries (0.25% only of the weight of the battery as opposed to 1% previously). Mercury is replaced by an organic compound, perfluoropolyethoxide, a totally harmless product to humans.

The product lines of several manufacturers today include alkaline batteries with a mercury content below 0.025% or even 0%.

Figure 7

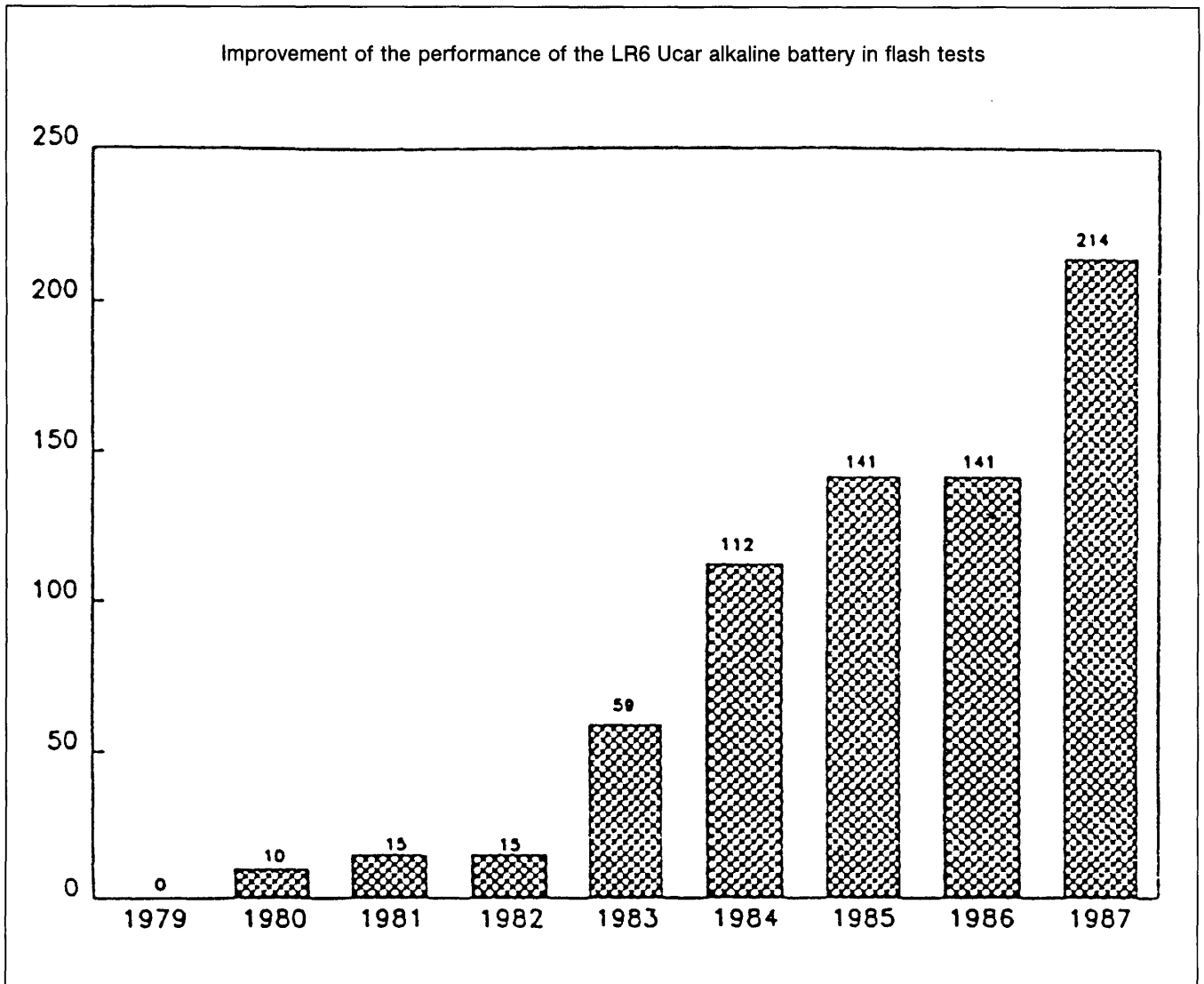


Table 21
Comparison of average cadmium content, 1986

	Natural soil	Domestic waste	Waste gases (1)
Cadmium content (ppm)	0.1	20	2 000
Enrichment factor	*	200	20 000

(1) Gases from combustion.

* Not applicable.

Source: H. Vogg, H. Braun, M. Metzger, J. Schneider. Waste Management and Research (1986).

Research efforts to reduce the mercury content of alkaline batteries have achieved consequential technological progress:

- considerable improvements in battery performance: capacity, conservation, resistance to leaks (see Figure 7);
- improvements in the design of batteries and the use of more efficient raw materials;

- better understanding of chemical and electro-mechanical phenomena.

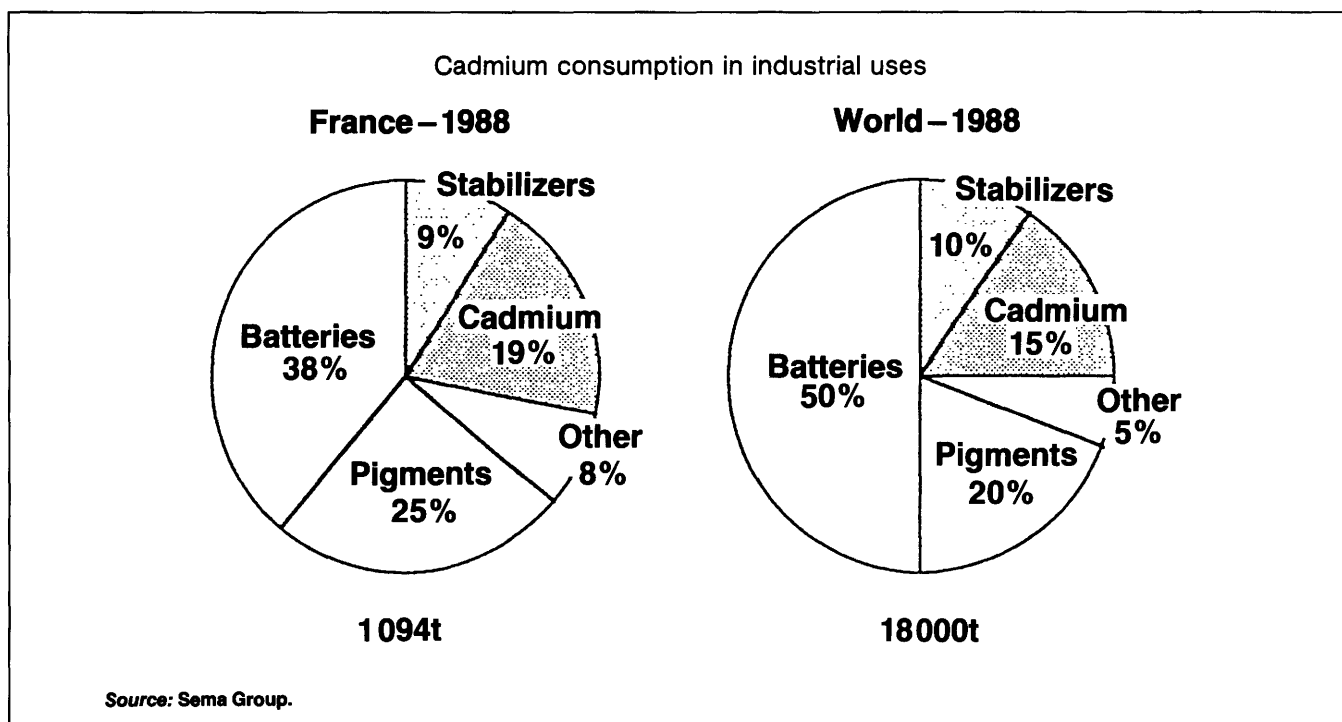
The new processes or products born from the fight against pollution by cadmium

Present in excessive content levels in the natural environment, cadmium accumulates in living organisms, and threatens — through the food chain — human health (serious, terminal effects: kidney disorders, etc.).

The fight against pollution by cadmium has been made particularly difficult due to the fact that it is:

- a multi-environment pollution: in the soil, the air and the water;

Figure 8



- a multi-source pollution: batteries, plastic additives, phosphate fertilizers, etc.

In addition, a cadmium concentration effect is observed in the waste destruction chain, leading to emissions (usually near urban centres) of incineration fumes with a cadmium content of 20 000 ppm more than that encountered in soils.

Cadmium consumption amounts to about 18 000 tonnes worldwide (industrial uses apart from phosphate fertilizers).

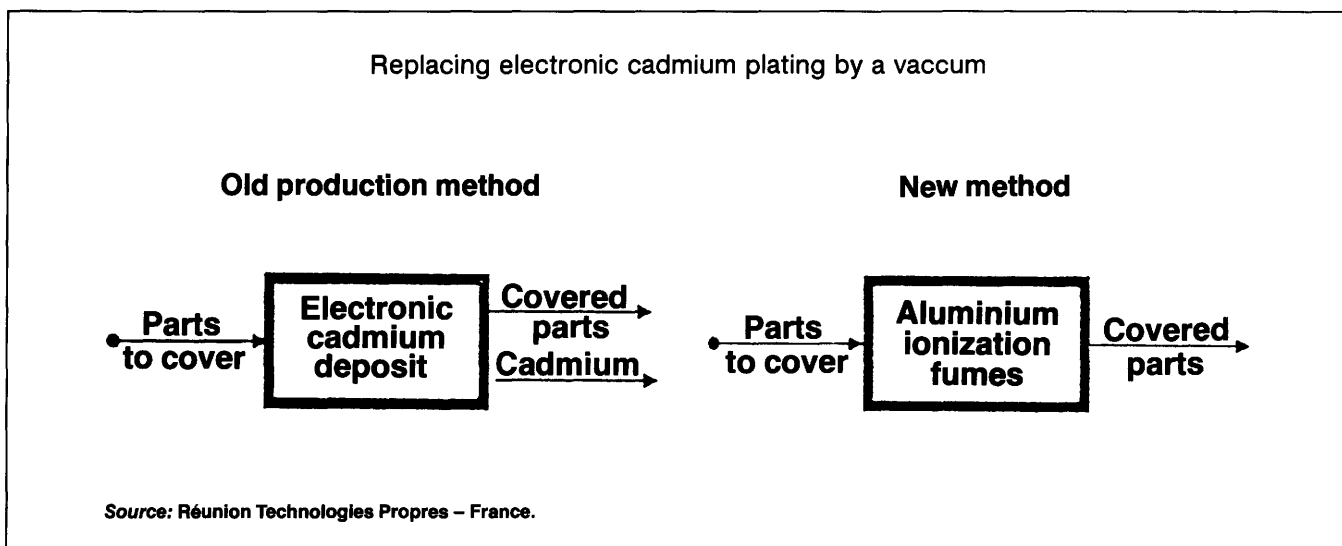
Rechargeable cadmium-nickel (car) batteries constitute henceforth the biggest consumption segment of cadmium in the world (about 50%). With the extremely fast development of mini-batteries for video, gardening equipment etc., this segment will become largely predominant in the medium term.

Pollution by cadmium from industry

R&D efforts aimed at reducing pollution by cadmium from industry are carried out in two ways:

- the development of substitution products (or processes)

Figure 9



- the maximization of recycling.

Cadmium plating is the most typical example where regulations have contributed to the emergence of new, less polluting processes. Intensive research efforts waged for several years now have led to the development of:

Table 22
World consumption of refined cadmium

(tonnes)	1986	1987
Europe	6 654	7 055
Africa	18	18
Asia	2 610	2 959
America	5 713	5 417
Australia	90	90
World total	15 085	15 538

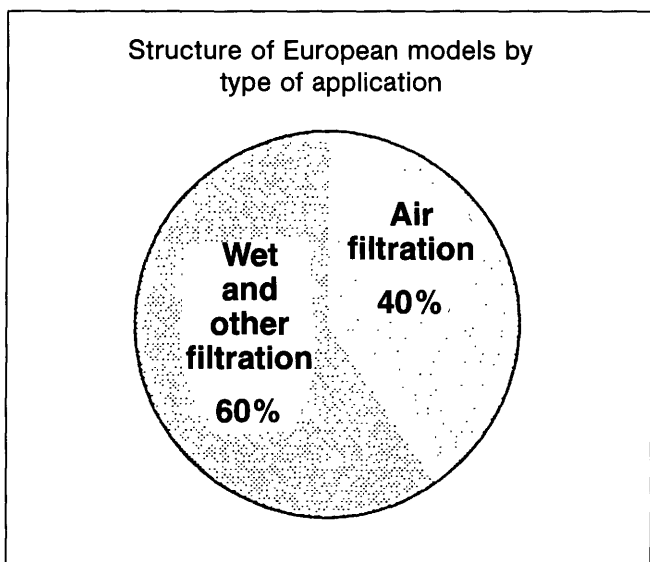
Source: World Bureau of Metals Statistics.

- cadmium substitute metals: zinc, silver;
- clean technologies using vacuum plating.

The main consequences of these developments are:

- a reduction in the cost price of about 30% in relation to competing technologies;

Figure 10



- improvement in the quality and precision of the treatments.

The advantages of vacuum surface treatments enable us to predict an extremely important development of these techniques in the fields of:

- self-corrosion;

- self-wear;
- improved appearance.

Table 23

	Substitution	Recycling
Cadmium plating (of metals)	X	X
Rechargeable accumulators	X	
Pigments	X	
Stabilizers	X	

Cadmium recycling technologies exist for cadmium-nickel batteries and (car) batteries, and research efforts are focused mainly on increasing the yield of used batteries.

Nevertheless, many laboratories are working on new types of rechargeable, more efficient batteries: nickel-hydrides, manganese-lithium, sodium-sulphur — which, in the medium term, could replace cadmium-nickel batteries for certain applications.

For cadmium-based pigments (colouring of glass and plastic) and cadmium-based stabilizers (stabilization of plastics), most consumer companies are pursuing an active policy of abandoning cadmium for substitute products:

- pigments: titanium dioxide, organic pigments;
- stabilizers: barium-zinc, calcium-zinc compounds.

Thus, with regard to PVC in Europe, 7% of cadmium has been replaced by other additives since 1981.

Table 24

National programmes for limiting the use of cadmium

Countries with strict regulations for fertilizers:
Japan, Finland, Austria

Countries where manufacturers or importers have to declare the cadmium content in fertilizers:
Federal Republic of Germany

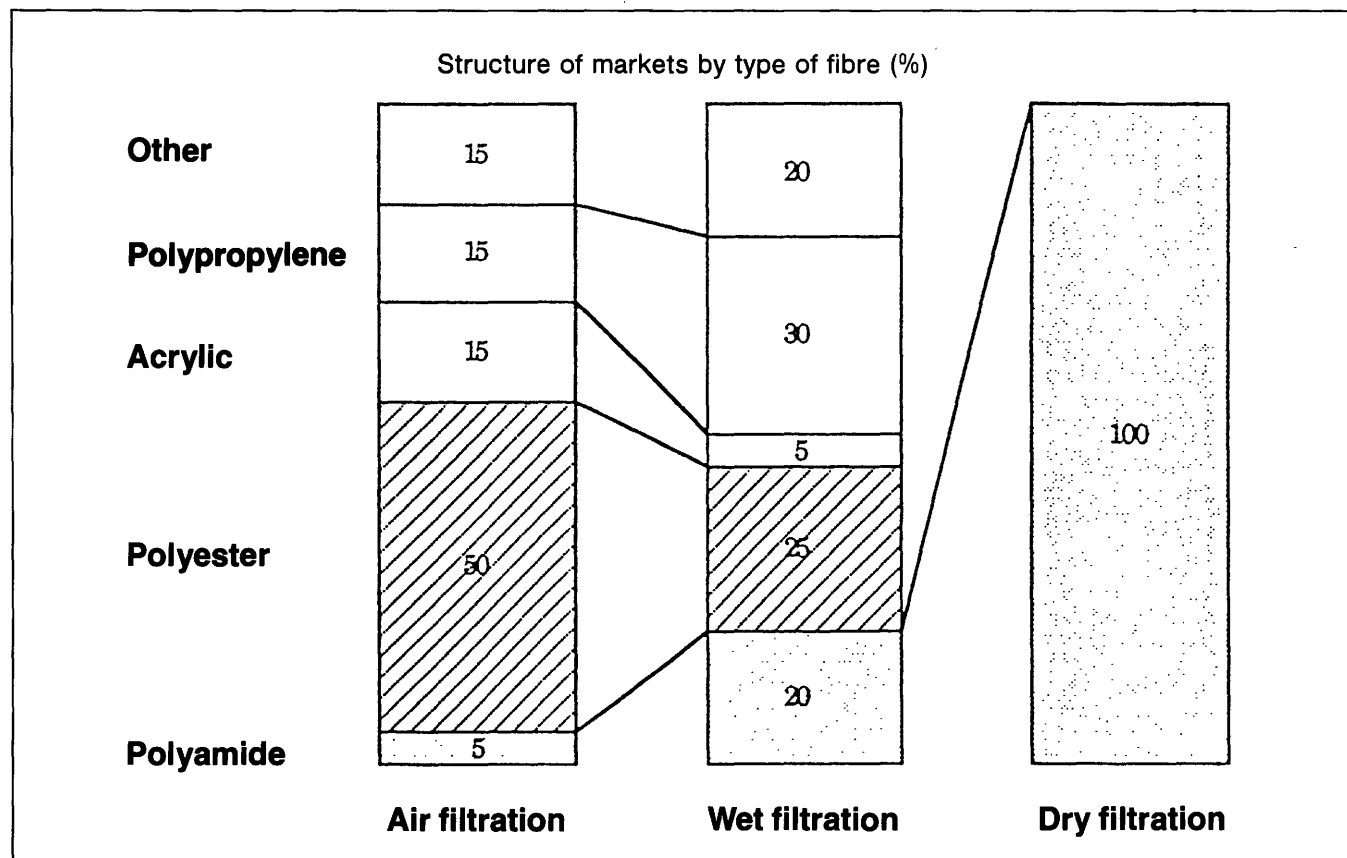
Regulations relative to cadmium not applied to fertilizers:
Sweden, Denmark, Switzerland, the Netherlands

Pollution by cadmium in phosphate fertilizers

In 1987, the Commission of the European Communities approved a new action programme aimed at reducing pollution by cadmium, especially in fertilizers. Nevertheless, no maximum cadmium content in phosphates was established.

By comparison with the years 1982-84, there is a noticeable change in attitude, as several Member

Figure 11



States are henceforth applying limitation programmes.

Table 25
Cadmium content in the main phosphates

Country	Source	Cadmium content in ppm	Average content
USSR	Kola	1	0.3
USA	Florida	3-12	7
USA	Carolina		36
Israel	Oron		3
Israel	Nahan Zin	19-21	20
Morocco	Khouribga	1-17	12
Morocco	Joussoufia		4
Algeria	Algiers		23
Western Sahara	Bucraa		43
Tunisia	Cafsa	55-57	56
Togo	Togo	38-60	53
Senegal	Taiba	68-100	84

Source: Fertilizer Review.

As a result of this limitation, certain phosphate-producing countries have launched major research programmes aimed at reducing the cadmium content in phosphates (in particular phosphates in West Africa, where the content can reach 80 ppm) (Table 25).

Several industrial processes have been defined and tested (Chemische Fabrik Budenheim — FR of Ger-

many). The most promising results are obtained by purifying phosphoric acid, a by-product of natural phosphates, which is the basic product of most phosphate fertilizers. The cadmium content in phosphoric acid is precipitated by a specific chemical agent and then filtered. The processes tested at present at the pilot stage reduce the cadmium content in phosphoric acid by a factor of four, but at too high a cost still. Continued efforts in this direction should lead to economically competitive processes in the short term.

Filter cloths

Current uses of filter cloths

Filter cloth (woven or non woven) is used in several pollutant separation technologies and in numerous clean processes:

- Air and gas filtration: to stop solid particles suspended in gases; a separation and depollution function (for example, black coal production, ceramic industries, steel, cement, etc.).
- Wet filtration: separation of solid particles from the liquid medium so as to collect the liquid or the solid (chemical industry, beer, wine industries, etc.).

- Dry filtration: elimination of foreign particles in a powder (e.g. mill operation, food industries, etc.).

The characteristics of the cloths depend on:

- the type of equipment used;
- the characteristics of the liquid to be filtered (temperature, chemical nature, pressure, etc.);
- the characteristics of the filtration planned.

Concentrated mainly in Germany (30 to 40%), the European market concerns primarily wet filtration applications (Figures 10 and 11).

European products and main producers

There are two types of manufactured cloths: non-woven and woven, chiefly in polyester, polypropylene and polyamide.

Table 26
Characteristics of the main types of fabrics

Type of fabric	Weight	Products
Non-woven	350-650	* Needled felt, currently used in all materials, from polypropylene to nomex (high temperature applications)
Woven fabrics * monofilaments	200-350	* (Polypropylene and nylon) canvas used for applications such as silk screen, dry filtration, etc. Twill, satin (polyester and polypropylene) for 50%
* multifilaments	300-500	Twill, satin for 50% used essentially for wet filtration

The main European manufacturers are situated in Germany, Switzerland and France.

Research and development in the environment field in Europe

The European research and development programmes are being increasingly worked out on a Community base or by and between multinational industrial partnerships.

The research action of the EC for the 1989-92 period on the environment shortly to be organized will be centered on two programmes:

- STEP (Science and technology for the protection of the environment): ECU 75 million;

Table 27
List of topics of the Eureka programme

Topics	Countries
Euroenviron Development of a wide range of technologies and processes aimed at solving a part of the main European environment problems	Denmark, Finland, Italy, Norway, Sweden, Switzerland, FRG, Netherlands, Spain
Clear water Improve aquatic environment Reduce pollution in the Rhine	Netherlands, Belgium
Design and manufacture ultrafiltration membranes for water treatment	France, Denmark
System ZEOL Purify gaseous and liquid industrial effluents by the displacement of organic constituents	France, Sweden, FRG
Eurotrac Trace the development of tropospheric pollutants	France, FRG
Formentor Control and analysis expert system used in industrial safety applications	France, Norway
AMR Development of a system of intervention robots in case of natural or industrial accidents	Spain, France, Italy
Eurockscana New geophysical methods for the underground storage of dangerous wastes: electronic control	Austria, FRG

- Epoch (European programme on climatology and natural hazards): ECU 40 million.

The previous section of the STEP programme just completed comprised the following aspects and budgets (in ECU):

- environment and health: 5 million;
- assessment of risks linked to chemical products: 7 million;
- soil and underground water protection: 6 million;
- research on ecosystems: 11 million;
- technology and protection of the environment: 6 million;
- major technological risks and fire safety: 3 million;
- protection and preservation of European cultural heritage: 1 million.

Table 28
European environment patents, 1986
Breakdown by type of pollution control affected

	Total	Air	Liquids	Solids
EC	510	182	217	112
Belgium	3	0	1	2
Denmark	19	6	8	5
FR of Germany	309	139	110	60
Greece	0	0	0	0
Spain	16	8	6	2
France	62	7	25	30
Ireland	4	0	3	1
Italy	11	2	7	2
Luxembourg	1	1	0	0
Netherlands	23	2	18	3
Portugal	0	0	0	0
United Kingdom	62	16	39	7
USA	257	79	107	71
Japan	109	44	38	27
Australia	40	12	11	17
Switzerland	20	8	11	1
Rest of the world	115	28	59	28
Total	1 051	352	443	256

Source: Denwert/INPI data base.

These programmes aim to harmonize and coordinate national programmes by emphasizing stricter standards, pollution and risk prevention policies, and assistance in making decisions about environment policies when scientific balance sheets are not available.

Furthermore, the Eureka programme where non-EC European countries are also involved, is a major part of the industrial actions in the environment field.

Patent applications constitute a good indicator of the result of research programmes. Statistics on valid patent applications in Europe in the environment field reveal a widely divergent situation depending on the applicant's country of origin:

- companies in non-EC countries apply for more patents in Europe than EC companies, particularly as regards the fight against air and water pollution.

Table 29
Pollution-control investment as a percentage
of all investment, by industrial sector

(%)	FRG 1986	NL 1986	Japan 1988	USA 1987
Electricity, gas, heating and water	18.9	8.8	5.8	N/A
Mining	18.3	2.1	6.2	2.0
Paper	11.1	2.8	3.0	5.0
Steel	11.1	2.7	2.7	11.3
Refining	10.0	22.2	1.1	7.0
Chemical industry	9.4	3.5	1.3	5.2
Metals, first processing	8.3	2.0	1.1	10.6
Foundries	7.5	N/A	N/A	N/A
Mineral processing	5.9	2.7	N/A	N/A
Leather	4.3	4.9	N/A	N/A
Motor vehicles	3.3	.2	1.0	3.0
Food	2.8	1.8	N/A	2.5
Textile	2.6	.7	2.2	1.8
Printing	1.7	.1	N/A	N/A
Mechanical engineering	1.3	5.0	.7	N/A
Electrical/electronic engineering	1.2	.3	1.3	1.8
Construction	1.1	1.8	1.6	N/A
Machine tools	.9	.4	7.0	.7

Source: Sema Group 89, Statistisches Bundesamt — FRG, Centraal Bureau Voor de Statistiek — NL, US Department of Commerce, Environment Agency — Japan.

Table 30
Japanese environmental protection expenditure

(million ECU)	1973	1974	1975	1976	1977	1978	1979	1980
All industries	1 626	2 639	2 596	2 361	1 326	1 222	965	993
% of total investment	10.6	15.6	17.7	13.5	7.2	5.5	4.5	3.9

(million ECU)	1981	1982	1982	1983	1984	1985	1986	1988
All industries	1 645	1 854	2 148	1 857	2 031	1 619	1 505	1 752
% of total investment	4.8	5.1	6.4	4.5	4.9	3.6	3.5	3.6

Source: SMC 1989.

- in the EC, the Federal Republic of Germany occupies a predominant position by contributing 60% of the patent applications.

It is followed by France and the United Kingdom with 12% each.

- the technological leadership of the Federal Republic of Germany, particularly confirmed in air treatment, seems to result from the German lead in this area (regulation and development of markets), linked to its choice of the coal system. On the other hand, French industries are less favourable to the development of technologies for the fight against air pollution because they have opted for the nuclear electric power system.

The costs of environmental protection in industry

The 'paying' sectors are the same in most countries. Whatever the geographic areas concerned, the sectors which allocate a large part of their investments are usually the same, though data should be consolidated over several years in order to obtain an objective vision of outlays.

The sectors which allocate an important share of their investments to environmental protection — about or over 10% — include:

- the energy sector (electricity and petroleum);
- the pulp/paper/cardboard industry;
- steel/metallurgy/initial metal processing;
- the chemical industry.

Several other sectors which make a significant effort — more than 3% of their total investment — are:

- the leather industry;
- the food industries;
- the textile industry;
- the automobile industry.

The investment effort for environmental protection has been made at different periods, depending on the country.

A comparison of recent data relative to investments for environmental protection in several countries shows that Japan invests little in this field.

This contrasts with the image the Japanese project abroad. But, it should be pointed out that the period of heavy investments antedates the stricter environmental standards in Europe and the United States.

Although Japanese industry appears to enjoy a more competitive position today because of smaller investments in this field, it is probably because it was able to make the necessary investments earlier than its competitors, at least in certain sectors.

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THE ENVIRONMENTAL SERVICES INDUSTRY

Summary

The notion of the environmental services industry was devised in the 1970s. Although an exact definition for the term is still being debated, it is generally accepted that the environmental services industry encompasses the production of goods and services capable of measuring, preventing, limiting or correcting environmental damage, such as the pollution of water, air, natural habitats, as well as waste and noise-related problems.

Table 1 indicates the chief technological fields and activities covered by the environmental services industry. The sector goes beyond industrial activities and includes the engineering, construction and management services necessary for the setting up and operation of environmental protection infrastructures and installations. The sector serves a varied clientele, including businesses, public authorities and households, among others. This chapter describes the current situation in the EC's environmental services industry, and discusses likely future trends.

Table 1

The environmental services industry: technology and activities

Technological fields:

- Measurement and analysis technology applied to the environment.
- Technology to substitute some products by less pollutant materials in the production processes and in the goods themselves
- Clean or integrated technology: optimization of existing processes, in-house recycling, newer, cleaner production processes, design of products that can be recycled more easily, or eliminated
- Recycling technology
- End of pipe or add-on effluent treatment technologies, remediation technologies

Activities:

- Engineering, design, planning
 - Manufacturing of equipment
 - Construction of plants and installation of equipment
 - Management and maintenance
 - Regulation and control
-

Current situation

A nascent sector

Although the sector was created only recently, many of the players that contributed to its birth have been

around for a long time. These firms were previously active in other economic sectors, such as mechanical engineering, chemistry, construction, instrumentation, urban services, etc. Some are still well implanted on their market of origin, but are giving greater priority to meet demands for environmental protection and are creating specialized departments, new subsidiaries or are simply taking a new posture without changing their structure. Moreover, new businesses have joined the sector. In the Federal Republic of Germany, for example, 48% of the arrivals in the sector in the 1980s are new businesses (IFO Institute).

Table 2 offers estimates of the number of businesses in four countries. Quantitative comparisons among the countries are difficult because the notion of 'clean technology' is not an absolute one, but rather the result of a number of criteria that vary from one survey to another. In addition, the supply of environmental technology and services is covered by private businesses, public enterprises, etc. that also vary from country to country. Lastly, some services are supplied by the final consumer himself in proportions that vary as well. Such services include in-house industrial engineering, direct management by municipalities of pollution control equipment, etc.

One general observation is that Europe's environmental services industry has not reached a high level of concentration. Given the large number of companies active in the water, waste and construction businesses, several thousand players are involved in this sector.

The prospects are enormous but demand in the medium term is uncertain because it is tied to political decisions on the environment. Markets often follow in the footsteps of measures and legislation that leads to investment in environmental protection. Their life span is therefore short and does not exceed several years, after which investments in environmental protection stabilize at a 'replacement' level. As a result, many businesses hesitate to focus on this market segment. The environmental services industry also has a large number of small and medium-sized businesses, agents whose activity in the sector is cyclical, and businesses that view the environmental services industry as a secondary concern. Only a small number of businesses have a solid foothold in the sector and are capable of developing long-term strategies.

Among these, however, are equipment manufacturers who, thanks to internal growth or acquisitions, have diversified to additional areas, such as air or water pollution, or waste disposal among others, and whose market can follow changes in environmental regulations. Deutsche Babcock, the current German leader, is in this category (environment turnover in 1988: ECU 650 million).

Table 2
Number of companies (excepting public companies managing water and waste disposal)

FRG	4 000 (1)
United Kingdom	1 500 (2)
Denmark	400 (3)
Italy	2 300 (4)

Sources: (1) IFO Institute (chemical companies and construction companies excluded).
 (2) Ecotec-ENDS Report.
 (3) Metalarbejforbund.
 (4) Censis.

Important service businesses have managed to gain a solid national position in France, one of the few European countries where water and waste services were privatized a long time ago. The main French firms are Générale des Eaux (environment turnover in 1988: ECU 2.8 billion) and Lyonnaise des Eaux (environment turnover in 1988: ECU 1.4 billion).

Engineering businesses that focus on water, emission treatment, the elimination of waste or noise pollution also belong to the core group of environmental services industries that are found in most EC Member States. The biggest Danish firm in water treatment, I. Kruger (turnover in 1988: ECU 85 million) is but one example.

Grouped around this core of businesses are chemistry, construction and industrial giants. Their position in the environmental services industry is generally not extensive, but they stand to get bigger through takeovers. By way of example, all the leading European construction companies have acquired an environment division in recent years: Focsa, No 3 in Spain, is today the leader in the waste sector; Holzmann, No 1 in Germany; Bouygues, No 1 in France; and Wimpey, No 3 in the UK.

Some examples of industrial groups involved in developing environmental activities are ABB, a result of the merger of ASEA and Brown Boveri, which employs 180 000 workers, has an ECU 1 billion R&D budget and recorded 13% of its turnover in environmental activities in 1986; and RWE (Rheinische Westfälische Elektrizitätswerke), the

biggest supplier of electricity in the Federal Republic of Germany.

Table 3 indicates the share that integrated technologies, i.e. clean technology, processes using less polluting materials, recycling and recovery systems, have in investment in pollution control activities for three countries. The figures are representative of the EC as a whole. They reveal that the overwhelming majority of environmental protection investment is made in end-of-pipe processes. This imbalance raises problems for the environment. The integrated processes mentioned above have the advantage of generating less pollution, while end-of-pipe processes only reduce emissions or transform them into waste that is more easily managed. The latter procedures have to have a high performance level to be truly efficient.

Table 3
Share of integrated technology in pollution control investments

Belgium	20% (1)
FRG	18% (2)
France	13% (3)

Sources: (1) Interenvironnement Wallonie (Flanders excluded) 1988.
 (2) IFO Institute (private investments only).
 (3) Ministry of the Environment — 1987.

Uneven potential in the EC

Despite difficulties in gathering reliable data that may be compared on the EC level, several estimates on the size of the environmental services market have been published recently. Table 4 indicates the wide gaps among the countries. We see that the German market is larger than the French and UK markets put together, and 50 to 100 times larger than the Greek, Irish and Portuguese markets. A comparative study of investment and operating costs in Western European markets confirms this hypothesis. The Federal Republic of Germany accounts for 40% of the total and is ahead of France at 15%, the UK at 11%, Italy at 9% and the Netherlands at 5% (HKU).

Table 4 also indicates that the gaps are not only the result of differences in population size and levels of economic activity. They also reflect uneven environmental policies. Demand comes mainly from public firms and bodies for whom environmental technologies and services are primarily seen from the cost standpoint. Past experience shows that in all countries demand mainly depends on regulations or economic incentives. By way of example, the EC



directive on large combustion installations created a demand for flue gas desulphurization and denitrification. Such a market was previously limited because the compulsory regulations did not exist in most EC Member States. The only products that are not bound by this rule are the so-called ecological products for which the final consumer can express a preference, and certain integrated technologies that are able to increase productivity in businesses.

Moreover, differences in levels of technological competence among countries can also be linked to the degree of priority given to environmental services policies. A recent study on the United Kingdom points out that the current lag in UK firms in becoming active in the business of flue gas desulphurization and anaerobic digestion of effluent is directly linked to delays in the implementation of measures dealing with acid emissions and a lack of regulations on the discharge of liquid waste (Ecotec). Similar examples could be found in most countries.

In Germany and the Netherlands, for example, several factors came together in the 1980s to boost innovation and the development of a series of environmental services industries. These factors are the swift adoption of new standards, a sharp increase in public spending on research and development and more aggressive strategies on the part of large groups on the environment market.

Differences at the national level

Table 5 gives an overview of five countries and the structural characteristics of their environmental ser-

vices sector. The comparison shows different levels of concentration, diversification, vertical integration of operations, engineering, manufacturing equipment and construction, plus a varying balance between the public and private sectors.

Table 6 shows in greater detail that, in the case of water supply, the number, size and nature of the entity serving a given market may vary a great deal. The exceptional level of concentration in the UK and the position of the private sector in France are worthy of note. The gaps are expressed in terms of financial might, technical capacity and the possibility of economies of scale.

Although the public sector dominates water management in most countries, it does not always do so in a uniform fashion. In the UK, for example, the Water Act of 1973 deprived towns of a large part of their responsibilities, passing them on to agencies entrusted with the management of the water cycle. In the Federal Republic of Germany, municipal enterprises play a major role. In addition to water, they often supply gas, electricity and urban heating. Owing to public monopolies in the operation of services, the vertical integration of the water industry is far from complete in most countries. France, with three large vertically integrated groups, is an exception.

In other areas of the services sector the public/private balance has changed. Fifty per cent of household refuse collection in Germany is now handled by private firms and several vertically integrated groups, Sulo-Altwater for example, have been set up.

Table 4
Environmental services market, 1987

	Environmental expenditure (1)		Share of GNP (2)	Share of population (2)
	Value (billion ECU)	Share of EC (%)		
EC	39.8	100.0	100.0	100.0
Belgium	1.2	3.0	3.1	3.0
Denmark	0.8	2.0	2.3	1.6
FR of Germany	14.5	36.4	25.5	18.9
Greece	0.2	0.5	1.1	3.1
Spain	1.2	3.0	7.2	12.0
France	7.7	19.3	19.9	17.2
Ireland	0.2	0.5	0.7	1.1
Italy	4.6	11.6	17.5	17.7
Luxembourg	0.0	0.0	0.1	0.1
Netherlands	2.0	5.0	4.8	4.5
Portugal	0.1	0.3	0.9	3.2
United Kingdom	6.8	17.1	17.0	17.6

(1) Estimate of national expenditure on air, water, refuse and noise.

(2) As a percentage of EC total; OECD figures.

Source: Données économiques de l'environnement — BIPE.

Table 5
The structure of environmental services industries

	FRG	United Kingdom	Denmark	Italy	France
● Public/private balance (management equipment of public entities)	Majority public 50/50 for MSW collection	Privatization under way	100% public	Majority public	Majority private
● Engineering (main structure)	Integrated industrial groups	Independent or integrated businesses with operations and management	Independent or integrated in industrial groups	Integrated industrial groups	Integrated groups of urban services
● Diversification (water, air, waste) main equipment suppliers	Strong	Weak	Moderate	Weak	Moderate
● Vertical integration	In process	In process	Limited	Limited	Strong
● New entrants	Electricity distributors chemical and construction companies	Construction groups Industrial cleaning services	Chemical groups	Construction groups State-owned groups	Construction groups

Note: MSW = municipal solid wastes.

Source: Recherche développement international.

The engineering field has other national characteristics and the role of independent engineers, subsidiaries of groups and services supplied by public bodies varies greatly from country to country. One report underscores that the creation of the Water Authorities has pushed out independent engineers on the UK water market to the advantage of in-house services (Select Committee on the Water Industry). In Germany, engineering consultancies are also having to deal with competition from municipal enterprises and integrated engineering on

the part of industrial groups. The leaders in environmental engineering are controlled by industrial groups such as Metallgesellschaft (Lürigi) and Hoechst (Uhde). In France the service groups have several engineering subsidiaries, such as OTV (Générale des Eaux) and Degrémont (Lyonnaise des Eaux).

The extent of internationalization

Available data show a high degree of internationalization of the European environmental services

Table 6
Water supply, 1989

	No of suppliers	Population served	
		Average per supplier	By private suppliers (%) (1)
Belgium	165	60 000	4
Denmark (2)	3 900	1 300	N/A
FR of Germany	6 700	9 100	2
Greece (2)	7 000	1 400	N/A
Spain	7 800	5 000	30
France	14 000	3 900	75
Italy	6 000	9 500	5
Netherlands (2)	85	170 000	N/A
United Kingdom (3)	45	1 260 000	21

(1) Only includes companies with private-sector majority ownership (excluding mixed companies with minority private ownership, public suppliers operating under private status etc.).

(2) No absolute figures available, less than 5%.

(3) The figure for the percentage of population served will exceed 80% after the privatization of the 10 Water Authorities of England and Wales (expected by the end of 1989).

Source: Recherche développement international.

market. In 1984, exports accounted for 40.5% of the German environment industry's activities, up from 25.7% in 1980. Moreover, 92% of exporting firms in the Federal Republic of Germany deal with the EC (IFO Institute). According to a Danish study, 60% of machine and electrical installations that are part of pollution control plants in Denmark are imported (Viemose & Spile). The figure is as high as 80% in the case of pumps and air treatment installations. Another study indicates that 33% of the capital of businesses in the environment sector in the Wallonia and Brussels regions is in the hands of foreign firms (Interenvironnement Wallonie).

There are many similar examples indicating that in several countries a significant share of the environmental services industry is based on imported technology. An assessment of how the French market of urban waste incineration has fared in the past two years shows that 65% of the market is held by French firms supplying Danish (Volund), German (Martin, Deutsche Babcock) or Swiss (Von Roll) technology under licence (RDI). In 1983 in Italy, 15 of the environment sector's biggest firms worked under a foreign licence (University of Pavia). A British study shows that the UK relies almost exclusively on foreign technology for flue gas desulphurization (Ecotec).

The internationalization process is also well advanced in the operation of services. The leaders in the UK (Biffa, Thames Water, etc.) and in France (Générale des Eaux, Lyonnaise des Eaux, SAUR, etc.) have conducted takeovers or have signed agreements in several countries in the waste and water sectors. German firms dealing with the collection of waste, by contrast, won fewer foreign franchises.

European firms have gained a solid foothold outside the EC as well. Table 7 shows that the share of work abroad of the main European exporting firms in the area of water engineering is proportionately larger than that of their American or Japanese counterparts. Most of these exports are bound for non-EC countries. In the field of operational services, French and UK firms are well implanted in North America, where a French company is in the number one position in water supply and a UK company holds the number four position in the collection and treatment of waste.

Technology exports outside the EC are developing fast in cases where environmental protection standards have already been introduced in the EC as a whole or in some Member States, while other industrialized countries are lagging behind. By way of example, in the mid-1980s technology transfers be-

tween Europe and the United States were marked by a change in US regulations. These new regulations helped to bridge the gap in several areas where European countries had managed to forge ahead of the United States. The introduction by the US Government's Environmental Protection Agency (EPA) of a ban on the landfill of all untreated dangerous waste by 1991 has increased transfers to the US of European processes for centralized industrial waste treatment. One of the first technology transfers concerned Danish technology developed at the Komunekemi plant. The rapidly developing market of household waste incineration was also soon to be dominated by US licensees of European technology.

Table 7
Water engineering exports

	Exports (% turnover)	Exports 10 million USD
USA		
Metcalf & Eddy	26%	> 30
Camp Dresser & McKee		
Dames & Moore	5-12%	10-20
CH2M Hill		
Engineering Science	5-10%	< 10
James Montgomery		
FRG		
GKW Consult	73%	10-20
Fitchner Consult	65%	30-50
German Water Engineers	92%	5-10
Netherlands		
Nedeco	100%	> 50
Euroconsult	100%	30-50
DHV	55%	30-50
France		
Coyne & Bellier	70%	10-20
BCEOM	93%	30-50
Sogreah-Sogelerg	54%	30-50
United Kingdom		
Ove Arup	41%	30-50
WS Atkins & Partners	42%	30-50
Binnie & Partners	84%	20-30
Italy		
C. Lotti & Assoc.	70%	10-20
Japan		
Nippon Koei	41%	> 50
Pacific Consultants	40%	> 50
Nihon Suido	10%	5-10

Source: Recherche Développement International based on ENR data (1986).

Conversely, non-EC firms have set up in the EC. A FAST study (Forecasting and assessment in science and technology — Directorate-General for Science and Research and Development, European Commission) conducted in 1984 indicates that non-EC

firms in the EC held 80% of the market in environmental control instrumentation. In the area of air and water treatment, US firms, such as Culligan and Dresser, have had European subsidiaries for some time. The flue gas denitrification example shows that when Europe abandons the lead with regard to environmental standards, then catches up with more advanced countries, technological development mostly relies on imported processes. Recently adapted European NO_x standards require the use of catalytic reduction processes which had hitherto been necessary only to meet Japanese standards. In participation of, or in response to, these measures, there was considerable growth in the number of agreements between German and Japanese enterprises to buy Japanese processes.

Table 8
Flue gas denitrification — German licensees of Japanese selective catalytic reduction processes (situation at the beginning of 1985)

Licence owner	Process
Deutsche Babcock Anlagen	Kawasaki Heavy Industries
Energie- und Verfahrenstechnik (EVT)	Mitsubishi Heavy Industries
Lentjes	Babcock Hitachi KK
L & C. Steinmuller	Ishikawajima Harima HI
Thyssen Engineering	Mitsubishi Heavy Industries
Uhde	Babcock Hitachi KK

Source: NO_x symposium Karlsruhe 1985 (PB).

The North American leaders in the waste sector (Waste Management, turnover: ECU 3 billion; and Browning Ferris, turnover: ECU 2 billion) hold five times more financial power than their European counterparts and have acquired many firms in recent years. Engineering firms specializing in the clean-up of old pollution have, to a lesser extent, signed cooperation agreements for the European market.

Outlook

The ups and downs of demand

In 1989 a number of articles appeared in the press on the brilliant future of the environmental services industries. Several studies offered optimistic projections for several segments of the market, predicting 50% growth in water treatment equipment for the 1987-97 period (F&S), a doubling or tripling for some pollution control processes and an even greater growth for CFC and battery substitutes by the year 2000 (BIPE). A comprehensive study of

Western Europe's environmental services market predicts 66% growth for the 1987-2000 period, during which the treatment and recycling of waste will be the most dynamic sector (HKU).

In addition, several far-reaching plans to combat pollution have been announced. The initial cost estimates for the Bush administration's programme to curb air pollution in the USA amount to some ECU 19 billion over a 10-year period. In Europe, it has been announced that ECU 10 to 15 billion, and 50 billion in the long term, will be spent on a Mediterranean pollution abatement programme, to be co-financed by the European Investment Bank and the World Bank. Similar estimates have been made for the Eastern European countries. In the EC, national programmes to ensure compliance with EC directives have been announced. For example, Spain is spending ECU 1 billion and the UK ECU 1.6 billion to curb air pollution. In Denmark, the government is spending ECU 2.5 billion to eliminate nitrogen and phosphorus from wastewater.

All this seems to indicate that good prospects are in store for the environmental services industry. Nevertheless, an analysis of the development possibilities of the European environmental services industry must consider the following, more complex, problems.

- In addition to announced intentions, the emergence of new markets depends to a large extent on how promptly regulations and administrative and financial measures are taken by the authorities, and implemented within each Member State. For example, the rate at which EC directives are adopted may remain slow owing to the complexity of the negotiation process; it took five years to devise, adopt and implement the directive on large combustion plants. The same goes for measures that must be taken in conjunction with extensive national plans. The result is a staggering over time of spending, which reduces the annual volume of the markets concerned.
- New markets will not emerge alongside already existing ones. They will replace them, at least in part. Some European markets that are well ahead in adopting and complying with environmental protection standards have reached a peak. They contributed to the environmental services industry's growth in the 1980s but in the 1990s will undergo a downward trend. This will apply to the sector dealing with emission treatment from large plants in the Federal Republic of Germany. This sector oversaw the proliferation of private sector investment in air pollution control, which

amounted to ECU 1 billion in 1984 and nearly ECU 3 billion in 1986, according to the IFO Institute. Today the sector has reached saturation.

- Notable differences in market shares among the EC Member States are also an important consideration (see Table 4). Consequently, even very high growth rates in the peripheral regions of the EC which have a large backlog of environmental infrastructure would have no more than a slight impact on the sector's activity on the EC level.

These observations mainly concern new projects. By contrast, the demand for operation and maintenance services will surely grow, given the increased environmental protection capital stock to be operated and maintained. The European environmental services industry will thus be dealing with a market that, while subject to the ups and downs of regulatory measures, should grow over time, thanks to public calls for greater environmental protection, expansion in demand to new regions of the world and an increased demand for services.

Integration of the European market

The environmental services industry, like any other sector, is concerned by the creation of the single European market. Changes in demand are expected because environmental protection standards will apply in a different fashion to trade and business, sectoral distribution and to the volume of activity. Moreover, environmental policies will be stepped up through the Single Act which is introducing the principle of preventive action, that of 'the polluter pays' principle and a high level of environmental protection (Articles 100a and 130r).

The structure of the EC's environmental services industry will become more concentrated and more international. Two factors are expected to contribute to this phenomenon. The first is the continued har-

monization of environmental standards and, secondly, the liberalization of public procurement. This should not be viewed as a break with current practices but rather as an acceleration.

Three broad approaches are on the horizon that will reinforce the position of leading firms. First, an internationalization of the sector within the EC, second, agreements with non-EC firms and, third, a concentration of firms on the national level. Table 9 shows the diversity of agreements between EC firms in the past two years. In addition, numerous subsidiaries were created and takeovers were abundant.

The proliferation of links with non-EC firms is continuing in the area of technology and services. Cooperation agreements have been set up with US, Japanese and non-EC European firms. Two recent examples in the waste sector are the creation of a British-Canadian-American group under Atwood and Laidlow (the world's third biggest group) and the reinforcement of the position in Europe of the world's number one firm in waste, Waste Management of the United States, which has recently conducted takeovers in the Netherlands, Spain and in Italy (Ecoservizi). The water management sector is gradually opening up to Eastern European countries and a joint venture has been set up between the Italian firm Acqua and the USSR.

Mergers on the national level are a generalized phenomenon. In Denmark the third largest industrial group, Danisco (turnover: ECU 1.6 billion) now controls several companies in the environmental services sector, including DDS (membranes and filtration) and Niro Atomizer (air treatment). In the UK a vertical integration of the water industry has been initiated. Thames Water (number one in supply) is expected to take over Portals (engineering), and Biwater (manufacture of equipment and engineering) is expected to develop in the distribution sector. In Germany vertical integration and diversifi-

Table 9
Agreements between European firms in 1988-89

Companies	Type of agreement	Area
Thames Water (UK) — Ansaldo (I)	Joint venture	Environmental management
Walther (D) — Alstom (F)	Participation in a German company	Emission treatment stationary sources
Kruger (DK) — Hölter (D)	Joint venture	Air and water treatment
DDS (DK) — Lyonnaise (F)	Cooperation in R&D	Water treatment
Biffa (UK) — Antwerp Waste Management (B)	Joint venture	Urban waste disposal
Italgas (I) — Générale des Eaux (F)	Joint venture	Water treatment
TNEE (F) — Deutsche Babcock (D)	Agreement/German licence	Emission treatment (incineration fumes)
Lyonnaise (F) — Fiat Engineering (I)	Joint venture	Water treatment
ATV (E) — Northumbrian Water (UK)	Joint venture	Water treatment

Source: Recherche développement international.

cation are working hand in hand; Rethman, one of the leaders in the German waste sector, is planning on extending its activities to waste water.

Although it is clear that the EC's environmental services industry is going through a concentration and internationalization trend, two factors will limit the scope of this phenomenon. The first factor is that, in response to the slow and difficult adoption and implementation of uniform environmental protection standards in the EC, greater use will be made of partial harmonization of and mutual recognition of standards and the introduction of minimum standards. Such an approach is justifiable in light of the diversity of environmental situations within the EC but, on the other side of the coin, it will do little to change the market's dispersion in the area of pollution control.

The second factor is that public monopolies seriously limit the extent to which public procurement can be opened to competition, especially in the area of services. 78% of household water supply is directly managed by local authorities or contracted out to public or semi-public enterprises, with a total absence of competition. The corresponding figure for wastewater is over 50%.

Management of local infrastructures

Some infrastructure categories are already well developed in the EC. Table 10 shows, for example, rates of link-up of households to water supply systems. This type of demand is increasingly placing the emphasis on the operation, maintenance and modernization of existing installations rather than on new installations. This trend is being reinforced in the case of installations under the responsibility of local authorities, owing to increasing problems of deterioration.

Because of financial difficulties encountered by local authorities, changes in management structures of

public installations have been underway since the beginning of the 1980s. The water, wastewater and waste sectors are the main sectors concerned.

An initial solution would be to create public bodies, separate from municipalities, in order to ensure the financial autonomy of services management. There are many examples in the EC of bodies initially created to furnish a local service that later expanded to other markets, either directly or through engineering firms controlled by them. This dynamic approach is resulting in greater competition with the private sector on non-EC markets.

The strategy of granting a franchise of a limited duration to a private operator, while the municipality maintains ownership and supervision of the services involved, is also on the upswing. For many countries, this means a break with traditions of public financing and management of services. In the German *Land* of Lower Saxony, for example, a dozen towns decided in 1987 to entrust the management and modernization of their waste water treatment plants to the private sector for a 30-year period. This model may serve as an example to other towns in Germany. In France, Spain, Belgium and Italy this trend has developed even further. The UK is on the verge of embarking on the most radical privatization ever of water by selling the Water Authorities to the private sector.

The environmental services industry is currently restructuring in order to adapt to these changes. French firms have more experience than others in private management of such services and are expanding beyond France's borders. At the beginning of 1989 their British subsidiaries in the water sector served 6 million inhabitants. In Spain, they serve nearly 10 million inhabitants, either directly or in conjunction with local firms. The sector will soon be more competitive when private groups arrive on UK market and when service firms develop in other

Table 10
Population served by the basic water infrastructure (1)

(%)	Water distrib. network	Sewage disposal system	Waste water treatment plants
Belgium	97	55	24
Denmark	85	98	92
FR of Germany	96	90	80
Spain	95	90	35
France	97	92	59
Italy	88	56	26
Netherlands	99	100	100
United Kingdom	99	95	82

(1) Data relate to various years preceding 1984.

Source: European Water Pollution Control Federation — 1984.

countries. Thames Water, with nearly 11.5 million customers, is in a position similar to that of the top two French firms.

In the waste sector, the development of public service markets is also accompanied by the internationalization of the leading firms. Today, leadership is shared among US, British and French firms.

Technological innovation

The range of technologies needed by the environmental services industry is highly diversified and ranges from mechanical and chemical procedures, filtering, to advanced biotechnological methods and lasers. Programming of medium and long-term research and innovation is suffering from uncertainties about future markets and their short life span. Firms often adopt a cautious attitude towards R&D, thereby limiting their horizon and short-term perspectives.

Two conditions are necessary to favour innovative strategies in Europe's environmental services industry: the establishment of a reliable system for the setting of priorities of environment policies, as well as the instruments and the implementation of such policies. The second condition is the fixing of high-level standards in keeping with the principle contained in the Single Act.

If European supply is reliant on a market that falls short of the world's most stringent standards or that is too uncertain about its prospects, then it runs the risk of falling behind in technology. As a result, new firms in the sector such as chemical or instrumentation groups, possessing a great deal of high technology, will be able to invest heavily and thus considerably reinforce the sector.

In order to overcome the uncertainties of private R&D, some countries have invested in public research programmes. Table 11 shows the efforts in this area of seven EC Member States, the United States and Japan and compares the efforts of the Netherlands and Germany, the only ones to devote more than 3% of their State budget to environmental research. In absolute terms, the Federal Republic of Germany surpassed the United States in 1985 and all the other EC Member States combined.

A joint EC research effort is underway under the Eureka programme. In July 1988, 14 Eureka projects were launched in the field of environmental services, bringing together 78 participants with a total estimated investment in R&D of ECU 400 million. A framework programme for the development of own technology projects, called Euroenviron, was set in motion in 1989.

A problem will no doubt emerge in the coming years that is quite separate from the impact of the standards that will be adopted by the EC and the Member States on the technological level of the environmental services industry. The problem will be one of an imbalance of technological potential within the EC.

One significant issue will be the ability of environmental services industries in the peripheral regions of the EC to take advantage of a demand that is expected to develop in those regions. Given the experience gained by firms in the most advanced countries and their level of concentration, the development of markets in the least well-equipped regions could lead to an influx of imported technology and expertise.

This is a formidable challenge for those responsible for industrial policy. It is not a matter of reinventing what is already in place. It would be much more

Table 11
Public environmental research and development expenditure

(billion ECU)	1975		1980		1985	
	Value	Share of all R&D (%)	Value	Share of all R&D (%)	Value	Share of all R&D (%)
Denmark	N/A	N/A	3.6	2.1	6.6	1.5
FR of Germany	53.2	1.0	102.0	2.0	309.3	3.1
Spain	0.0	0.1	2.2	0.6	9.2	1.0
France	35.5	0.8	46.7	1.1	51.1	0.5
Italy	5.6	0.6	13.6	1.0	44.6	1.0
Netherlands	N/A	N/A	N/A	N/A	53.7	4.1
United Kingdom	25.8	0.5	30.9	0.7	99.6	1.1
USA	190.2	0.9	171.7	0.8	259.5	0.5
Japan	50.8	1.5	60.3	1.6	N/A	N/A

Source: OECD.

effective in the short run to set up licensing or equipment importing agreements. However, if such purchases are not accompanied by an effort to develop technological expertise, then industries too reliant on outside sources will lag in competitiveness, have difficulties in exporting and will suffer from a handicap in negotiating international standards.

Conclusion

The environmental services industry is a burgeoning sector. European potential is unevenly distributed and national situations vary widely in their concentration, vertical integration, public/private balance and areas of expertise. A significant level of internationalization has already been attained, both within the EC and between EC and non-EC companies.

The creation of the single European market will have little impact on the sector's volume of activity, where there is extensive reliance on environment policies and their implementation. But growth in the sector, a result of the reinforcement of these policies, is in the offing. The lifting of trade barriers and the opening of public procurement to competition will step up mergers and internationalization in Europe's environmental services industry. However, the possibility of partial harmonization of European environmental standards and the maintenance of local public monopolies mean that important segments of the market will survive.

The strategies of the leading firms differ, depending on each country's own particular selling points. Broadly speaking, German firms tend to support the harmonization of environmental standards in order to ensure markets in the rest of the EC for their

advanced technology. French firms, with their experience in operating infrastructure and installations, are seeking to adapt their strategies to the opportunities offered by privatization. The UK is particularly dynamic in the area of services. The Netherlands is making a considerable effort in research and innovation. Denmark, very advanced in some areas but without large groups, is striving to advance in the area of innovation and the regrouping of its firms. The chief concern in Spain and Italy appears to be that of opening up to foreign technologies and expertise, while at the same time preserving a certain autonomy in their firms.

The environmental services industry is having to take up several challenges. The single market is certainly an opportunity but if the principle of a high level of environmental protection called for by the Single Act is only partially achieved through environmental policy decisions, then the EC's ability to compete with US and Japanese environmental services industries will be undermined. In addition, the current imbalance in technological know-how within the EC could well become exacerbated in the forthcoming years.

Despite progress in technology and organization, the environmental services industry will only solve environmental problems if adequate environmental protection measures are taken. Here, the shortfalls in the current situation should be considered: integrated processes hold an excessively weak position in relation to end-of-pipe, some public installations function poorly, and lags in investment have accumulated in some regions.

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MACROECONOMIC OUTLOOK

This chapter is an extract from the draft annual economic report of the European Commission 1989-90, written by the Directorate General for Economic and Financial Affairs (DG II). It presents the Community's short-term outlook.

Introduction

The state of the Community economy at the outset of the new decade is quite promising. Important steps are being taken towards economic, financial, monetary and social integration. Fundamental improvements which have been achieved during the 1980s are resulting in a significantly better growth and employment performance.

Unemployment is still very high, however, and levels of GDP per head are still very different throughout the Community. In addition, there is a risk that the persistence or indeed the worsening of certain negative features which have characterized the Community economy over recent years — inflation, current account imbalances and budgetary disequilibria — could endanger the continuation of the present expansion and of further progress towards monetary stability in the Community.

Economic policy in the Community faces two major challenges:

- to strengthen further the determinants of growth;
- to improve convergence towards stability.

The first arises out of the need to reduce unemployment and to ensure that the less prosperous regions continue catching up.

The second results from a double necessity; on the one hand, that of preventing a resurgence of inflationary expectations from endangering the continuation of growth; on the other, that of improving the conditions for exchange rate stability — and for the success of stage one of EMU — by reducing divergences in inflation, in current account balances and in budgetary positions.

The short-term outlook

In the Community, economic growth is continuing strongly and presents, in most countries, the same healthy features of the past two years. Investment and exports remain the most dynamic components of demand while the determinants of growth continue to improve, even if more slowly than in 1988. Measures aimed at preventing overheating or at curbing excessive current account deficits, however, are dampening somewhat demand and output growth in some countries. Real output will expand in 1990 by about 3%. This is lower than the 3.8% achieved in 1988 and the 3½% likely to be recorded in 1989, but it is still higher than any of the first six years of the present period of expansion. Investment also is not expected to increase as fast as in 1988 and 1989 in response to the deceleration of demand, to the tightening of policies and to the coming on stream of the capacities created over recent years. It should, however, still grow at an average rate of almost 5%. Exports of goods and services to the rest of the world should continue to grow strongly (more than 6% in real terms), in line with the expected increase in world trade.

Inflation (private consumption deflator) has accelerated between mid-1988 and mid-1989 under the combined impact of higher import prices, higher wages in some countries and higher taxes and public service charges in others. Thanks to a swift reaction by monetary policy-makers and to a softening of import prices in the course of 1989, this trend now appears to have been halted. In 1990, average inflation in the Community could be reduced to about 4½% from 5% in 1989. This compares with a rate of just 3.6% in 1988. The average masks the fact that rates within the Community differ widely, with certain Member States still experiencing double-digit inflation.

Some of the best news keeps coming from the labour market. After the record increases of 1988 and 1989, another 1.5 million jobs should be created in 1990. As a result, unemployment in the Community will continue to decrease and might fall below 9%, a level still much higher than that prevailing at the beginning of the 1980s. Also reassuring is the news on the current account of the Community, which should remain in broad equilibrium. The divergence in the

external positions of the Member States, however, is expected to go on increasing.

The outlook for the rest of the OECD is also positive and broadly similar to that for the Community, though the deceleration of growth is likely to be more pronounced. Output is forecast to expand next year by just over 2½% against 3½% in 1989 and 4.6% in 1988. This reflects essentially a marked slowdown in the USA and Canada (about 2% in 1990 in both countries against 4.4% and 5% respectively in 1988).

Elsewhere, growth should continue more or less at the same rate as in 1989 and with the same regional differences. The Asian newly industrialized economies should again experience growth rates of about 6%, significantly faster than in the OPEC and in Eastern Europe. Growth in the most indebted LDCs continues to be seriously constrained by the debt burden.

As for the payments imbalances of the world's largest economies, the US deficit and the Japanese surplus have been reduced somewhat in 1989, but they are forecast to increase again in 1990.

A much improved economy

The 1989 performance confirms that the Community economy is now functioning distinctly better than during most of the previous two decades. It is useful to examine what has taken place in two related areas: the expansion of investment and the creation of new jobs. The results achieved are impressive, but not yet sufficient to ensure the reduction in unemployment to more acceptable levels.

Growth has become investment-led . . .

In the second half of the 1980s the Community moved to investment-led growth. The amount of investment in equipment by Community firms in 1989 will exceed the 1986 figure by one third. This impressive investment performance became possible because, in the Community as a whole, the profitability of the capital stock has recovered steadily since 1981. The moderate increases in real wages compared with productivity growth have been the major reason for the recovery of the rate of return on productive capital, but declining energy prices and a recovering capital productivity have also helped. When, in the second half of the 1980s, final demand began to strengthen and Community policies — the internal market programme — began delivering

additional impulses, firms were in a position to exploit fully the opportunities available.

Among the less prosperous countries, Spain, Portugal and, more recently, Ireland have experienced a rapid growth of investment. This has been made possible by a substantial wage adjustment and the consequent increase in profitability. The resulting significant increase in the share of investment in GDP (financed largely by imports of capital in Spain and Portugal) has contributed to faster growth of GDP per head than in the rest of the Community. In the case of Spain and Portugal, joining the Community has provided an additional and substantial impulse. Fundamental structural adjustments are still required in Greece, if it is to catch up on the rest of the Community. In particular, the necessary increase in investment will require a substantial adjustment of real unit labour costs.

The sustainability of the investment performance in the Community has also been facilitated by the simultaneous rise in the national savings ratio. This has permitted investment to accelerate while overall external equilibrium has been maintained. The rise in the national savings ratio has been largely due to a reduction in government dissaving: in 1989 government saving has become positive again after declining to - 1.3% of GDP in 1981 from + 5% in 1970.

Despite the remarkable improvement over the 1980s, however, the profitability of fixed capital and the share of investment in GDP are still below the levels of the quasi-full employment 1960s.

. . . and more employment-creating

With faster economic growth, job creation has speeded up. At the same time the employment content of growth has increased substantially. In the 1960s, annual GDP growth of 4.8% barely created 0.3% of new employment. Today, a GDP growth trend of slightly above 3% is accompanied by net annual employment expansion of more than 1%. This result is due to various factors: the change in the trend of relative factor costs, the greater flexibility of working practices, the reduction of working hours per person employed, the extension of part-time employment, the steady expansion of the service sector and measures to improve the adaptability of the labour market.

Main economic indicators, 1986-90
EC, USA and Japan

(a) GDP at constant prices
(% change on previous year (1))

	1986	1987	1988	1989 *	1990 *
B	1.9	2.0	4.0	4.25	3.25
DK	3.3	-1.0	-0.4	1.75	2.00
D	2.3	1.9	3.7	3.75	3.50
GR	1.2	-0.4	4.0	2.50	2.25
E	3.3	5.5	5.0	4.75	4.00
F	2.1	2.2	3.4	3.25	3.25
IRL	-0.4	4.1	3.7	5.00	4.50
I	2.9	3.1	3.9	3.50	3.00
L	4.7	2.5	5.2	3.75	3.25
NL	2.1	1.3	2.8	3.75	3.00
P	4.3	4.7	3.9	4.75	4.50
UK	3.1	3.8	4.2	2.25	2.00
EC	2.6	2.8	3.8	3.50	3.00
USA	3.0	3.6	4.4	2.75	2.00
JAP	2.4	4.3	5.8	4.75	4.25

(b) Domestic demand at constant prices
(% change on previous year)

	1986	1987	1988	1989 *	1990 *
B	3.0	3.4	4.0	4.50	3.25
DK	5.4	-3.2	-2.2	0.75	1.00
D	3.5	3.2	3.8	2.75	3.00
GR	-1.8	-1.8	3.5	3.50	2.75
E	6.1	8.5	6.7	6.75	5.25
F	3.9	3.3	3.8	3.25	3.25
IRL	1.4	-1.5	0.2	5.00	4.25
I	3.6	4.8	4.3	4.00	3.75
L	2.3	2.5	4.6	3.25	3.00
NL	3.5	2.1	2.3	4.25	2.75
P	8.4	10.6	8.3	5.50	5.00
UK	3.8	4.3	7.3	3.75	0.75
EC	3.9	4.0	4.8	3.75	3.00
USA	3.7	3.0	3.3	2.25	1.75
JAP	4.0	5.1	7.8	5.50	4.25

(c) Deflator of private consumption
(% change on previous year)

	1986	1987	1988	1989 *	1990 *
B	0.4	2.2	1.2	3.25	3.50
DK	3.4	4.1	4.9	4.75	3.00
D	-0.2	0.7	1.1	3.00	2.75
GR	22.0	15.7	13.9	14.25	15.00
E	8.7	5.4	5.1	6.75	6.25
F	2.7	3.1	2.7	3.50	2.75
IRL	3.9	3.1	2.5	4.25	4.00
I	5.8	4.8	4.9	6.25	6.00
L	0.8	2.9	1.5	3.25	3.00
NL	0.6	-0.3	0.8	1.50	2.25
P	13.5	10.2	9.6	13.00	11.25
UK	4.4	3.9	5.0	5.25	5.50
EC	3.8	3.4	3.6	4.75	4.50
USA	2.2	4.2	4.0	4.75	4.75
JAP	0.5	-0.1	0	2.00	2.75

(d) Balance of current transactions
(as a % of GDP)

	1986	1987	1988	1989 *	1990 *
B	2.0	1.2	1.0	0.75	0.75
DK	-5.2	-3.0	-1.8	-2.00	-1.00
D	4.4	3.9	4.1	5.25	5.75
GR	-5.2	-2.5	-1.5	-3.50	-3.50
E	1.7	0.1	-1.1	-3.00	-4.00
F	0.5	-0.4	-0.4	-0.50	-0.50
IRL	-2.9	1.4	2.0	2.00	1.75
I	0.5	-0.1	-0.6	-1.25	-1.50
L	39.4	33.0	16.4	15.0	14.50
NL	2.8	1.6	2.4	2.25	2.00
P	3.9	1.8	-1.4	-2.75	-3.50
UK	-0.9	-1.6	-3.2	-4.00	-3.25
EC	1.4	0.8	0.3	0	0.25
USA	-3.4	-3.6	-2.4	-1.75	-1.75
JAP	4.3	3.7	2.8	2.25	2.50

(e) Number of unemployed as %
of the civilian labour force

	1986	1987	1988	1989 *	1990 *
B	11.9	11.5	10.4	9.25	8.75
DK	5.8	5.8	6.4	7.50	7.50
D	6.5	6.4	6.4	5.50	5.25
GR	8.2	8.0	8.5	8.50	8.50
E	21.2	20.5	19.6	17.50	16.50
F	10.4	10.5	10.2	9.50	9.00
IRL	18.3	18.0	17.8	16.75	16.25
I	10.6	10.1	10.6	10.50	10.50
L	2.7	2.7	2.2	1.75	1.75
NL	10.3	10.2	10.3	10.00	9.50
P	8.3	6.8	5.6	5.25	5.25
UK	11.5	10.6	8.7	6.75	6.50
EC	10.8	10.4	10.0	9.00	8.75
USA	6.9	6.1	5.4	5.00	5.25
JAP	2.8	2.8	2.5	2.50	2.50

(f) General government lending and borrowing
(as % of GDP)

	1986	1987	1988	1989 *	1990 *
B	-8.8	-7.0	-6.5	-6.00	-5.75
DK	3.5	1.8	0.2	0.25	0.75
D	-1.3	-1.8	-2.1	0	-0.25
GR	-11.6	-9.9	-14.9	-20.00	-20.00
E	-6.1	-3.6	-3.2	-2.50	-2.50
F	-2.9	-2.5	-1.4	-1.25	-1.00
IRL	-11.0	-8.9	-3.7	-3.75	-1.50
I	-11.7	-11.2	-10.6	-10.25	-9.75
L	2.5	2.7	2.5	2.50	2.75
NL	-5.9	-6.2	-4.9	-4.50	-4.25
P	-7.8	-7.0	-6.5	-6.00	-6.00
UK	-2.4	-1.5	0.8	1.50	1.00
EC	-4.8	-4.3	-3.6	-3.00	-3.00
USA	-4.4	-2.3	-2.0	-1.75	-1.50
JAP	-1.1	-0.3	1.2	1.75	2.00

(1) GNP for USA and Japan from 1987 onwards.

* Forecasts September/October 1989.

Main economic indicators, 1986-90
EC, USA and Japan

(g) Total employment
(annual % change)

(h) Real compensation of employees per head
(annual % change (2))

	1986	1987	1988	1989 *	1990 *		1986	1987	1988	1989 *	1990 *
B	1.0	0.4	1.4	1.00	0.50	B	3.7	-1.3	1.2	2.00	2.25
DK	2.3	1.1	-0.3	-0.50	0.50	DK	1.2	4.0	-0.6	-1.00	0.25
D	1.0	0.7	0.6	1.50	1.25	D	4.1	2.2	2.0	0	0.75
GR	0.3	-0.1	1.1	0.75	0.75	GR	-7.2	-3.4	4.0	5.50	1.00
E	2.3	5.4	2.9	3.50	2.50	E	0.7	0.9	1.2	0.75	0.75
F	0.2	0.1	0.6	1.50	1.25	F	1.4	0.6	1.1	0.50	1.25
IRL	0.2	0	1.0	1.25	1.25	IRL	1.1	2.8	-0.2	0.50	1.00
I	0.9	0.2	1.3	1.00	0.50	I	1.6	4.0	3.8	2.75	2.00
L	2.6	2.7	2.9	1.75	1.25	L	4.4	0.9	2.5	3.00	3.00
NL	1.9	1.2	1.3	1.50	1.00	NL	1.3	1.6	0.6	-0.25	1.25
P	-2.7	2.7	2.6	1.50	0.75	P	6.0	3.1	0.9	-0.75	1.50
UK	0.4	1.9	3.1	1.75	0.75	UK	2.8	3.0	2.3	2.75	3.00
EC	0.8	1.2	1.6	1.50	1.00	EC	2.3	2.0	1.9	1.25	1.50
USA	1.7	2.9	2.2	2.25	1.50	USA	1.1	-0.3	1.8	1.00	1.25
JAP	0.9	1.0	1.7	1.50	1.25	JAP	2.7	3.0	3.4	3.75	2.50

(i) Investment in construction
(annual % change; constant prices)

(j) Investment in equipment
(annual % change; constant prices)

	1986	1987	1988	1989 *	1990 *		1986	1987	1988	1989 *	1990 *
B	2.0	5.5	12.0	9.00	3.75	B	4.8	8.6	14.0	16.00	8.00
DK	17.5	-0.9	-6.1	-3.00	1.50	DK	15.4	-14.5	-7.0	4.00	3.00
D	2.7	0.2	4.7	4.75	3.25	D	4.3	4.1	7.5	11.25	7.50
GR	0.2	-4.9	7.7	7.50	6.00	GR	-12.6	-1.0	10.7	5.50	7.00
E	6.5	10.0	13.5	14.50	11.00	E	15.8	24.2	14.7	12.75	8.75
F	2.5	3.3	4.3	3.75	3.50	F	2.5	4.7	9.7	7.00	7.00
IRL	-3.6	-6.5	-6.8	6.00	10.25	IRL	5.3	3.6	2.8	10.50	10.00
I	0.7	-1.3	3.7	4.00	3.00	I	2.0	15.0	6.0	6.25	4.75
L	6.0	4.6	5.4	4.25	3.50	L	39.1	6.1	3.0	4.50	5.00
NL	4.8	2.8	12.6	4.25	0.50	NL	11.3	1.1	6.3	9.75	2.75
P	8.7	10.5	12.3	11.50	11.00	P	13.7	31.0	19.5	11.75	9.00
UK	3.7	3.9	6.5	-1.50	-1.00	UK	-1.8	7.2	20.4	10.25	4.00
EC	3.2	2.4	6.3	4.75	3.50	EC	3.5	8.5	10.6	9.25	6.00

(k) Total investment
(annual % change; constant prices)

(l) GDP per head
(EC = 100; current prices and purchasing power standards)

	1986	1987	1988	1989 *	1990 *		1960	1973	1986	1989 *	1990 *
B	3.7	7.6	12.9	12.25	5.75	B	95.4	100.6	101.1	102.4	103.0
DK	17.3	-9.0	-6.5	0	2.25	DK	118.6	113.1	118.0	108.0	107.2
D	3.3	1.8	5.9	7.75	5.00	D	117.2	110.1	114.4	113.3	113.4
GR	-5.7	-3.2	9.0	6.50	6.50	GR	38.4	56.3	56.0	54.0	53.6
E	10.0	14.6	14.0	13.75	10.00	E	59.2	77.4	72.2	75.7	76.3
F	2.9	3.7	7.3	5.50	5.50	F	104.3	109.3	110.0	108.5	108.6
IRL	-0.3	0.0	-1.7	8.50	10.00	IRL	61.4	59.9	63.4	66.0	67.3
I	1.4	5.2	4.9	5.25	4.00	I	91.2	98.8	104.0	105.1	105.2
L	15.8	5.3	4.5	4.25	4.00	L	134.5	123.9	126.3	128.0	128.7
NL	8.2	1.6	9.7	6.75	1.50	NL	117.8	112.1	106.4	103.5	103.1
P	9.5	19.5	15.8	11.50	10.00	P	37.3	54.2	52.8	54.5	55.4
UK	0.9	5.5	13.1	4.50	1.75	UK	127.6	107.2	104.2	104.6	103.7
EC	3.4	4.8	8.4	7.00	4.75	EC	100.0	100.0	100.0	100.0	100.0
USA	0.9	3.1	5.8	2.25	4.00	USA	188.7	160.4	156.1	154.5	152.1
JAP	6.0	10.3	13.6	9.75	5.25	JAP	55.5	95.4	111.0	115.8	116.9

(2) Deflated by the deflator of private consumption.

* Forecasts September/October 1989.

The EC economy — use and supply of goods and services

(percentage change)	Average 1982-84	Average 1985-87	1988	1989 **	1990 **
Private consumption	1.2	3.4	3.8	3.00	3.00
Government consumption	1.6	2.2	2.0	1.50	1.75
Gross fixed capital formation	-0.1	3.6	8.4	7.00	4.75
Domestic demand (including stocks)	1.3	3.4	4.8	3.75	3.00
Exports of goods and services *	2.6	1.8	4.9	7.25	6.00
Total demand	1.4	3.2	4.8	4.25	3.25
Imports of goods and services *	0.4	7.9	11.9	9.50	5.25
Gross domestic product	1.6	2.6	3.8	3.50	3.00

* Extra-Community trade only.

** Forecasts.

Notwithstanding the favourable employment trend, unemployment has declined only slowly. In 1990, average will still be about 9% with significant differences among Member States. Youth unemployment is still particularly high, although it has improved considerably in recent years. The increase in long-term unemployment appears to have been halted. With employment now increasing rapidly, a more determined use of specific measures (vocational education and training) would be most effective in reducing this type of unemployment.

... but more is necessary

A significant reduction in unemployment over an acceptable time span requires yearly increases in employment of at least 1½%. On present trends, such increases could be attained with rates of economic growth of about 3½%. This was the pattern aimed at in the 'Cooperative Growth Strategy for more Employment'. Developments in 1988 and 1989 have corresponded almost exactly to such a pattern. To repeat fully these very good performances in the immediate future will be difficult, however, because of the need to curb the growing macroeconomic disequilibria before they begin adversely affecting the determinants of growth.

Thus, a further improvement in the determinants of growth and in the functioning of the economy is needed to place the Community economy on the sus-

tainable medium-term growth path that can produce the required employment increases and make possible a lasting catching up by the less favoured countries. To this end the Community has since 1985 developed a coherent policy approach.

The completion of the internal market, which is creating a new dynamism, is becoming an important engine of growth and a greater potential. To realize fully this potential, growth and employment policies along the lines indicated in the Annual Economic Reports of recent years must be continued in all Member States and especially in those where GDP per head is lowest and the long-term growth potential is highest; in these countries Community aid and regional and social policies will support the catching up process. The full implementation throughout the Community of the social dimension principles would considerably strengthen economic and social cohesion. Such a comprehensive policy approach would facilitate progress towards EMU.

The stronger and more balanced growth that could become possible in the next decade must be made compatible with increased environmental protection. The extra resources generated by stronger growth should provide the means for an active policy to tackle the environmental problems.

Commission of the European Communities, General Secretariat, Draft Annual Economic Report 1989-90.



**INDUSTRY REVIEWS
AND
FORECASTS**

THE ENERGY SECTOR

Addressing the 1989 World Energy Conference in Montreal, Commissioner Cardoso e Cunha put the challenge for the European Community when he said:

Energy is politics in the noblest sense of that word. It affects us all in our daily lives, lighting and heating our homes, powering our factories and providing us with the freedom of transport. But in doing so we consume the world's resources and create pollution. The challenge is to provide energy services efficiently, cleanly and at moderate cost; this we must address not only within the European Community but with our global partners.

As shown in Figure 1, energy is an important contributor to GDP in the EC, particularly in the United Kingdom and Spain.

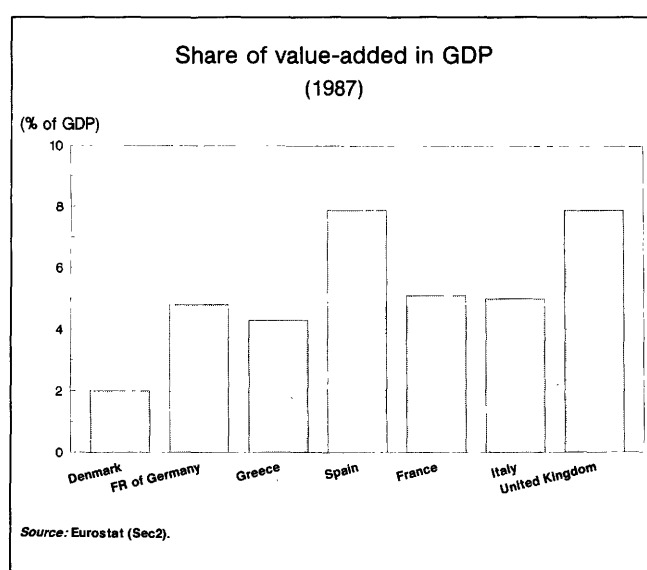
Energy demand

Intensity

There is a close link between industrial activity, and economic growth in general, and energy consumption. Energy is a key factor of production. The availability and price of energy have been key determinants of the structure of economic activity, its volume and rate of growth. Until the first oil shock, there was a one-to-one relationship between GDP growth and energy consumption (which means that a 1% growth in GDP requires a 1% growth in energy). The oil price shocks of the 1970s, and the ensuing general increase in energy prices, encouraged progress in the rational use of energy and led to a progressive divergence between economic and energy

consumption growth. Between 1973 and 1985, primary energy consumption in the 12 members of the EC increased only 3%, while GDP increased 25%. The energy intensity of GDP (the amount of energy required to produce one unit of GDP) therefore fell by more than 17%, or an average rate of 1.6% per year.

Figure 1



The rate of improvement in energy intensity has since declined and varies among countries. National variations reflect different starting points, differences in economic and industrial growth patterns, degrees of dependence on imported energy, price patterns and the degree of attention which governments and consumers pay to the efficient use of

Table 1
Main indicators, 1980-95

(million toe)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1990	1995
Final energy consumption	692.6	663.2	644.9	642.1	655.6	676.2	689.1	703.1	705.5	746.6	783.3
Gross inland consumption	1036.7	1002.5	980.0	965.1	990.9	1029.4	1043.8	1062.6	1073.2	N/A	N/A
Net exports	-591.8	-509.0	-476.4	-434.9	-458.3	-456.8	-479.5	-489.6	-512.6	-559.0	-668.1
Primary production	479.0	503.6	513.6	537.5	533.7	589.0	600.5	600.8	590.6	614.3	573.7
Employment (1 000) (1)	2016.9	2055.0	2025.9	2014.9	1967.1	1914.9	1870.4	1796.9	1755.5	N/A	N/A

(1) Excluding Portugal; employment figures are for energy and water.

Source: Eurostat (Sirene), DG VII.

energy. Energy efficiency improvements have arisen as a result of structural changes, technological changes and behavioural changes. Price effects provide most — but not all — of the explanation for these changes.

Table 2
Final energy intensity of GDP (1)

(toe per 1 000 ECU)	1973	1985	1986	1987	1988
EC (1)	0.522	0.426	0.420	0.418	0.407
Belgium	0.641	0.495	0.500	0.497	0.486
Denmark	0.456	0.343	0.335	0.342	0.312
FR of Germany	0.520	0.429	0.417	0.412	0.403
Greece	0.512	0.567	0.546	0.584	0.601
Spain	N/A	0.430	0.425	0.414	0.416
France	0.438	0.376	0.376	0.375	0.362
Ireland	0.691	0.567	0.588	0.585	0.567
Italy	0.457	0.371	0.363	0.370	0.364
Luxembourg	1.511	0.829	0.779	0.752	0.744
Netherlands	0.594	0.478	0.485	0.493	0.474
Portugal	N/A	0.543	0.563	0.557	0.598
United Kingdom	0.617	482	0.476	0.462	0.447

(1) Energy intensity is gross inland consumption divided by gross domestic product at 1980 prices and 1980 exchange rates.

Source: Eurostat (Sirene).

Following the oil price collapse, the energy intensity has begun to level off. For the EC globally, the

intensity was virtually flat in 1987 and preliminary estimates indicate a small decline in 1988. Provisional data for 1988 show a growth of total primary energy requirements of 0.3% over 1987, compared to a growth in GDP of 3.7%. This result is mostly explained by weather conditions, which were exceptionally mild in 1988. After correction for the weather, the increase in energy consumption is 2.3%.

Energy demand by sector

Conservation and structural changes in the 1970s had a great impact on the industrial sector, particularly in energy-intensive industries. Industrial energy consumption (including non-energy use) declined 21% between 1973 and 1985. In the residential and commercial sector, despite improvements in the efficiency of end-use equipment and in the use of insulation, energy consumption is slightly higher in 1987 than it was in 1973. Energy use for transport increased 35% between 1973 and 1987, although there were improvements in vehicle fuel-efficiency. As a result of these trends, the share of industry in EC final energy consumption has fallen from 35% in 1973 to 27% in 1986. The transport sector absorbs 25% of final energy demand in the EC in 1986, com-

Table 3
Final energy consumption by sector (1)

(million toe)	1973	(%)	1980	(%)	1983	(%)	1986	(%)
Industry	247.9	35	227	32	186.4	29	189.4	27
Transport	128.2	18	153.6	22	155.6	24	172.5	25
Residential	264.9	37	265.8	38	252.6	38	275.4	39
Non-energy	70.3	10	60	8	57.4	9	63.5	9
Total	711.3	100	706.4	100	652	100	700.8	100

(1) EC 10.

Source: DG XVII.

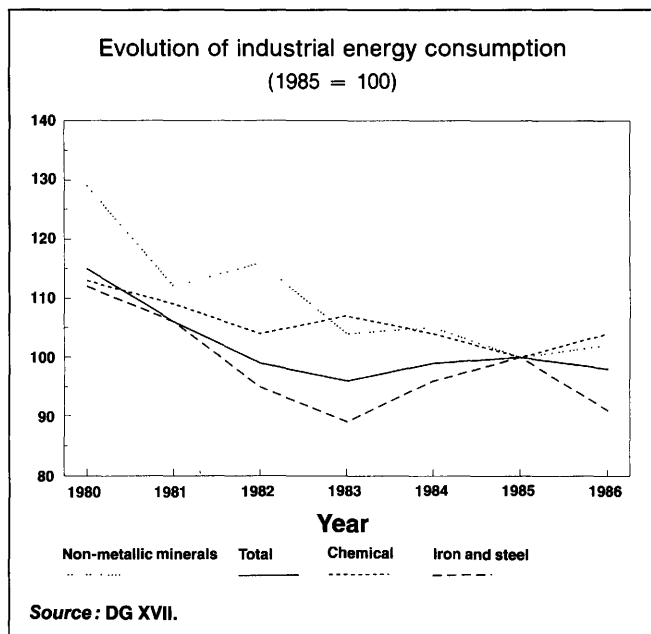
Table 4
Evolution of energy consumption in Industry

(1 000 toe)	1980	1981	1982	1983	1984	1985	1986	(%)
Iron and steel	61 281	58 399	52 138	49 000	52 928	54 890	49 799	-19
Non-ferrous metals	9 726	9 102	10 431	8 778	10 520	11 107	10 774	11
Chemicals	41 234	40 089	38 054	39 074	38 221	36 644	37 976	-8
Non-metallic minerals	36 346	31 702	32 661	29 406	29 574	28 236	28 729	-21
Ore-extraction	2 818	2 485	2 462	2 551	2 512	2 378	2 380	-16
Food, drink and tobacco	19 832	18 551	17 933	17 587	17 061	17 450	17 929	-10
Textiles, leather	8 453	8 314	7 870	7 687	7 619	7 239	7 259	-14
Paper, cardboard	11 696	10 890	10 780	10 532	10 793	10 149	10 748	-8
Engineering	24 353	22 856	21 761	20 591	20 606	20 978	21 797	-10
Other	19 067	15 127	13 342	16 158	14 394	14 448	17 859	-6
Total (all sectors)	244 621	225 136	210 996	205 130	211 068	213 363	208 602	-15

Source: DG XVII.

pared to 18% in 1973. The residential and commercial sector remains the dominant sector with a share of 39% of final energy consumption.

Figure 2



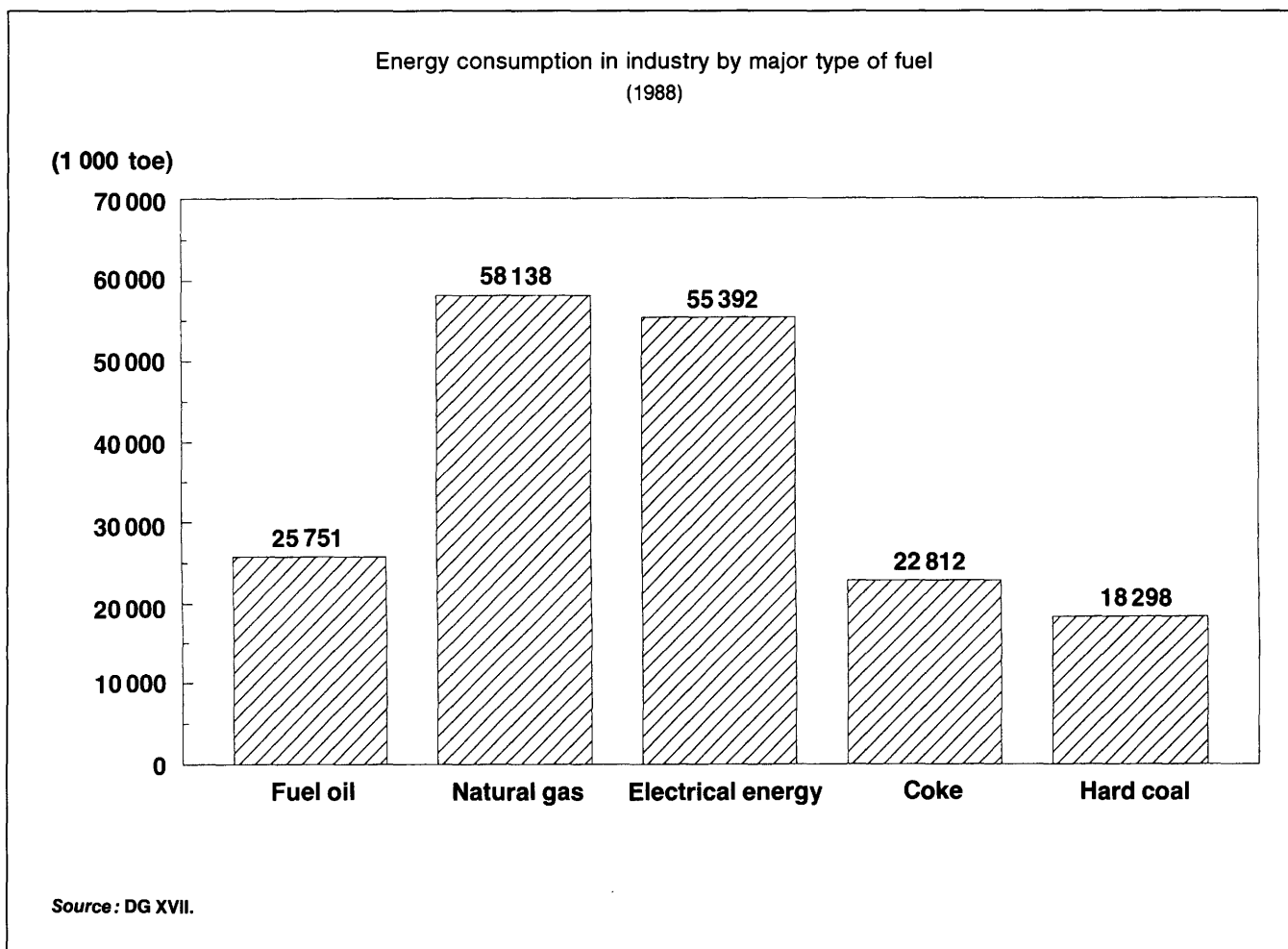
Energy efficiency in industry

Given the importance of efficiency improvements in industry, a special article prepared by DG XVII on the subject is included in this section.

A more detailed analysis of industry disaggregated into nine main sectors is presented in Table 4 (EC 12):

- in the period 1980-82, final energy consumption in the industrial sector decreased by close to 15%;
- energy consumption in two industrial sectors declined more than the mean trend (15%) with a decline of around 20% in the steel and non-metallic mineral sectors;
- the non-ferrous metals sector is the only one to show a (substantial) increase in energy consumption;
- evolution of energy consumption in ore-extraction and textiles is comparable to the mean trend in industry while energy consumption in the chemicals, paper and engineering sectors decreased slightly by 8 to 10%.

Figure 3



The evolution of energy consumption in steel, chemical and non-metallic minerals (altogether, 55% in the final energy consumption in industry) is compared in Figure 2 with the evolution in industry (1980 = 100).

An analysis of the structure of industrial energy consumption by type of fuel is presented in Table 5 (EC 12).

Consumption of fuel oil, which was the main fuel in industry in 1980, declined by more than 50% between 1980 and 1986 while natural gas and electrical energy became the two main fuels in 1982. Natural gas consumption decreased slightly (-2%) while electricity consumption increased by 5% over the same period. Coke consumption declined by 15% and hard coal consumption increased sharply by more than 50%. Figure 3 shows energy consumption of the five main fuels.

Final energy consumption in industry is driven by growth in industrial output, change in the structure of industry and change in energy efficiency. Improvement in energy efficiency is achieved by management measures and by investment in equipment.

Management measures are measures which can be taken through management action with little or no capital expenditure (better control of heating or lighting, better scheduling of energy-intensive processes, improved maintenance, etc.) while investment in equipment involves capital expenditure.

Two categories are defined in investment: specific energy investments for which energy saving is the unique purpose and other investments whose justification includes improvement in quality of the product, increase in production capacity or reduction in maintenance costs; in the latter case, energy saving provides only incidental benefit.

According to a study on energy indicators (*Energy conservation indicators*, ISI, Karlsruhe, December 1986), the energy intensity of industrial production declined by 20% between 1980 and 1986.

Government policies have played an important role in achieving efficiency improvements in industry in the past. They will be important in the future to assure that the interest in energy conservation and efficiency improvements is maintained and that investment in energy-saving equipment continues.

European programmes

Actions undertaken at the EC level for improvement in energy efficiency in industry include research and development programmes, demonstration programmes and technical audits in industrial sectors. Hereafter follows a brief survey of actions supported at Community level.

- Research and development programmes: the European Council approved a first energy R&D programme in 1975. More than 100 research contracts were negotiated with the Community institutions and firms. The budget for the programme exceeded ECU 22 million, half paid by the Commission. Given the success of this first programme, a second one was launched in 1979. The call for tenders attracted some 600 proposals relating to energy savings and 160 proposals were selected and granted a total of ECU 25 million by the Commission. A third programme started in 1986.
- Demonstration programmes: the Commission initiated a first demonstration programme in 1978, followed afterwards by a call for proposals published each year. Over 500 projects were adopted between 1979 and 1988 in the field of energy saving in industry with total Community support of 200 million ECU. The sectors that most fre-

Table 5
Final energy consumption of industry

(1 000 toe)	1980	1983	1984	1985	1986	1987	1988
Hard coal and patent fuel	10 889	13 961	14 852	18 727	16 668	17 411	18 298
Coke	28 494	24 238	26 443	27 125	24 166	21 559	22 812
Lignite, peat and derived products	1 695	2 028	2 156	2 236	1 903	1 798	1 827
Residual fuel oil	63 831	38 747	34 500	29 031	29 095	25 821	25 751
Other petroleum products	27 094	20 764	21 174	21 350	22 916	25 576	23 399
Natural gas	51 418	46 450	50 129	51 090	50 340	57 033	58 138
Derived gases	12 118	10 689	11 364	11 974	10 809	11 071	10 508
Derived heat	1 197	2 005	2 075	2 288	2 286	2 759	2 306
Electrical energy	47 885	46 248	48 375	49 542	50 452	52 784	55 392

Source: Eurostat (Sirene).

quently appeared were the chemicals, steel and food processing sectors. As dissemination of the results was seen as a key step to the complete success of a demonstration programme, the Commission encouraged firms to put into practice the experience already gained. On-site information workshops were organized, leaflets on completed projects distributed and the results, presented at conferences and seminars, were stored in data banks such as Sesame.

- Energy auditing: the Community 'Energy bus' programme was launched in 1980 with the aim to help small and medium-sized businesses to save energy by energy audits. The Energy bus programme was extended after 1985 and concentrated on a few energy-intensive sectors such as ceramics, abattoirs, dairies, breweries, textile finishing, etc. Data covering nearly 12 000 audits are now available in the central database at the Joint Research Centre at Ispra. The Commission also ordered several audits in industrial sectors to specialized consultants, covering the following sectors: steel, aluminium, pulp and paper, glass, fertilizers and basic chemicals, grains, dairies, ceramics and bricks.

Member States' initiatives

Government policies to improve energy efficiency rely on mandatory standards, financial aids, R&D programmes and information programmes. Most Community countries set up research and development programmes to contribute to the development of rational use of energy technologies in industry. Regulation measures for energy conservation in industry are very limited (with some exceptions in Italy and Greece) and financial aids and information programmes were therefore emphasized.

Hereafter follows a brief survey of the national actions devoted up to 1986 to financial aids and information programmes (in parentheses, the organization in charge of the energy efficiency measures in industry).

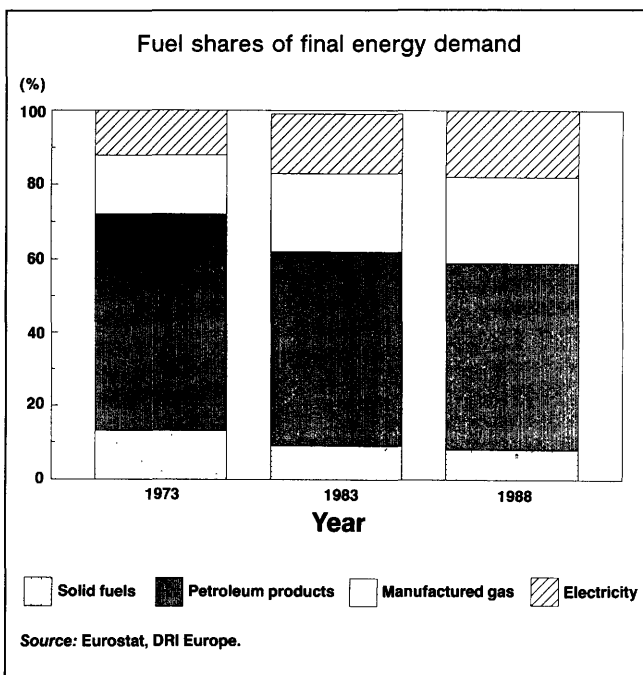
- The action of the Belgian authorities for improving energy efficiency in industry was mainly concentrated on financial incentives. Companies may claim up to 35% of the total cost of specific investment related to energy conservation. Information campaigns on energy conservation were organized per industrial branch (Ministry of Economy).
- In Denmark, important financial aids were available but especially in the residential sector. In

1986, financial aids decreased in all sectors and the government started up a technical information programme on energy conservation opportunities (Ministry of Energy).

- France organized an important programme of financial incentives. Grants for investment in small and medium-sized businesses were available as well as soft loans with government guarantee; accelerated depreciation method of capital expenditure was allowed. Information on energy conservation benefits was disseminated through personal contacts in industry (AFME).
- The Federal Republic of Germany devoted significant efforts to promote information on energy conservation and gave partial financial support to techno-economic studies and energy audits. The authorities restricted tax deduction to some investments such as heat recovery systems and heat pumps.
- In Greece, energy-intensive companies had legal obligation to make capital expenditure on energy conservation equipment (proportional to capital) and to control their energy bill. In small and medium-sized businesses, energy conservation was upon company responsibility (CECI, Commission for Energy Conservation in Industry).
- Ireland restricted financial aids while a National Audit Service was organized in order to supply technical information and to assist companies for energy balance (IIRS, Institute for Industrial Research and Standards).
- Italy was one of the countries to follow a 'national plan' approach. A national energy plan was defined by law in 1982 with the emphasis on information and education; however, financial support for investment was excluded (Ministry of Industry).
- Luxembourg, much more concerned with energy consumption in the residential sector, took little specific action for energy conservation in industry (Ministry of Energy).
- The Netherlands initiated a specific programme (NEOM) to promote already well-experienced techniques for energy conservation. Grants for investments (up to 22% of the specific energy cost) and partial financial support in energy audit were available. An independent organism (SVEN) was also created to disseminate information on energy conservation (Ministry of Economy).

- Portugal allowed grants for investment in industry of up to 30% of the energy specific costs. Higher percentages were available when demonstrating innovative technology.
- Spain followed a 'national plan' approach. The national energy plan adopted in 1984 included partial financial support for energy balance, grants for investment and soft loans (IDAE, Institute for Energy Diversification and Conservation).
- An important programme of information and motivation for energy conservation was implemented in the United Kingdom. An Energy Efficiency Demonstration Scheme was initiated to promote new technology for energy efficiency, including financial support for investment. Substantial effort was devoted to increase the dissemination of the technologies supported in the demonstration programme (Ministry of Energy).

Figure 4

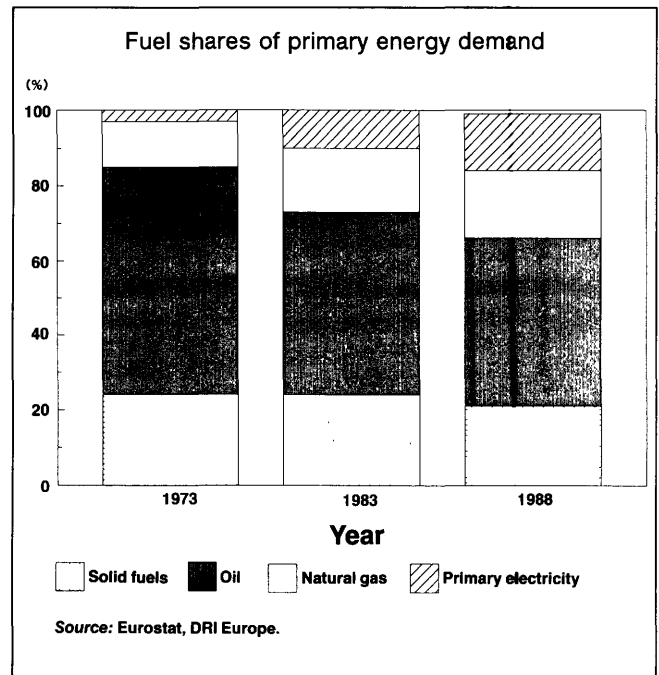


Energy demand by fuel type

Oil is still the dominant fuel in the EC. The share of oil in total final energy consumption has been approximately stable at 50% since 1985, after having declined from 59% in 1973. The share of oil is only 39% in industry and 35% in the residential and commercial sector but the transport sector is nearly completely dependent on oil. The contribution of natural gas in final energy demand was 21% in 1987 and that of solid fuels 8%. The share of electricity was close to 18%.

The growing role of electricity in meeting end-use energy requirements has been accompanied by increased penetration of nuclear power (see chapters on electricity and nuclear fuels). Nuclear and hydro-power accounted for 43% of electricity generation in 1987 and 15% of total EC primary energy requirements. Natural gas accounted for 18% of primary energy requirements and solid fuels for 22%. Although the share of oil in total primary energy requirements has declined substantially since the early 1970s, oil still accounts for 45% of EC primary energy requirements.

Figure 5



Energy supply

Total EC energy production has increased very little since 1986 and the degree of self-sufficiency has fallen from 56.5% in 1986 to 55% in 1988. Net energy imports have increased continuously since 1983 and imports accounted for 45% of total energy consumption in 1988.

Description and structure of the energy industry

The energy industry includes:

- extraction and briquetting of solid fuels (NACE 11);
- coke ovens (NACE 12);
- extraction of petroleum and natural gas (NACE 13);

Table 6
Gross inland consumption by fuel type

(1 000 toe)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Hard coal (1)	202 477	201 016	197 217	192 477	180 743	200 591	196 111	196 854	192 117
Lignite and peat (1)	35 470	37 436	37 331	37 768	38 661	38 344	35 550	32 297	33 706
Crude oil (1)	551 364	505 693	482 425	467 364	472 281	462 816	474 290	476 581	484 974
Natural gas	171 073	167 749	160 334	167 487	176 634	184 699	186 843	198 287	192 539
Other fuels	1 660	1 397	1 593	1 833	1 562	1 664	1 660	2 169	2 160
Nuclear/geothermal heat	46 094	61 144	68 280	80 934	104 443	125 711	132 888	138 583	148 735
Electrical energy	16 647	16 666	16 549	16 748	16 579	15 764	15 037	16 779	18 286

(1) Including the balance of foreign trade and stock changes of derived products.

Source: Eurostat (Sirene).

- mineral oil refining (NACE 14);
- nuclear fuel industry (NACE 15);
- production and distribution of electricity, gas, steam and hot water (NACE 16).

The energy industry in the EC is characterized by the existence of large companies, many of them being national monopolies, especially in the electricity and gas distribution industries. Some of them have an international dimension (the major oil companies) while others are national, often State-owned or with a large participation of the State.

Community energy policy and the internal market

Energy policy at Community level is embodied in a number of energy policy objectives. The latest Com-

munity energy policy objectives for the year 1995 were agreed upon by Energy Ministers in September 1986. These take the form of horizontal objectives which are general to the energy sector as a whole, for example the need to maximize security of supply, and vertical objectives which relate to specific energy sub-sectors, such as oil, natural gas, solid fuels, etc. The main thrust of Community energy policy is to safeguard security of energy supply and continued restructuring of the Community's energy economy. In particular, this means continued efforts to reduce the Community's dependence on oil, especially imported oil, and the drive to achieve further improvements in energy efficiency.

In 1988, the Commission reviewed Member States' energy policies in the light of the 1995 Community energy objectives, publishing its findings in a report to the Council (COM(88) 174 final). The conclusions

Table 7
Primary production by fuel type

(1000 toe)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Hard coal	159 806	161 872	156 922	148 548	107 639	133 597	139 496	133 908	129 714
Lignite and peat	34 357	36 541	36 241	36 089	37 618	35 634	33 854	32 582	32 447
Crude oil	89 924	100 292	115 892	130 607	141 680	144 765	145 697	144 082	136 269
Primary petroleum products	2 392	2 486	3 755	4 737	5 546	5 860	6 239	5 725	4 591
Natural gas	129 265	125 236	115 984	119 940	119 952	127 117	124 565	129 101	120 177
Other fuels	1 660	1 397	1 593	1 833	1 562	1 664	1 660	2 169	2 60
Nuclear/geothermal heat	46 094	61 144	68 280	80 934	104 443	125 711	132 888	138 583	148 735
Electrical energy	15 388	14 642	14 905	14 772	15 042	14 581	14 246	15 189	16 517

Source: Eurostat (Sirene).

Table 8
Trade

(1000 toe)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1990	1995
Imports	818.8	748.4	720.7	691.4	725.6	723.8	766.2	763.6	774.8	803.5	891.0
Exports	227.0	239.5	244.3	256.5	267.3	267.0	286.7	274.0	262.2	244.5	222.9
Net exports	-591.8	-509.0	-476.4	-434.9	-458.3	-456.8	-479.5	-489.6	-512.6	-559.0	-668.1

Source: Eurostat (Sirene).

arising from the review received a first and full discussion at the Energy Council held on 9 June 1988. A second round of discussions took place during the Energy Council's meeting of 8 November 1988. The Energy Council stressed the need for action by Member States to achieve 1995 energy objectives in the field of energy efficiency at Community level where the additional 20% improvement is unlikely to be attained. Likewise, the objective requiring an increase in the share of solid fuels in energy consumption is unlikely to be achieved due to increasing use of nuclear energy and gas in power plants and partly because of environmental constraints. However, the Community would appear to be on course to achieving its oil objective, i.e. to keep Community oil consumption down to around 40% of total energy consumption and less than one third of net energy imports.

Energy is a key factor for any economic activity and the European single market can never be achieved without a strong and solid contribution from the energy sector. A Commission working document of May 1988 (COM(88) 238 final) entitled 'The internal energy market' sets out the obstacles to the achievement of such a market and presents a strategy for action to eliminate them. The Energy Council of 8 November 1988 emphasized the importance of this working document and agreed with the overall strategy proposed by the Commission, which advocates making parallel progress in the different spheres of action (implementation of the White Paper, application of Community law, environment and specific areas of energy) in order to establish the internal energy market.

The potential for further integration of the electricity and gas sectors is one of the policy areas the Commission is currently focusing on. The internal market can substantially affect the structure of the supply companies but the extent of this impact can be measured only after the details of the proposed actions have been defined and adopted by the Council. This is an ongoing process which will require time, and the impact of which will be felt over the longer term. This process can be illustrated by looking closely at the issues raised in moving towards greater integration of the Community's electricity sector.

Electricity integration

A special report was commissioned, 'Modelling analysis of the electricity sector in the context of the internal market' by the Centre for Operations Research and Econometrics — UCL, to study the issue of electricity integration in some depth.

Applying 2% growth rate to the network comprising the Netherlands, the Federal Republic of Germany, France, Belgium, Spain, Portugal, Italy and the United Kingdom, estimates were prepared showing potential gains from closer integration of the networks through time. These net monetary benefits include savings from both fuel and investment costs, yielding an accumulated ECU 70 billion over the period (taking the mid-point in 2000 and 2010).

In terms of investment saving, the benefits under the present practices are estimated at 13 GW to 2000. With greater integration there is an additional benefit of 12 to 15 GW.

Taking into account the continuation of current practices and reinforcing these by greater integration, the Community's electricity park can meet growing electricity demand to 2000 (averaging over 2%) with an increase in physical capacity of under 1% per annum.

In addition to the economic benefit above there is also an 'external' benefit of the reduced emissions because of lower consumption of fossil fuels. In the medium term these could be averaged out at about a 5% reduction in CO₂, SO₂ and NO_x.

Translating these 'producer benefits' into reductions in consumer prices is a further step in the integration process. The direction of Commission thinking, other than on price transparency, will emerge over the new year or so. The Commission proposes a detailed study of the way to extend third-party access with Member States and sectoral interest.

Similarly, the issues raised by greater integration of gas networks were also examined. The results suggested that the way forward will be linked with market structures and with network optimization and, as with electricity, the direction of Commission thinking on these structures will only emerge later and can then be better analysed.

Harmonization of taxes

Harmonization of taxes, both excise duties and VAT rates, is an important Community initiative which will have direct impact on the energy sector. In 1987 the Commission proposed a directive on the harmonization of petroleum product excise duties and VAT rates. Discussions on those proposals are in progress and at the time of writing (July 1989) the Commission has indicated possible revisions to its original proposals but details have not yet been decided.

Petroleum products

In the market for petroleum products, the overall effects on refining at Community level are likely to be small. The competitive nature of this market and the rationalization carried out in the last decade suggests that there is little scope for 'system-wide' gains — the most efficient plants are already being utilized. However, the removal of frontier controls will provide scope for significant improvement in the efficiency of distribution systems. Further gains can be expected by 1992 when the oil regimes of Spain, Portugal and Greece will be fully liberalized.

The overall effects on demand will come both from the general increase in economic activity brought about by the completion of the internal market and from the much less important reduction in prices due to efficiency gains.

The effects on relative product prices are likely to be stronger than the effects on the general product price level. Demand is constantly increasing in favour of the lighter distillates, and this will be intensified by the extra demand and increasingly stringent product specifications. At the same time, conversion and upgrading refining capacity for these high quality products may well become tighter. Availability of these products in international markets is likely to be limited.

Concern about possible tightness in the supply of motor gasoline arises also from the fact that:

- (a) the general move to unleaded gasoline as a result of legislation can only be achieved at satisfactory octane levels with some reduction in the yield of gasoline;
- (b) the introduction of progressively higher-octane unleaded gasolines by the major companies, as part of their strategy to increase market share, further reduces the yield of gasoline available with existing technologies.

To some extent the switch to diesel, if it continues, will offset these effects, but there are also limits on the domestic production of diesel and these may be intensified if product specification legislation adopts the more stringent standards applicable in some countries.

This shift in demand mix is taking place at a time when demand for transportation fuels is likely to grow steadily (2% to 1995). The effect will be that, in the Community as a whole, there will be a need for more conversion and upgrading capacity. If public authorities delay defining future environmental stan-

dards, there could be a risk of shortage of adequate capacity when it is needed.

If and when excise taxes and VAT are harmonized in the Community, price levels in the southern Member States could be lower, leading to an increase in consumption. This would have some effect on refining and distribution patterns.

The increased relative demand for lighter distillates, coupled with the small overall effect on the price of oil means that, while there is excess capacity in refining, the price of heavy fuel oil will face downward pressure. Only if national policies change back to encouraging the use of heavy high-sulphur fuel oil in power generation will a ready market be found. This has implications for coal in that it will become even harder for coal to compete in this end-use.

Other dimensions of the internal market

In addition to gas and electricity trade, tax harmonization and oil product trends, other aspects of both the general actions to achieve the single market (including public tendering, freeing of capital movements, removal of technical barriers), more rigorous application of some provisions of the Treaties (e.g. coal aids, oil monopolies) and specific actions under the internal energy market (price transparency, tariff structures) will have an impact on the energy sector.

Part of the impact will influence costs and consumer prices, leading in some cases to convergence of costs (public tendering, abolishing State monopolies) and prices (transparency and possible tariff structure proposals). Other actions will have an impact on behaviour (more competitive mentality) — subjective factors outside the scope of quantitative analysis.

What is clear is that the internal energy market, as it is gradually defined, will change the parameters of future energy policy structures.

Energy and the environment

There is a strong link between energy and the environment. The production and use of energy does generate a great deal of atmospheric pollution. In its conclusion on the internal energy market in November 1988, the Council of Energy Ministers of the Community made it clear that 'the achievement of a satisfactory balance between energy and the environment — in accordance with the Single Act — must constitute a major goal of the Community's work'.

Energy production and use has an impact on the environment through air pollution, waste discharges and waste generation. Regulations that ensure protection of the environment raise the costs of energy and influence the competitive position of fuels. It is therefore essential to reconcile energy and environment objectives when formulating energy policies.

The environmental impacts of energy production, transformation and use extend far beyond air pollution (local and trans-frontier), although these are the most crucial problems at present. Additional concerns include water demand and pollution, waste generation and disposal, as well as the impact on land use and nature.

Emissions of SO₂ and NO_x are mainly related to the combustion of fossil fuels and contribute to acid deposits. Energy activities contribute to approximately 90% of man-made SO₂ and NO_x emissions. Stationary combustion sources are the most important source of SO₂ emissions, whereas transport is the major contributor of NO_x emissions. Legislation in Member States and in the Community has been adopted to limit SO₂ and NO_x emissions from energy use. A major breakthrough regarding emissions from stationary sources has been achieved with the adoption of the Council Directive on the limitation of emissions into the air from large combustion installations (88/609/EEC). As regards mobile sources, substantial reduction in emissions will result from legislation on the introduction of clean cars and cleaner automotive fuels.

The 'greenhouse effect' is coming to the fore as one of the major global issues and fossil fuels contribute to emissions of greenhouse gases, such as CO₂, CH₄ and N₂O. It has been estimated that 55% of the greenhouse effect is caused by CO₂, 15% by methane and 5% by N₂O and O₃. Between 70 and 90% of the CO₂ emissions come from burning fossil fuels. The Community now accounts for around 15% of the world's CO₂ emissions. In terms of CO₂ emissions per capita, the USA and the German Democratic Republic lead the world with 4.9 tonnes of carbon each year. In the Community, there are five countries producing between 2 and 3 tonnes per year. The Commission has decided to carry out a work programme to evaluate policy options to reduce CO₂ emissions.

Methods to control air pollution include:

- energy conservation: the promotion of energy efficiency contributes at the same time to sound energy policy;

- fiscal methods: energy prices should reflect their full economic and social costs, including possible damage to the environment; introduction of a levy on CO₂ is now under discussion in some countries;
- fuel substitution: an efficient way to reduce emissions into the air; especially for those emissions like CO₂ where control technologies are not available;
- switching from fossil fuels that emit large quantities to low emitting fuels or to nuclear power;
- increasing use of renewable energies, such as solar power, that generally have a smaller impact on the environment than fossil fuels;
- emission control technologies, that are already available for reducing SO₂ and NO_x emissions; ongoing R&D programmes will also lead to the availability of better and more cost-effective technologies.

Outlook

With energy prices expected to start rising again, the primary energy intensity of GDP, after a few years of stagnation, is expected to resume declining in the 1990s, with an accelerating rate of decline in the second half of the 1990s. Steady growth is expected in final energy demand in all sectors, with total final energy demand growing approximately 1% per year in the early 1990s. The transport sector is the sector where growth is strongest. The transport sector accounts for close to 50% of EC oil consumption and will be the only source of growth for oil use in the future. Oil use is expected to decline in the other end-use sectors.

Electricity will continue to increase its share of final energy demand, although at a slower pace than in the past. Apart from use for power generation, solid fuel use will decline. Although consumption of solid fuel in power plants will increase, its contribution to electricity production is stable. Nuclear power capacity will increase only slightly from the current level and the share of nuclear power in electricity production will peak in the mid-1990s. Additional generation requirements will be met by burning more oil and gas in the early 1990s.

Natural gas demand is expected to increase in all sectors. It could get an additional boost from increasing environmental concerns, as natural gas is a relatively 'clean' fossil fuel.

Edited by DRI Europe, based on various documents prepared by DG XVII. The section on efficiency in industry has been prepared by DG XVII and is reproduced here in its entirety

SOLID FUELS

(NACE 11)

Summary

Solid fuels accounted for about 22% of gross energy consumption and 28% of primary energy production in EC 12 in 1987. The corresponding figures for 1980 were 23 and 41%. Over the period 1980-87, the contribution of solid fuels to EC primary energy production declined substantially, the decline being entirely attributable to hard coal, while the contribution of lignite was virtually stagnant.

Electricity generation in thermal power stations is by far the dominant outlet for solid fuels (over 60% of total hard coal consumption and up to 90% of lignite consumption). The second largest market is for the production of coke in coking plants; 90% of the coke produced is used by the steel industry. The industrial market is in third position. This sector experienced an encouraging growth in the use of solid fuel since the second oil crisis with, however, a drop since 1985 due to the collapse in oil and gas prices. The last-ranking market is the domestic sector, where solid fuel consumption has been declining since the 1960s. This decline is likely to continue.

Imports of hard coal have been meeting an increasing proportion of demand. In 1987, indigenous production of hard coal satisfied 70% of EC hard-coal requirements and provided employment for 380 000 workers.

Description of the sector

NACE 11 'solid fuels' covers not only hard coal (NACE 111) but also brown coal or lignite (NACE 112). Solid fuels or 'coals' are usually classified according to their rank, i.e. their degree of maturity, which ranges from peat, the lowest rank, to lignite, bituminous coal and finally anthracite, the highest rank. Although reference will be made to the total

contribution of solid fuels to the Community energy balance, the emphasis in the following pages will mainly be on hard coal. Some details about lignite production and use are also to be found in the section on supply trends.

Current situation

The proportion of EC primary energy consumption accounted for by solid fuels fell only slightly between 1980 and 1987, from 23.3 to 21.6%. However, the trends were very different across countries (see Table 2). The proportion of energy consumption represented by solid fuels ranged from 9 to 40% in 1987, depending on the country.

In seven of the 12 Member States, the proportion of solid fuels increased over the period 1980-87. However, over the same period, the share of solid fuels declined in the major coal-consuming countries, which are also the producing countries (United Kingdom, Federal Republic of Germany, France and Belgium). In Spain, which is also a producing country, the proportion of solid fuels increased between 1980 and 1985 but declined thereafter.

Recent developments in solid fuel consumption are at variance with the Community energy policy objectives adopted in 1986, which called for an increase in the contribution of solid fuels in meeting the Community energy requirements.

Given the uncertainties — both in terms of prices and availability — surrounding the Community energy supply in the future, and the need to reduce excessive dependence on imported hydrocarbons, top priority should be given to corrective measures, both at the Community and national level, for encouraging the expansion of solid fuels consumption.

Table 1
Main indicators, 1980-90
Hard coal

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Apparent consumption	341.1	336.1	334.8	309.2	258.7	313.9	320.4	311.1	306.8	305.5	309.5
Net exports	-80.8	-75.5	-78.0	-64.3	-85.8	-96.5	-92.5	-89.4	-92.2	-97.7	-108.4
Production	260.3	260.6	256.8	244.9	172.9	217.4	227.9	221.7	214.6	207.8	201.1
Employment (1 000)	599.7	582.6	567.9	537.9	504.3	464.4	420.8	378.4	367.0	361.7	N/A
of which underground	387.1	381.7	369.8	356.4	331.4	420.8	282.0	256.7	N/A	N/A	N/A

Source: Eurostat (Sirene).



Production and consumption

Consumption

Table 3 illustrates how the use of hard coal developed in the Community over the period 1980-87, dropping from 331 million tonnes to 322 million tonnes (i.e. by 0.4% per annum on average).

Amongst coal-using sectors, coke manufacturing performed worst, with a decline in hard-coal consumption of 23% between 1980 and 1987 (from 94 million tonnes to 72 million tonnes). The Community steel industry — like the coal industry — underwent a major crisis during this period. Community quotas were introduced in 1980 on the production and deliveries of certain categories of steel products, the production capacity was reduced by almost 20% between 1980 and 1986 and crude steel

Table 2
Share of solid fuels in gross domestic energy consumption by country

(%)	1980	1985	1986	1987
EC	23.2	22.8	22.3	21.6
Belgium	24.0	22.5	19.8	19.1
Denmark	30.6	39.6	38.5	40.0
FR of Germany	30.6	29.6	29.6	28.1
Greece	20.9	34.8	36.4	37.4
Spain	21.3	28.0	25.6	24.3
France	16.8	12.6	10.5	9.4
Ireland	20.7	29.5	34.6	38.1
Italy	8.6	11.4	10.6	9.4
Luxembourg	50.7	45.5	42.1	34.0
Netherlands	6.3	10.8	10.2	10.7
Portugal	4.5	6.5	10.0	10.5
United Kingdom	35.0	30.8	31.8	33.0

Source: Eurostat (Sirene).

Table 3
Hard coal

(million tonnes)	1980	1987	1987/80 AAGR
Production	260.3	221.7	-2.3
Imports	80.3	91.7	1.9
Exports	.9	1.7	9.5
Gross domestic consumption	330.9	322.1	-0.4
Transformation, of which:	293.3	280.0	-0.7
electric power stations	194.2	204.9	.8
coking plants	93.8	72.0	-3.7
Final consumption, of which:	36.1	42.2	2.3
industrial	17.0	26.3	6.4
domestic	18.9	15.7	-2.6

Source: Eurostat (Sirene).

output fell by some 16 million tonnes over the same period.

In addition to declining steel production, technological improvements contributed to the reduction in coke consumption, and therefore in coal consumption in coke manufacturing. Technological improvements aimed at reducing production costs resulted in particular in a reduction in specific coke consumption per tonne of pig iron produced in blast furnaces. The major technical change has been the wider use of pulverized coal injection (PCI) in blast furnaces, thereby reducing specific coke consumption: as a result of the PCI technology, there has been a partial substitution of coke by coal in the production of steel. The full potential for use of PCI in Europe has not yet been realized and there is, therefore, scope for further reduction in coke consumption.

The decrease by over 20 million tonnes in the use of hard coal in coking plants was spread throughout the Community, but the Federal Republic of Germany, France and Italy were most severely affected, with cuts of 10.8 million tonnes, 5.1 million tonnes and 2 million tonnes respectively over the period 1980-87. Although the European steel industry has benefited from a welcome recovery over the last two years — with a corresponding increase in coal deliveries to coking plants — no growth in coal consumption in coke manufacturing is expected over the next few years, given the technological changes discussed above.

In contrast, consumption of hard coal in power stations increased by nearly 11 million tonnes (5.4%) over the period in question to a total of 205 million tonnes in 1987. The power-generating sector accounted for 63.5% of total hard coal consumption in 1987, compared with 58.8% in 1980. This figure clearly indicates the critical role of the power-generating sector in determining the future of hard-coal consumption. The power-generating sector is expected to account for an increasing portion of hard-coal consumption.

With the exception of 1984-85 (marked in the United Kingdom — the largest coal producer — by a year-long strike in the coalmining industry), there has been a relatively slow but steady growth in hard-coal consumption in that sector. Growth would have been stronger, if not for the increasing penetration of nuclear energy over the period. Indeed, the contribution of nuclear power to electricity production increased from 12.4% in 1980 (EC 10) to 32.8% in 1987. The rapid penetration of nuclear power has reduced the use of fuels on which conventional thermal power plants run (coal, oil and gas-fired).

Between 1980 and 1987 the trend towards increased hard-coal consumption in power stations was seen throughout the Community. France was a notable exception, with a total reduction of 15 million tonnes of coal use in power stations due to the predominant role of nuclear energy in electricity generation (some 70% of the total in 1987). On the other hand, hard-coal consumption in power stations was broadly stable in the United Kingdom and increased in the other EC countries as follows: Denmark, 2 million tonnes; the Netherlands and Federal Republic of Germany, 3.5 million tonnes; Italy, 5 million tonnes; and Spain, 12.2 million tonnes. Encouraging developments have also occurred in recent years in Portugal and Ireland, where the use of coal in power stations was virtually non-existent in 1980.

The use of hard coal in the industrial market (excluding power stations and coking plants) gradually increased over the period 1980-87, from some 17 million tonnes in 1980 to a peak of 30 million tonnes in 1985, and fell back to 26 million tonnes in 1987. The industrial sector consists of a large number of small and medium-sized consumers from various industries, such as cement, chemicals, food, engineering, with varying energy requirements (motive power, high-temperature heat, low-temperature heat, etc.). Following the second oil shock, which had shown the need to reduce Community dependence on imported oil and gas, as well as to diversify energy supply, there was a revival in industrial coal consumption, prompted in some cases by government incentives offered to companies switching from oil and gas to coal. European coal producers also offered programmes to encourage conversion to coal. However, growth in the industrial use of coal was relatively slow and limited to a few countries, except in the cement industry, where coal has a clear-cut advantage even without government incentives. Given the higher capital cost of coal installations, industry has an incentive to switch from oil and gas to coal only if the price differential is sufficiently large. Since the oil price collapse of 1986, conversion from oil and gas to coal has virtually disappeared. There is a large potential for additional coal-burning in the industrial sector — a potential which will not be realized without strong incentives at the national and Community level.

The last sector where significant quantities of hard coal are consumed is the domestic sector, which includes households, services and administrative bodies (essentially for space heating). This sector consumed 15.6 million tonnes of coal in 1987 within the Community, compared with some 19 million

tonnes in 1980. With the exception of Denmark and Ireland, which consumed 0.7 and 1.2 million tonnes respectively in 1987, deliveries of hard coal to individual households were again largely concentrated in the producing countries and notably in the United Kingdom, where they amounted to 8.4 million tonnes in 1987. The declining consumption mentioned above is very likely to continue in the future, due mainly to lack of convenience in the use of coal and pressure from competing fuels.

Production of hard coal

Hard coal is currently being mined in the Community in five countries (see Table 4).

Small amounts of coal are also produced in Portugal and Ireland. Total EC output amounted to 215 million tonnes in 1988, a slump of 46 million tonnes (18%) compared with 1980. The three largest coal-producing countries — the United Kingdom, Federal Republic of Germany and Spain — accounted together for over 90% of total output. With the exception of Spain (where a reported increase of 6 million tonnes was partly due to changes in statistical definitions), production declined in all Members States, particularly the United Kingdom (27 million tonnes) and Federal Republic of Germany (15 million tonnes).

The drastic reductions in European coal production since the 1960s were due to the growing competitive pressure from cheap hydrocarbons (in the 1960s and since 1986) and to the competition from imported coal. Indeed, because of poor geological conditions, European coal is expensive to produce and the gap between European production costs and international coal prices has been widening.

The fact that European coal is mostly produced from deep underground mines, as opposed to open-cast mines, partly explains the higher production costs. Approximately 7% of the European coal output is extracted from surface mines, compared to 50% in Australia, 60% in the USA and 85% in Canada.

Coal is the most abundant fossil fuel in the world and in the Community. EC hard coal reserves, i.e. proven and economically exploitable, were estimated at the end of 1986 at 70 billion tonnes, enough to last more than three centuries at the present rate of production. However, because of the progressive exhaustion of easily accessible deposits, the geological conditions now prevailing in the Community are such that production requires: (1) working at very great depths (sometimes over 1 000 m); and (2) heavy-duty, sophisticated equipment, both for technical and safety reasons. This has a major impact on production costs and on the financial situation of the mining industry.

Besides high production costs, several other factors contributed to the poor financial situation of the EC coal industry since 1985:

- the 1986 collapse in oil prices, which triggered a decline in world coal prices;
- the depreciation of the dollar compared to European currencies, which made imported coal cheap in European currencies; as a result, the gap between imported coal prices and European production costs increased;
- competition from large quantities of coal available on world markets at cut-rate prices, which sometimes did not cover production costs.

Although this is not a sustainable position in the long run and should therefore be seen as a temporary phenomenon, it had the effect of seriously worsening the financial situation of the Community coalmining industry.

Faced with increasing financial losses due to growing competition from imported energy, the European coal industry had to rationalize, closing the most uneconomic pits, reducing the workforce and increasing productivity. The number of underground operating mines ('pits') fell from 504 in 1982 to 380 in 1987 (EC 12). Total personnel fell from

Table 4
Hard coal output

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC	260.3	260.6	256.8	244.9	172.9	217.4	227.9	221.7	214.6
United Kingdom	128.2	125.3	121.4	116.4	49.5	90.8	104.6	101.6	101.4
FR of Germany	94.5	95.5	96.3	89.6	84.9	88.8	87.1	82.4	79.3
Spain	12.9	14.8	15.6	15.4	15.3	16.1	16.1	19.3	19.0
France	18.1	18.6	16.9	17.0	16.6	15.1	14.4	13.7	12.1
Belgium	6.3	6.1	6.5	6.1	6.3	6.2	5.6	4.3	2.5

Source: Eurostat (Sirene).

some 600 000 in 1980 to less than 380 000 in 1987 (EC 12). Productivity improved between 1980 and 1987, with underground output per man-hour increasing 35% in EC 9.

These developments were made possible by major rationalization programmes and restructuring investments. Massive capital expenditure has been engaged in new coalmining technologies, the concentration of production in surface mines and in the opening up of new reserves, mainly in the United Kingdom and in the Federal Republic of Germany. Over the period 1980-87, some ECU 1.5 billion (EC 10) were on average invested each year for improving Community coal competitiveness. Rationalization and investment programmes should be sustained so that further loss of competitiveness of the European coal industry can be avoided.

Production of lignite

The main indicators below illustrate the position of the lignite industry in the Community.

Lignite (brown coal and black lignite as well as peat for Ireland) accounted for only 3% of Community primary energy consumption and about 5% of Community primary energy production in 1987. As far as individual countries are concerned, however, lignite contributed significantly to the achievement of the Community energy objectives of diversification away from oil. It accounted for 29% of primary energy consumption in Greece in 1987, almost 14% in Ireland, 8.3% in the Federal Republic of Germany and around 4% in Spain.

The main indicators above also show that unlike hard coal, lignite is hardly traded at all internationally (2.4 million tonnes in 1987, traded exclusively between East Germany and the Federal Republic of Germany). Because of the lower calorific value of lignite, transport over long distances would prove too expensive. Accordingly, lignite is, for the most part, mined and consumed (or transformed) on the site, in nearby power stations or briquetting plants.

Lignite is mined in six countries, with the following output in 1987: Federal Republic of Germany (109 million tonnes); Greece (44.6 million tonnes); Spain (16 million tonnes); Ireland (7.2 million tonnes); France (2.1 million tonnes); and Italy (1.6 million tonnes). The three biggest producers accounted for over 90% of total output in 1987. Between 85 and 90% of total lignite output is burnt in power stations, the remainder being used for the manufacture of briquettes as well as (more recently) the preparation of pulverized lignite for use in the industrial market.

Although total EC output was generally stable between 1980 and 1987, at around 180 million tonnes/year, production trends varied across countries: production declined by 21 million tonnes in the Federal Republic of Germany, nearly doubled in Greece (from 23 million tonnes to 45 million tonnes) and remained virtually stagnant in France and Italy.

Most of the lignite mined in the Community is by surface ('open-cast') methods, which give good productivity and yield fuel that is competitive with other fuels used for electricity generation.

The long-term prospects for lignite will mainly depend on developments in the electricity market. In its 1988 report on the 'Main findings of the Commission's review of Member States' energy policies' (COM(88) 174 final), the Commission expects the EC production of lignite and peat to grow from 34 million tonnes of oil equivalent (toe) to 42 million toe in 1995, with most of the increase originating in Greece and Italy. The contribution of solid fuels in general to electricity generation should, on those EC assumptions, increase from 149 million toe in 1986 to 186 million toe in 1995.

Trade

Indigenous coal production accounted for about 70% of total coal consumption in 1987, the remainder being covered by imports. Over the period 1980-87, intra-Community imports, mainly from the two largest producers, the Federal Republic

Table 5
Main indicators, 1980-90
Lignite

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Apparent consumption	178.7	190.9	190.5	191.5	199.9	189.6	186.0	183.0	182.8	N/A	N/A
Net exports	-2.2	-2.8	-2.8	-3.0	-3.3	-2.7	-2.9	-2.4	-1.9	N/A	N/A
Production	176.5	188.1	187.7	188.5	196.6	186.9	183.1	180.6	180.9	186.5	189.3

Source: Eurostat (Sirene).

of Germany and the United Kingdom, fell sharply from 17 million tonnes to less than 10 million tonnes. In the mean time however, imports from third countries rose from 80 million tonnes in 1980 to 92 million tonnes in 1987, with a peak of 98 million tonnes in 1985.

Japan and Western Europe (especially the Community) are the two major hard-coal importing areas in the world, accounting for more than 90 million tonnes each in 1987. The world seaborne coal market remains small, however, representing less than 10% of world coal output.

Among suppliers on the world coal market, the role of the USA has always been predominant for the Community (28 million tonnes in 1987), although weakening slightly in recent years because of the rapidly growing importance of Australia (24 million tonnes of Australian coal was imported by the EC in 1987). By contrast, deliveries from Poland, which was the Community's second largest supplier in the mid-1970s, have been declining since 1984 to 9.5 million tonnes in 1987 and they are not likely to increase again in the foreseeable future because of increased internal demand and production difficulties. Deliveries from South Africa (the cheapest coal available) peaked in 1985 at 26 million tonnes and were then affected by the embargo decisions taken by France and Denmark. As a result, exports from South Africa to the Community fell to 18.7 million tonnes in 1987.

The four countries mentioned above accounted for almost 90% of total Community imports in 1987.

The role of 'newcomers' on the international coal market such as Colombia or China as reliable suppliers to the Community has yet to be confirmed.

Italy, the Netherlands, France and Denmark were the largest coal importers in the Community in 1987, each accounting for over 10 million tonnes and representing together almost 60% of the EC 12 total. The Federal Republic of Germany, Belgium, the United Kingdom and Spain each imported some 8 million tonnes in 1987.

Imports of both steam (or thermal) and coking coal increased in the early 1980s. However, the bulk of the increase in imports was accounted for by steam coal to be delivered mainly to power stations, but also to the general industrial market.

Research and development

Comprehensive research programmes are being carried out in the Community in the field of solid fuels, with the major objectives of:

- constantly improving productivity in coalmines;
- improving safety and working conditions;
- opening up new markets for traditional and new products;
- protecting the environment and making solid fuels environmentally acceptable products.

The Treaty establishing the European Coal and Steel Community (ECSC) stipulates (Art. 55) that the High Authority shall promote technical and economic research relating to the production and increased use of coal and to occupational safety in the coal industry. From 1959 onwards, the ECSC High Authority — and subsequently the Commission — granted financial aid to that end.

Although several programmes on safety and health in mines were successfully carried out over the period (also with the support of the ECSC), the emphasis below is mainly on technical coal research with its two key areas: mining technology and product upgrading.

Research in mining technology is concerned with improvement of roadway support techniques (with reference to ever-greater working depths), monitoring of ventilation, automatic steering of mining machines, new and safer transport systems for both personnel and materials. Important research efforts are also being made in the field of remote control, data processing and modern communication systems, which can contribute to increased safety and improved working conditions as well as the optimization of mining operations.

Product upgrading research is connected with coal preparation and handling as well as the coking of coal, with due consideration to improved environmental protection.

Both fundamental and applied research is being carried out by mining institutes, universities and laboratories, often on a joint — international — basis, and with ECSC financial support amounting to about 60% of total costs. In this context, total ECSC financial aid to coal research reached some ECU 150 million over the period 1980-87, or an average of about ECU 19 million per annum.

In December 1988 some 188 research projects, representing a total cost of ECU 122 million, were under way in the Community, 67% of them in the mining-technology area.

Interest grew after the first oil crisis in the conversion of hard coal and lignite into other energy forms as a way of escaping excessive dependence on imported hydrocarbons. As a result, several pilot and demonstration programmes were launched by the Community in the following fields:

- gasification and liquefaction of solid fuels (including underground gasification);
- substitution of hydrocarbons by solid fuels with fluidized bed combustion, coal-liquid mixtures and combined cycles as key areas of research;
- utilization of solid fuels within the framework of the EC R&D programme on non-nuclear energy.

R&D programmes are likely to be maintained and possibly even expanded. Indeed, additional research is needed on an ongoing basis to develop better technologies for the clean use of coal (reducing the emission of CO₂ and other pollutants), such as fluidized bed combustion and combined cycles.

Outlook

Though previous energy forecasts were frequently off the mark, there is growing recognition that solid fuels will have an increased role to play in meeting future Community energy requirements.

This was confirmed by the Council in its 1986 resolution on the 1995 Community energy objectives. Against a background of continuing economic and energy demand growth, but with limited possibilities from energy savings or renewables, the continuing

risks associated with oil and gas imported from insecure sources, and the uncertainty associated with the future acceptability of nuclear energy, an increased reliance on solid fuels is unavoidable in the longer term.

This will particularly be the case for the power-station sector. The Commission acknowledges in its 1988 review of Member States' energy policies that 'if large-scale use of hydrocarbons in the electricity sector is to be avoided, nuclear energy and solid fuels are the only two options available that can respond, in the dimension required, to the expected Community electricity growth'.

In the short term however, such an upward trend is not to be observed or at least not on the required scale. Because of the very long lead times applying to the energy industry in general, this shows the need to develop and actually implement a coherent long-term policy. In this context, solid fuels will have to be one of the main energy sources for the Community also in the future. Community and imported coal will therefore have to be combined in a reasonable way, providing an economically and strategically satisfactory overall supply of solid fuels to the Community as a whole. They will benefit from the introduction of the most modern clean coal technologies, such as fluidized bed combustion or combined cycle systems, supported by a major effort in R&D activities. This will contribute significantly to improving the environmental acceptability of the use of solid fuels.

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EXPLORATION AND PRODUCTION OF CRUDE OIL AND NATURAL GAS

Summary

Major changes took place in the petroleum exploration and production sector in the EC during the 1980-88 period: they resulted mainly from changes in crude oil prices. Large price increases up to the end of 1981 were followed by a steady decline through 1985 and then by the 1986 collapse.

Proven remaining crude oil reserves in the EC countries are declining; natural gas reserves also show a recent tendency to decline. This, together with current work programmes, will lead to a slight decrease in crude oil and natural gas production in the short term, a trend initiated in 1987-88.

Both the United Kingdom and the Netherlands are major contributors to the total EC hydrocarbon production with respective shares of 59 and 20%.

After a continuous growth through 1985, the exploration and development activity was reduced substantially following the oil price collapse. The 1988 figures indicate a recovery, with a high activity level in the North Sea (UK and the Netherlands).

Production of crude oil and other liquids has increased by 50% since 1980, reaching 138.6 million tonnes in 1988. The UK plays a predominant role with 83% of the total EC crude oil production. Marketed natural gas production has remained fairly stable through 1987, but declined last year. Production was 153.6 billion cubic metres in 1988. The two main gas producers are the Netherlands and the UK. Offshore activities covered 92% of total crude oil production in 1988 and 52% of the natural gas output.

Production figures for 1988 show declines versus 1987 of respectively 6 and 7% for liquids and natural gas. Indigenous crude oil production now contributes to about 27% of total EC crude oil needs and 13% of total primary energy requirements; natural gas production covers 62% of EC gas consumption and 11% of EC primary energy needs.

After continuous growth through 1985, exploration and development activity declined substantially following the oil price collapse. A slight recovery took place in 1988 for the EC overall fostered by the high activity level in the UK North Sea. In total, current levels are still well above the 1980 mark.

Current situation

The value of total EC crude oil and natural gas production is estimated at about ECU 28 billion (USD 38 billion) in 1980 with corresponding 1988 values being ECU 23 billion (USD 27 billion). A peak was reached in 1985 at ECU 67 billion (USD 51 billion). These values are calculated on the basis of average cif import prices.

Crude oil prices increased in the early part of the period, with the average OPEC crude price, reaching a peak USD 34/bbl by the end of 1981 compared with USD 24/bbl at the end of 1979, and then decreased progressively until the end of 1985. Since the value of the dollar increased considerably in relation to European currencies, crude oil prices expressed in ECU/bbl continued to increase until

Table 1
Main indicators, 1980-88
Crude oil and natural gas

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	115 300	152 400	157 500	152 300	169 700	167 100	81 900	75 500	63 000
Net exports (1)	-87 700	-110 200	-107 400	-98 100	-105 800	-100 600	-46 600	-46 800	-40 300
Production	27 600	42 200	50 100	54 200	63 900	66 500	35 300	28 700	22 700
Employment (1 000) (2)	N/A	N/A	N/A	N/A	110	110	100	94	95

(1) Estimate based on Beicip and BP Statistical Review.

(2) Approximate.

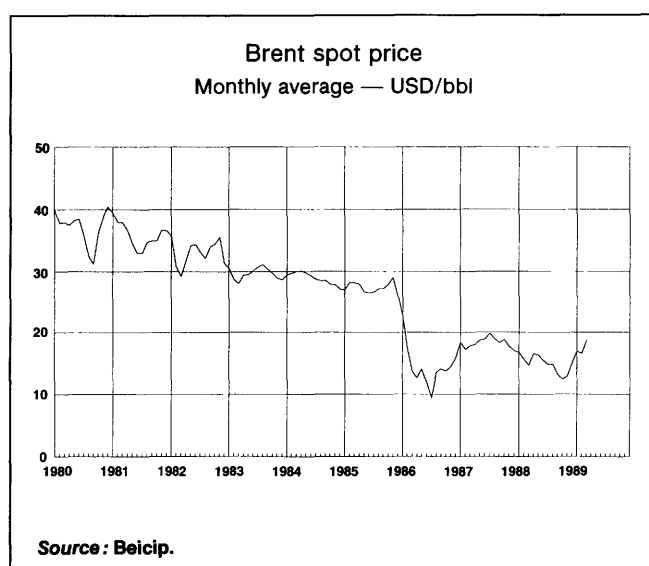
Source: Beicip.

1985, peaking at about ECU 40 to 41/bbl in the first quarter of 1985. This provided a strong incentive to European countries, which are very dependent upon crude oil imports, to conduct aggressive exploration and development programmes for local hydrocarbon production. The early 1980s were also marked (in most countries) by taxation changes increasing the government share of upstream activity profits.

As a result of market developments (with worldwide supply exceeding demand) and OPEC dissension, crude oil prices fell below USD 10/bbl by mid-1986, then recovered progressively, reaching nearly USD 18/bbl on average for 1987; prices went down again in 1988 to an average of USD 14.9/bbl for the year but were back up to USD 18 to 20/bbl by early 1989. Activity in the sector has reacted to this new environment.

Table 2 shows the development of crude oil prices over the 1980-88 period expressed in ECU/bbl and USD/bbl (the volatility of the last three years is evident on Figure 1 which shows the spot price of

Figure 1



Brent). Natural gas prices follow oil prices with a delayed and dampened effect, as can be observed in Table 2.

Not only the oil price environment has been unfavourable for exploration and production, but in addition technical conditions have become more difficult, with smaller discoveries and higher development and production costs despite decreasing unit technical costs since 1986. Tax regimes in some countries have been modified to compensate for this less favourable environment.

Factors behind production trends

Oil reserves

Proven remaining reserves of liquid hydrocarbons in the EC have fallen from about 1 330 million tonnes at the end of 1980 to some 810 million tonnes by the end of 1988. This decrease essentially reflects a drop in the UK, from 1 125 million tonnes down to 590 million tonnes; reserves elsewhere remained stable, in the 200 to 220 million tonnes range. The fall in the UK illustrates the trend towards intensive exploration with decreasing 'yield' and higher costs. Recent favourable results may somewhat slow down this decreasing trend.

With regard to the other EC countries, proven remaining reserves are declining in the Federal Republic of Germany, Spain and Greece, with small discoveries not entirely offsetting production. Reserves have been increased in Denmark and the Netherlands due to offshore discoveries, with improvements in France coming from new discoveries in the Paris Basin.

On the basis of proven oil reserves alone, the remaining reserve to production ratio, expressed in number of years at constant production, is recorded

Table 2
Average crude oil and natural gas import prices (cif) (1)

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Crude oil price (USD/barrel)	32.8	36.5	33.8	30.1	29.0	27.6	14.4	17.9	14.9
(ECU/barrel)	23.6	32.7	34.5	33.8	36.8	36.2	14.7	15.6	12.6
Natural gas price (2) (USD/boe)	16.3	20.0	21.9	20.5	20.2	20.6	19.4	13.5	12.7
(ECU/boe)	11.7	17.9	22.3	23.1	25.6	27.0	19.7	11.8	10.7

(1) cif = Cost, insurance and freight.

(2) boe = Barrels of oil equivalent.

Source: Eurostat (Sirene), IEA.

in 1988 at an average of six years for the EC with a somewhat lower figure for the UK, and an average nine years for the other EC countries.

Of more significance are the corresponding ratios on the basis of proven and probable remaining oil reserves of present discoveries which are estimated at 11.5 years and 10.5 years for the EC total and the UK respectively. However, total proven and probable reserves also show a declining trend. Sizeable reserves in Norway add very substantially to total crude oil resources available to Western Europe and the EC.

Natural gas reserves

Proven remaining natural gas reserves have increased slightly over the 1980-88 period reaching over 3 000 billion cubic metres at the end of 1988 (about 3% of world gas reserves — reserves peaked at about 3 300 in 1984) compared with about 2 900 billion cubic metres at the end of 1980. This reflects a modest decrease in the UK, and increase in the Netherlands and a sizeable 14% increase in other EC countries.

UK reserves have stabilized in the Southern Basin, while reserves have declined elsewhere; a large number of small gas discoveries have been added to the resource base. In the Netherlands, total numbers reflect a less conservative approach, on Groningen

proven reserves, and a slight increase in offshore reserves.

In the other EC countries, the increased proven reserve figure results essentially from a substantial increase in Italy.

In total, the ratio of proven reserves to production moved from 17 years in 1980 to 19.5 years in 1988. The ratio for 1988 increased to 25 years on the basis of proven and probable reserves. Here again, the very large gas resource base in Norway improves these numbers substantially.

Overall crude oil and natural gas reserves

Table 3 compares the crude oil and natural gas proven reserve situation in the EC, the USA and worldwide, together with production figures, over the 1980-88 period.

As regards the EC, the trends shown above reflect a decrease in proven crude oil reserves since 1980, with natural gas proven reserves also declining significantly since 1984. Crude oil reserves are also declining on a proven and probable basis; natural gas reserves are constant.

In the future, considerable proven reserves could be added for both crude oil and natural gas. This may come from the large reserves currently in the 'possible' category, especially in the UK, and from

Table 3
Production and reserves of crude oil and natural gas

	EC		USA		World	
	1980	1988	1980	1988	1980	1988
Production						
Crude and other liquids (1)	93	139	476	454	8 081	3 030
% share of world total	3.0	4.5	15.5	15.0	100.0	100.0
Natural gas (marketed) (2)	168	154	549	472	1 531	1 969
% share of world total	11.0	8.0	36.0	24.0	100.0	100.0
Reserves : Proven remaining of crude and other liquids (1)	1 330	810	3 602	3 615	90 920	135 000
% share of world total	1.5	.6	4.0	3.0	100.0	100.0
R/P in years (3)	14.5	5.8	7.5	8.0	29.5	44.5
Natural gas (2)	2 930	3 020	5 405	5 300	74 670	115 700
% share of world total	4.0	3.0	7.0	5.0	100.0	100.0
R/P in years (3)	17.0	19.5	10.0	11.5	49.0	59.0

(1) Million tonnes.

(2) Billion cubic metres.

(3) Ratio of end-year proven remaining reserves to yearly production, expressed in years.

Source: World Oil, CPDP, Cedigaz and official statistics from EC countries.

new finds, provided exploration continues at a sustained level. However, this would not have any sizeable effect on current short-term production projections considering, in particular, substantial delays of four to five years or more for developing new offshore resources.

Production

Oil production

Production of liquid hydrocarbons, including crude oil, condensates and other liquids from gas-treating operations, reached 148.8 million tonnes in 1986, decreasing thereafter to 138.6 million tonnes by 1988. This compares with 92.6 million tonnes in 1980 (see Figure 2). In 1975 total EC production was only 14 million tonnes.

The UK plays a dominant role in this production, with output of 114.4 and 80.5 million tonnes respectively in 1988 and 1980. This corresponds to 82% of total EC production in 1988 compared with 87% in 1980. UK production in 1988 declined 7% versus 1987 as a result of several production incidents, the most severe being the destruction of the Piper Alpha platform.

As a result of the development of the UK North Sea fields and other offshore developments elsewhere, 92% of 1988 EC production came from offshore fields, compared with 87% in 1980.

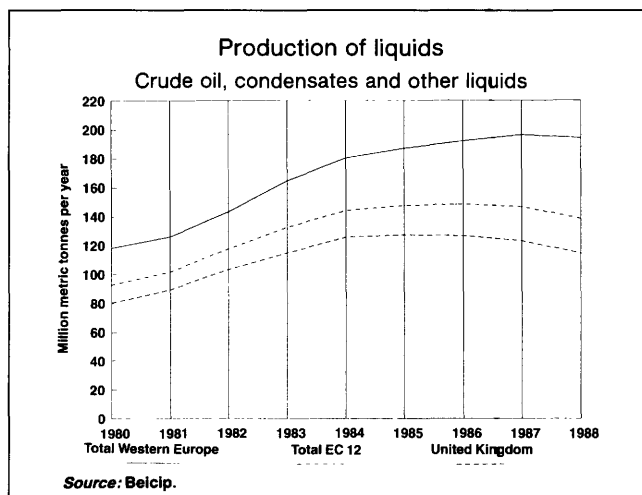
A high level of activity has taken place on the UK North Sea continental shelf. At the end of 1988, 37 oil fields were in production with 12 others under development; this compares with 15 oil fields in production at the end of 1980, and 9 fields under development. In total, 44 platforms were in operation for oil production at the end of 1988, compared with 28 at the end of 1980. Production increases over the period essentially came from large fields developed pre-1980, such as Beryl, Brent, Forties, Ninian, Piper and the UK portion of the Statfjord field — all of which have reserves over 100 million tonnes — and new developments of pre-1980 discoveries. By the end of 1988, four large oil terminals were receiving North Sea crude. Nine UK onshore fields are also currently in production.

In the other EC countries, production increases over 1980-88 have occurred in the Netherlands (from 1.6 to 4.3 million tonnes), Denmark (from 0.3 to 4.7 million tonnes), Italy (from 1.8 to 5.0 million tonnes) and France (from 2.2 to 3.7 million tonnes). Production has declined in Germany (from 4.6 to 3.9 million tonnes), in offshore Spain since 1983 (Cas-

ablanca and others, 1.4 million tonnes in 1988) and in Greece (1.1 million tonnes in 1988).

In total, production in the EC 11 (excluding the UK) reached 24.2 million tonnes in 1988, compared with 12.2 million tonnes in 1980, showing a 98% increase over the period.

Figure 2



Natural gas production

Marketed natural gas production reached 153.6 billion cubic metres in 1988 compared with 167.6 billion in 1980 (see Figure 3). The corresponding values for 1975 and 1970 were 171 and 77 billion cubic metres respectively. The 1988 level is down 7% compared to 1987. The two main contributors are the Netherlands, where production declined from 90.3 billion cubic metres in 1980 to 66 in 1988 (or 43% of the 1988 EC total), and the UK with production increasing from 37.3 to 45.8 billion cubic metres (30% of total EC). Offshore gas now represents 52% of the total compared with 35% in 1980.

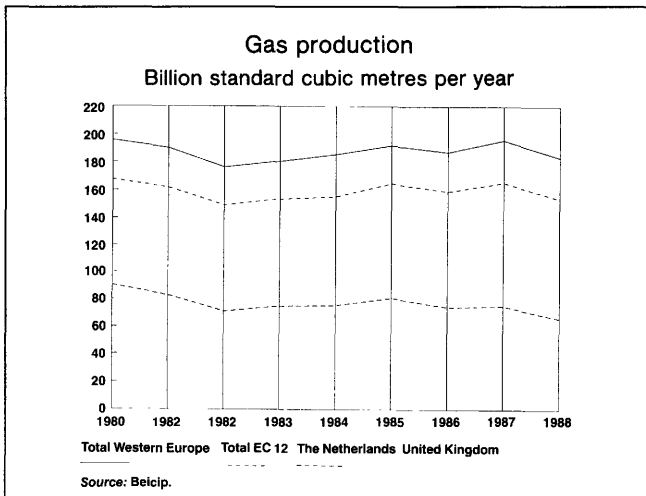
In the Netherlands, production from the giant offshore Groningen field, discovered in 1959, decreased from 65 billion cubic metres in 1980 (or 72% of total Dutch production) to 34 billion in 1988 (or 52% of the total). This decrease has been marginally offset by other mainland production from Drenthe, Noord Friesland and others, and offshore production.

In the UK, Southern Basin gas production has decreased slightly and now accounts for some 60% of total UK production (80% in 1980). By the end of 1988, 22 gas fields were in production located in the Southern Basin, East of Scotland, East of Shetlands, with one field (Morecambe) in the Irish Sea; this compares to only seven fields at the end of 1980. Ten

gas-receiving terminals are in operation for offshore gas with seven in the Southern Basin area.

Gas production for the other EC 10 countries has increased from 40 billion cubic metres in 1980 to 41.8 billion in 1988, with production starting up in Denmark, Spain and Greece. Production increased in Italy and declined in Germany and France. The two main contributors to 1988 production within the EC 10 group were Germany (16.6 billion cubic metres) and Italy (16.5 billion cubic metres).

Figure 3



Exploration and development activities

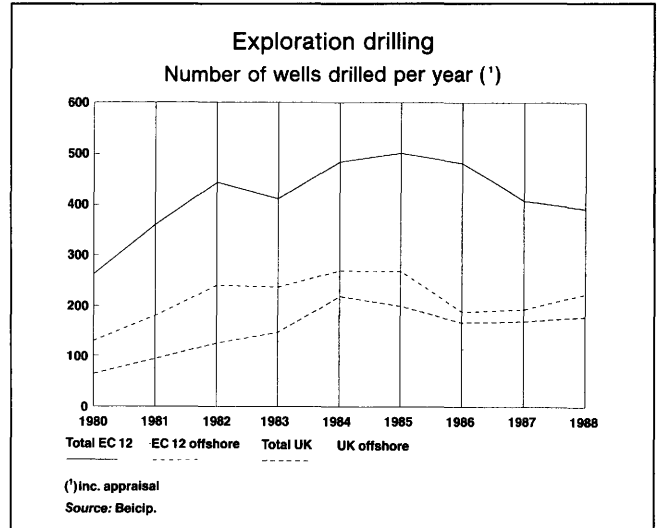
The 1980-85 period saw continuous growth of both exploration and development activities. Activities declined significantly in 1986-87 because of the 1986 fall in crude prices. After the low levels of activity at the end of 1986 and early 1987, there was a marked recovery especially in the UK sector of the North Sea. Current depressed levels are still well above the 1980 mark. In general, the decline in activity in the EC, with a 20 to 25% decrease in typical indicators, was far less marked than in the USA where falls of 50% or more were recorded in seismic and drilling rig activity.

In the EC generally, the area covered by exploration and production licences has decreased from an estimated 0.9 million square kilometres at the end of 1980 to some 0.7 million square kilometres at the end of 1988. About 40% of the total surface is covered by offshore permits. After the large increase over the 1980-85 period, seismic activity suffered most from falling crude prices with cuts of the order of 40% comparing the 1987-88 level to peak activity in 1985.

The number of exploration and appraisal wells drilled over the period peaked at about 500 wells in 1985, decreasing to some 400 wells in 1987 and 390 in 1988 (see Figure 4). Offshore drilling was severely

cut in 1986, recovering thereafter; the current level is 18% below the 1985 peak (compared to 30% down in 1986). Cuts in onshore drilling were only noticeable in 1987 with continuing high levels in Italy and France in 1986-88. Exploratory drilling activity in 1988 was split 45/55% between onshore and offshore.

Figure 4



Development drilling activity was growing up to 1985, when a pronounced peak of about 500 wells was reached due to development of new finds in the Paris Basin and in offshore Netherlands. Subsequently, activity declined with the 1987 level about 30% below the 1984-85 average, then recovered in 1988, with nearly 400 wells drilled (see Figure 5). UK activity was severely cut in 1986 but recovered strongly in 1988 with a record level of 189 wells drilled (63 wells more than 1987). Offshore activity in the Netherlands also increased (21 wells in 1988 versus 13 in 1987).

Figure 5

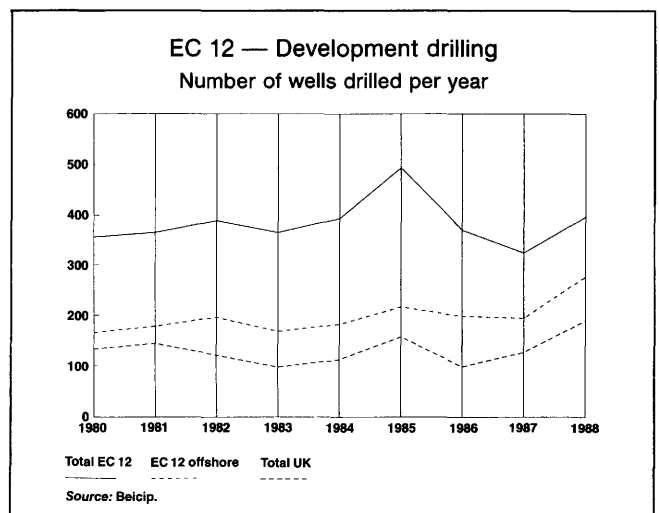


Table 4
Number of wells drilled

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC	.62	.73	.83	.78	.88	1.00	.85	.72	.79
%	.7	.7	.8	.9	.8	1.3	1.4	1.3	1.3
USA	64.8	80.6	79.5	67.1	83.6	69.7	39.4	34.5	33.7
%	76	82	80	77	78	72	66	60	55
World	85.3	98.7	99.9	87.6	107.2	96.6	60.1	57.1	60.9
%	100	100	100	100	100	100	100	100	100

Source: Beicip.

Activity over the short-term is likely to be stable and at levels similar to the 1987-88 average.

Table 4 shows the total number of wells drilled in the EC, the USA and the world over the 1980-88 period.

As regards exploration and development investments, the 1984-85 average level of investment expenditure is estimated at about ECU 11.5 billion/year or USD 9 billion/year, with about 65% of that total in the UK alone. Comparing the 1987 level with the 1984-85 peak, reductions in expenditure were close to 40% expressed in ecus but only about 20% when expressed in dollar terms, due to exchange rate movements. This brings the 1987 figure down to about ECU 6.3 billion or USD 7.2 billion. Exploration expenditure alone would correspond to some 35% of this total.

Official 1988 investment figures are not yet available but an increase of some 8 to 10% versus 1987 (the bulk of it in the UK, with the Netherlands offshore activity also contributing to the increase) will likely be recorded based on activity levels.

United Kingdom offshore operating costs are given at a current USD 3/bbl level. The average cost of producing oil, including related exploration, development and operations as well as a real 10% return on investment before taxes, is estimated at approximately USD 13/bbl (1987 USD) for larger fields developed prior to 1980. Costs for more recent developments of smaller fields are much higher: USD 18/bbl for fields which started production between 1980 and 1988. This results in an average USD 15/bbl for all fields currently under production. Cost reductions are being achieved as a result of more efficient operations, better cost controls and decreasing service costs; therefore, short-term UK developments are projected at USD 9 to 12/bbl. This also reflects a stiffer screening of development projects.

For other EC countries, total producing costs, including depreciation, are reported in a USD 9 to 15/bbl range. The crude oil price fall in 1986 has rendered the exploitation of marginal onshore fields and wells uneconomic. It is estimated that, at the end of 1987, some 1 200 to 1 300 wells, the bulk of them in Germany, were shut down as a result of depressed crude oil price levels. However, this represented only a marginal decrease in production.

Technological development

The significant share of offshore operations in overall EC activity has given impetus to large R&D programmes in this area. High crude price levels prevailing through 1985 also led to research in the field of enhanced recovery, with programmes now considerably reduced. Other programmes have been aimed at improving tools and operations efficiency for both exploration and production with a view to reducing costs.

Most of these programmes have been carried on with partial EC funding. They have produced remarkable achievements and fostered, at least until 1985, a large growth of service and equipment supply activities, not only within the EC, but also elsewhere in Europe and throughout the world. This branch of activity now plays a major role internationally and ranks second after the American industry, well ahead of other countries. Due to the deep water and severe conditions in the North Sea, European oil companies as well as the service and equipment industry have gained unique experience in offshore operations and continue to play a leading role worldwide in some advanced technologies and oil-field practices.

The following technical advances among many others, have been achieved:

- the development of new systems for collecting, processing and interpreting geophysical data;
- the development of dynamically positioned drilling vessels, capable of operating at water depths of as much as 2 000 metres, and the completion in the Adriatic Sea of the first commercial horizontal drilling operation;
- the development of new platform concepts including tension leg platforms (TLP) and floating production systems;
- the development of deep-diving techniques and of submarine vehicles for underwater works;
- the implementation of pilot projects for enhanced recovery of oil and gas (CO₂ injection, polymers, etc.);
- the pipe-laying trials in Sicilian waters leading to the construction of the first subsea gas-line linking Africa to Europe, which is now conveying 12 billion cubic metres per year of Algerian natural gas to Italy.

Other R&D programmes are currently conducted in areas described above, including the 'Poseidon' programme aimed at improving multiphase production and pumping technology to eliminate the need for high cost support installations in offshore operations.

Major structural and geographical features

Direct government involvement in oil operations has been declining; of particular significance was the privatization of the British National Oil Company (BNOC) in 1981.

Currently, there is increasing competition for the awarding of exploration permits, with smaller areas being granted to more numerous entities, including minor independents. This has been especially marked for North Sea operations, for activities off Denmark with the end of the bulk of DUC exclusive rights, in the Paris Basin in France and elsewhere.

Despite this trend, especially noticeable in exploration, some major groups still play a major role in the exploration and production sector in the EC. These include Shell and Esso mainly through their 50/50 joint ventures in the UK North Sea, in the Netherlands (NAM) and in Germany (BEB) — BP with a significant share of UK North Sea activity, as well as national oil companies such as Elf, DSM, AGIP or Repsol, heavily involved in operations both in their home countries and elsewhere in the EC. A very

large number of other international and European companies are also participating in exploration and production activities.

Main firms in the various countries are listed below:

- in the UK, the top five companies control some 40% of the acreage, 55% of the hydrocarbons reserves and 60% of the oil and gas production. They include BP, Shell, Esso, British Gas and Elf, with Conoco, Enterprise, Amerada Hess, Mobil, Chevron, Total and Petrofina coming next. In addition, BP and the joint 50/50 Shell/Esso venture, each covers some 22% of the UK reserves and production;
- NAM (Shell-Esso) plays a predominant role in the Netherlands, especially in onshore operations, and in association with DSM, control some 80% of the gas production and 30% of the oil output. Other offshore operators include Petroland (Elf), Placid, Mobil, Unocal, Conoco, Pennzoil etc.;
- while DUC (AP Moller, Shell/Texaco) is the major operator in Denmark, other companies (AGIP, Amoco, BP/Britoil, Statoil, Norsk Hydro, etc.) are now involved in petroleum activities;
- BEB is a major actor in the Federal Republic of Germany, controlling nearly two-thirds of the gas production, with also Mobil, Texaco, Wintershall and others being active in the country;
- major operators in France include Elf, Esso, Total and BP, with other smaller groups also present;
- AGIP in Italy, Repsol in Spain play a significant role.

A recent trend since 1986 is towards consolidation of reserve assets in the North Sea, with a large number of assets and reserves acquisitions having taken place (especially in 1988). In that year, some 15% of the UK North Sea oil and gas reserves changed hands, bringing significant changes to individual company positions. Deals over the 1986-88 period involved some 20 to 22% of the hydrocarbon reserves. While BP's acquisition of Britoil assets was by far the most significant deal in 1988, other deals covered major purchases by Elf, British Gas, Arco, Enterprise and others; in total some USD 8.6 billion were reportedly paid for these transactions. The trend towards major acquisitions is continuing through early 1989.

Acquisitions amounting to some USD 400 million also took place in the Netherlands continental shelf in 1988, the most significant being Clyde's buying of Newmont Oil and Gas, with Total, Wintershall and

others also being active buyers. In Germany, Texaco sold all of its assets (upstream and downstream) to the German utility, RWE.

Environmental protection

Following a long period of a very good safety record, several accidents occurred in the UK North Sea in 1988 and early 1989, which will likely influence production levels and operations costs in the near term. The Piper Alpha platform explosion in July 1988 resulted in the worst loss of lives (167 men dead) the industry has seen in the area, and a loss of production from Piper and adjacent fields for a long period. Another incident was a blowout in September 1988 on the semi-submersible Ocean Odyssey which resulted in one fatality and severe damage to the rig.

In late 1988-early 1989, the Fulmar offshore loading unit broke away from its moorings, halting production from Fulmar and nearby fields; a further platform shutdown occurred due to damage at the Brent Delta platform; an explosion on the Cormorant Alpha platform after a gas leak also curtailed production. The Saint Fergus gas processing facilities were also temporarily shutdown in late April 1989 after small cracks were found in the plant.

These accidents are a matter of concern even though, as mentioned above, historically the safety record has been very good from the beginning of activities in the North Sea, in spite of difficult operating conditions. New safety regulations with respect to gas-handling operations will likely result from current investigations.

Tight regulations continue to apply to all offshore operations in the EC including regulations regarding oil spills, and oil mud and cuttings discharges; work is also being pursued to define guidelines and standards for the abandonment of disused offshore installations and structures.

Employment

A rough estimate of direct employment in the oil and natural gas exploration and production sectors stood at 100 000 to 120 000 persons in 1984-85. A decrease of about 15% is likely to have resulted from measures taken after the 1986 oil price collapse.

The service and equipment supply industry in the EC ranks second immediately after that of the USA with an estimated 20% share of the world market,

compared with 60% for the USA. Employment for the period 1984-85 is estimated at over 200 000 people (100 000 to 120 000 for the UK alone, where indirect employment is around three to four times higher than direct employment). Large decreases, of 30 to 35% or more, have been quoted as resulting from the fall in activity after the 1986 crisis.

Nevertheless, exploration and production activities, including related and induced activities, play a major role in the EC in terms of employment of highly qualified and experienced personnel. In addition, due to the emphasis given to innovative research and development programmes, EC firms have an internationally recognized expertise in exploration and production technology.

Outlook

Production forecasts

Short-term projections estimate output of crude oil and other liquids slightly below current levels with a value for 1990 of about 130 to 135 million tonnes; this is supported by current reserve levels and continuing offshore development programmes, especially in the United Kingdom. In the UK, it is expected that there will be a production decline from fields already in production — many of them since the mid-1970s. Natural gas production is likely to remain stable through 1990, at about 150 to 155 billion cubic metres per year, taking into account a more favourable reserve situation than for crude oil, as well as recent discoveries and current development activities.

Other Western European countries will play an important supply role for EC countries. A continuing rise in oil production can be expected in Norway through 1990, with the impact of current programmes concerning natural gas production and supplies being felt after 1990.

The above estimates are based on the assumption that crude prices will remain between USD 15/bbl and USD 18/bbl in constant USD/bbl terms through 1990. New safety measures resulting from 1988 accidents may affect current projections to a certain extent.

The impact of '1992'

The opening up of a single European Community market by the end of 1992 will have a smaller effect on upstream activities than on downstream opera-



tions. A recent document published by the European Commission (June 1988) lists the various areas where obstacles appear to exist for achievement of the single market. It includes:

- in some Member countries, the procedures for granting of exploration and production rights, especially when State companies may benefit from favourable conditions (reserved areas, compulsory government participation, etc.);
- in two Member States, the local landing obligation;
- in some cases, special rights for specific gas operations (production and sales) given to State or State companies.

Obligations for local procurement of goods and services resulting either from regulations or from government pressures are also quoted as an obstacle to be removed.

Progress is being recorded in the various Member States towards a more open and diversified access to exploration licences. The European Commission is also currently preparing a proposal for a specific Directive for Public Tender Procedures in Member States with inclusion in the procedures of the oil and gas exploration and production activities.

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REFINING AND DISTRIBUTION OF OIL

(NACE 140)

Summary

Oil consumption in Europe has continued its slow recovery for the third consecutive year since the spectacular price drop of 1986, settling at 447 million tonnes in 1988; it has been helped in this by lower crude prices and a fairly good economic situation. This recovery is due essentially to the transport sector, while demand for heating oil has continued to diminish. This upturn has encouraged an increase in activity in European refining which has resorted to increased imports of crude oil; refineries have continued to restructure and modernize, on one hand reducing further their distillation capacity and on the other increasing their conversion capacity, with the plants running better as a result. Restructuring and modernization have also been carried out to various degrees in the distribution networks, in particular to encourage the sale of unleaded fuels.

The oil market

Prices of crude oil and petroleum products

Developments in crude oil prices

From USD 34 a barrel (Arabian Light), crude oil prices have decreased since the end of 1982; at the level of prices expressed in ecus, this decrease was more than compensated for by the dollar's rapid and continuous rise between the second half of 1980 and the beginning of 1985.

The end of 1985 marks a break in relation to this development, with the fall in the value of the dollar

Figure 1

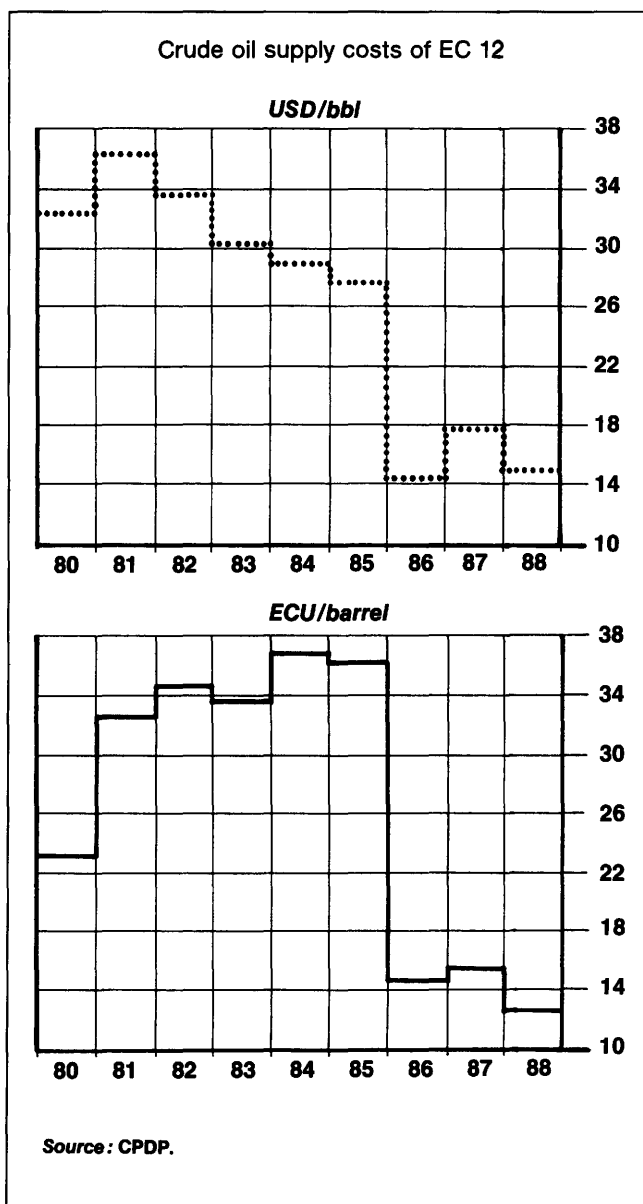


Table 1
Main indicators, 1980-90
Mineral oil refining

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Gross inland consumption of petroleum products (1)	577.1	515.5	492.8	474.0	482.8	471.4	502.3	507.1	504.0	N/A	N/A
Net exports (2)	-12.7	-10.1	-22.0	-16.1	-42.4	-40.0	-31.2	-39.4	-22.2	N/A	N/A
Production (3)	531.6	475.6	442.4	429.5	433.1	421.2	445.8	442.7	456.5	459.2	466.1
Employment (1 000)	157.9	149.5	151.6	145.4	144.0	140.0	126.6	122.2	120.4	118.6	N/A

(1) Including bunkers and refineries' own consumption.

(2) Refined products, all destinations and all sources.

(3) Net refinery production.

Source: Eurostat (Sirene).

as from the first quarter and the excess supply of OPEC crude oil following Saudi Arabia's desire to regain what it considered to be its fair share of the market. The result was a considerable drop in crude prices to about USD 8 a barrel, a low point reached in July 1986.

From this very low level, crude prices were to rise again to about USD 18 in two stages: USD 15 in the wake of the conference held in Geneva in July/August 1986 at the conclusion of which OPEC decided to cut down its production and return to the quota system; the level of USD 18 a barrel, the goal fixed by OPEC for itself at the end of 1986, was reached at the beginning of 1987, because of a new reduction in quotas and the abandonment of the practice of so-called 'net-back' contracts.

Until mid-1988, prices oscillated between USD 15 and 18 a barrel, essentially because of the fluctuations in production in the OPEC countries and the political hazards in the Persian Gulf. Cessation of hostilities between Iraq and Iran on 20 August 1988 resulted in additional supply, which, together with OPEC's difficulties in determining a coherent production policy, was the cause of a fall in crude prices to about USD 10 to 12 a barrel at the end of October. The fixing of new production quotas within OPEC in November (18.5 million barrels per day, including Iraq), linked to a firm demand for crude on the world market, has led to a new rise in prices, accentuated by cuts in production in non-OPEC countries, particularly in the North Sea. Thus, at the end of April 1989, crude oil prices exceeded USD 20 a barrel. To this increase in the price of crude oil has just been added that of the dollar which has notably raised the price of crude expressed in ecu.

Developments in petroleum product prices

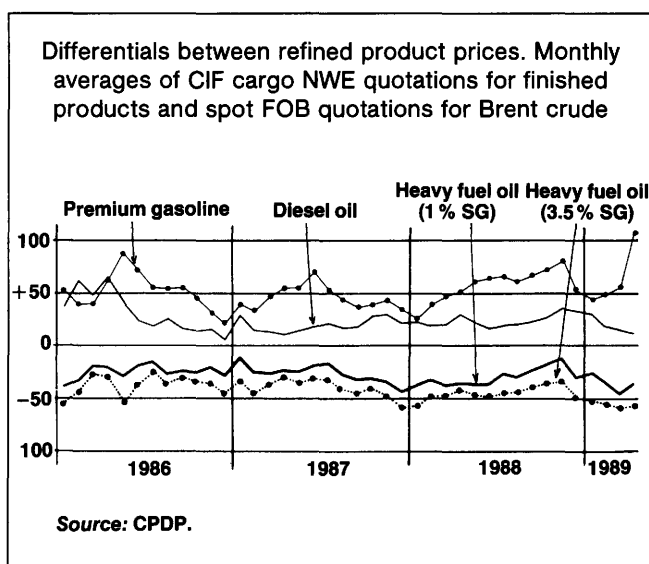
Prices of petroleum products, the general level of which is linked to that of crude oil, seem nevertheless to be more volatile, partly because of their stronger reaction to the uncertainties of the market, due especially to a greater number of operators, and partly because of seasonal fluctuations in demand.

Internationally, the variations in crude oil prices since 1985 have had repercussions to a comparable extent on refined products, both in the drop at the end of 1985/early 1986 and at the time the market steadied at the end of 1988/early 1989, though with more gasoline or less pronounced intervals of time. However, gasoline prices, which had climbed upward since February 1989, took off in April,

reaching levels equivalent to those of the end of 1985 because of the increase in crude oil prices and a very strong level of demand, from the United States in particular.

The diagram below traces variations in differentials for the principal refined products in relation to Brent crude oil; it can be noted that prices of refined products, unlike those of crude oil, take account of freight costs, a fact which slightly increases the disparities. This evolution of differentials has a direct influence on the profitability of refining plants.

Figure 2



Within the Community: the developments in prices of Community supplies, expressed in dollars per tonne, are very similar to those in international prices; on the other hand, the effect of the dollar is very strongly felt as regards prices of supplies calculated in ecus per tonne. The strong rise of the dollar is one of the main causes of the increases observed in refined product prices at the beginning of the second quarter of 1989.

Table 2
Production and foreign trade of crude oil

(million tonnes)	1980	1987	1988	Change 88/87 (%)
Production of crude oil (1)	90	141	134	5
Imports (2)	488	347	374	8
Exports (2)	13	30	30	0
Processed crude (3)	570	476	500	5

(1) Excluding condensate.

(2) Imports to/exports from third-party countries.

(3) Including feedstocks.

Source: Eurostat (Sirene).

Crude oil supplies

Crude oil supplies for EC 12 come for the most part from outside the Community, the only Community production of significance being in the North Sea.

The following will be considered characteristics of developments in 1988:

- a reduction in Community production of crude oil, attributable solely to the United Kingdom (111 million tonnes in 1988 compared with 118 million tonnes in 1987), production in the other Member States having increased slightly (+3%);
- growth in operations within Community refining (+5%), fed by higher crude imports from outside the Community;
- as regards place of origin, OPEC's sustained share in imports, 60% of imports from outside the Community (61% in 1987) and in processed crude (45% as in 1987). In terms of large zones, the Near and Middle East have represented 37% of imports from outside the Community, Africa 30%, eastern Europe 15% and Norway nearly 10%, and there has been a noticeable increase in imports from Iran (19%), Libya (23%) and eastern Europe (32%);
- the situation is very different from Member State to Member State: the United Kingdom alone shows a surplus, having exported 72 million tonnes and imported 44 million tonnes; all the other Member States, except Denmark, import most of their needs.

The origins of the supplies also vary to a very appreciable degree from country to country. Dependence on OPEC countries (imports from OPEC/total imports), which is 40% for France, 50% for Belgium and the Federal Republic of Germany and more than 55% for Denmark and Spain, is equal to or more than 65% for Italy, Portugal, the Netherlands and Greece;

- the proportion of imports from Community countries to total imports, almost nil for Greece and Italy, low for Spain, of the order of 10 to 15% for

Belgium, the Netherlands, France and the United Kingdom, is over 25% for the Federal Republic of Germany;

- total exports from Community countries have fallen by 8 million tonnes; 81 million tonnes in total in 1988, of which most (50 million tonnes) was exported to Member States and 30 million tonnes, as in 1987, to countries outside the Community.

Imports and exports of refined products

Imports of refined products

In 1988 imports of refined products developed in a completely opposite way to crude oil imports; as a whole they decreased by 14 million tonnes (161 million tonnes compared with 175 million tonnes in 1987), or -8.1%. This fall is linked to the increased operations of refineries (24 million tonnes of processed crude oil), or +5%.

Developments are appreciably different from country to country. Table 3 summarizes the situation in 1988 by distinguishing between total imports, imports from outside the Community and imports from Community countries.

Also represented in this table is the level, in 1988, of the inland deliveries for all products, which makes it possible to establish quickly the proportion of total imports or imports from outside the Community within a country's total consumption.

The share of imports from Community countries for the EC 12 represented in 1988 48% of total imports of refined products, but this rate varies from 16% for Italy to 54% for France, 60% for the United Kingdom, 65% for the Federal Republic of Germany and 100% for Ireland and Luxembourg. Overall, for the Community as a whole, total imports of refined products represented in 1988 36% of total inland

Table 3
EC imports of refined products, 1988

(million tonnes)	EC	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK
Total imports	161.2	11.4	4.9	44.9	3.0	7.8	21.8	2.8	18.7	1.3	34.4	1.9	8.1
of which, from:													
Extra-EC	83.1	1.9	3.7	15.9	2.4	6.0	10.1	0.0	15.8	0.0	23.7	.4	3.3
Intra-EC	77.7	9.3	1.2	29.0	.6	1.7	11.7	2.8	3.0	1.3	10.7	1.4	4.9
Inland deliveries	450.4	17.9	8.8	109.6	10.9	38.2	77.7	3.7	81.9	1.3	20.0	9.0	71.5

Source: Eurostat (Sirene).

deliveries (compared with 40% in 1987) and imports from outside the Community represented 18.5% in 1988 compared with 21.1% in 1987.

Total exports from Community countries

Total exports from Community countries remained stable in 1988: 139 million tonnes in all compared with 137 million tonnes one year earlier (1.3%). The main exporting countries appear in Table 4.

Table 4
Exports of petroleum products from major EC exporting countries

(million tonnes)	1988	Change 88/87 (%)
Belgium	14.3	-11.1
FR of Germany	6.4	32.0
Greece	5.0	-16.4
Spain	12.6	9.1
France	11.5	15.0
Italy	13.6	6.3
Netherlands	54.2	-2.5
United Kingdom	16.9	.9

Source: Eurostat (Sirene).

Net balance of Community countries

Subject to difficulties of interpretation posed by the problem of feedstocks — classified in part within imports of refined products — and in view of the transfers made a posteriori by certain Member States, the net balances would appear as shown in Table 5.

It will be remembered that the countries showing a large deficit are, as in 1987, the FR of Germany, France and Italy but that their deficits have diminished; still showing a large surplus are the Netherlands and, to a lesser extent, the United Kingdom and Spain.

Consumption of oil products

Table 6 shows preliminary estimates by product for each of the EC countries in 1988. These figures con-

cern only inland deliveries, excluding bunkers and refineries' own consumption.

Table 5
Imports and exports of refined products, 1988

(million tonnes)	Imports	Exports (1)	Net
EC	161.2	138.9	-13.7
Belgium	11.4	14.3	3.9
Denmark	4.9	2.9	-2.0
FR of Germany	44.9	6.4	-29.1
Greece	3.0	5.0	2.4
Spain	7.8	12.6	3.9
France	21.8	11.5	-11.6
Ireland	2.8	.5	-2.3
Italy	18.7	13.6	-5.1
Luxembourg	1.3	0.0	-1.3
Netherlands	34.4	54.2	19.8
Portugal	1.9	.9	-1.0
United Kingdom	8.1	16.9	8.8

(1) Net exports is defined as exports — imports, and accounts for transfers between member countries of crude oil, condensates and refined products.

Source: Eurostat (Comext).

The overall consumption of oil in Europe, which had fallen by 120 million tonnes between 1979 and 1985, is increasing for the third consecutive year (7 to 8 million tonnes in 1988, or 1.7%), essentially on account of the transport sector.

Demand for heating oil has continued its decline and sales of heavy fuel oil have again fallen.

The increase in overall demand has been met by increased production by Community refineries, while there was a reduction in net Community imports of oil. As we saw above, total imports of crude oil and feedstocks increased by about 19 million tonnes.

Table 7, established on the basis of preliminary estimates available from Eurostat, summarizes these developments for EC 12.

Table 6
Consumption trends by country, 1988

(million tonnes)	EC	B-L	DK	D	GR	E	F	IRL	I	NL	P	UK
Total products	447.1	19.1	8.7	106.3	10.8	39.7	77.7	3.7	82.0	18.7	8.9	71.5
of which:												
LPG	16.7	.5	.1	2.4	.2	2.6	2.8	.1	3.0	2.5	.6	1.8
Motor gasolines	100.1	3.3	1.5	26.0	2.1	7.3	18.8	.8	12.4	3.4	1.1	23.2
Diesel/Heating oil	169.9	9.0	4.4	52.7	4.2	13.1	32.6	1.4	26.9	5.3	2.3	17.9
Heavy fuel oils	67.7	2.6	1.1	8.0	2.5	6.7	6.4	.8	25.3	.6	2.5	11.1

Source: National statistics.

Table 7
Supply and demand of fixed products
Summary table

(million tonnes)	1987	1988
Net production by refineries	437	456
Imports of refined products (1)	175	161
Exports of refined products (1)	137	139
Net exports (2)	-1	-14
Total inland deliveries	442	450
Bunkers	30	32

(1) Including trade between member countries.

(2) Balance includes correction made by some member countries because of product transfers and reclassification.

Source: Eurostat (Comext).

It will be remembered that the comparisons made over a longer period — 1987 in relation to 1980 — produced a totally opposite conclusion: refinery production had decreased noticeably more than demand, while net imports had increased to fill the gap.

Developments in consumer prices

Consumer prices vary widely across Member States, as the tables below show, because of the diversity of taxation levels and of the differences that exist between price systems.

Quality of petroleum products

For reasons that essentially concern environmental protection and because of technical requirements, improvement in the quality of oil products is a constant preoccupation for the Member States and refining companies.

Restriction on the use of lead in motor gasoline

This action has been carried out on two levels: reduction in the lead content of leaded gasoline on the one hand and the introduction of unleaded gasoline on the other; Council Directive 85/210 of 20 March 1985 (1) sets the framework for this.

- Reduction of the lead content in gasoline: in the majority of European countries, the lead content of gasoline (premium and regular) has already been reduced to 0.15g/l, the low value called for by the Community Directive. France, Spain and Italy have announced their intention to attain this value in June 1991; France is, moreover, soon to make official an intermediate lead content level of 0.25g/l for premium, a level already introduced on the initiative of the refining companies. In Italy, the lead content has already been reduced to

(1) Amended by Directives 85/581 of 20 December 1988 and 87/416 of 21 July 1987.

0.30g/l for regular and premium on 1 April 1989. In Greece, the lead content is fixed at 0.15g/l for premium, that of regular gasoline remaining at 0.40g/l. In Denmark, there exists a premium mix (a mixture of equal parts of leaded premium and unleaded premium).

- Introduction of unleaded gasoline: The same Community Directive provides that by 1 October 1989 at the latest, the distribution of unleaded gasoline must be ensured in each Member State. Unified specifications on Community territory as a whole have been defined for Eurosuper: octane rating at the pump of 95RON and 85MON and a maximum benzene content of 5%. Most countries have already adopted specifications corresponding to the standards set by the Community Directive. Distribution of a product bearing a strengthened octane rating of 98RON is in the process of being developed in the Federal Republic of Germany, Belgium, France, the Netherlands and the United Kingdom, on the initiative of the refining companies.

European regulations, which have not defined standards regarding unleaded regular gasoline, do allow the prohibition of sales of leaded regular gasoline: this type of petrol has disappeared from the Dutch (March 1987), German (beginning of 1988) and Luxembourg (September 1988) markets; Belgium is due to withdraw it on 1 June 1989. At the same time, some countries, such as the Federal Republic of Germany, Belgium and the Netherlands, have introduced an unleaded regular gasoline with a rating of 92RON.

For reasons linked both to economizing on crude oil and especially at the moment to the development of unleaded gasoline, several Member States have been allowed to mix oxygenated additives with gasoline. Council Directive 85/536 of 5 December 1985 (2) harmonized the proportions of oxygenates in the blend at between 3 and 15% in volume according to the products.

Reduction of sulphur content

- Diesel oil: most of the Member States have set a standard of 0.3%, the upper limit which appears in Council Directive 75/716 of 24 November 1975. (3) Some countries (the Federal Republic of Germany, Belgium, Denmark, Luxembourg, the Netherlands) have already opted for the lower value, i.e. 0.2%.

(2) Amended by Directive 87/441 of 29 July 1987.

(3) Amended by Directive 87/219 of 30 March 1987.

Table 8
Retail prices of petroleum products (all taxes included)
Mid-month figures (ECU/cubic-metre for gasoline and diesel, ECU/tonne for heavy fuel oil) (1)

		B	DK	D	GR	E	F	IRL	I	L	NL	P	UK
Leaded premium gasoline	1985 Dec.	697	764	630	611	N/A	799	899	935	586	692	N/A	693
	1986 Dec.	549	842	477	525	555	667	755	887	451	496	722	507
	1987 Dec.	555	801	487	470	558	679	740	887	451	663	706	537
	1988 Dec.	557	821	492	445	548	689	757	885	480	677	691	570
	1989 March	599	834	573	439	571	713	766	890	498	694	694	591
Automotive diesel oil	1985 Dec.	512	486	607	313	N/A	626	840	508	472	469	N/A	683
	1986 Dec.	372	528	423	256	412	445	655	409	303	356	425	454
	1987 Dec.	385	346	450	229	415	460	661	453	317	372	439	493
	1988 Dec.	366	545	436	217	407	455	646	481	299	356	429	518
	1989 March	402	532	441	214	424	478	661	501	312	369	431	541
Heating oil	1985 Dec.	294	451	322	313	N/A	436	414	453	330	366	N/A	333
	1986 Dec.	156	487	158	256	242	261	238	373	165	239	N/A	160
	1987 Dec.	166	489	191	229	243	274	281	414	179	254	N/A	176
	1988 Dec.	149	489	165	217	237	264	206	454	166	240	N/A	165
	1989 March	161	489	194	214	247	274	224	456	178	259	N/A	162
Heavy fuel-oil (HSG)	1985 Dec.	168	236	200	222	N/A	207	255	189	201	190	N/A	213
	1986 Dec.	91	368	102	175	102	131	134	89	93	123	131	106
	1987 Dec.	84	352	97	147	102	104	124	87	92	126	132	104
	1988 Dec.	71	345	95	140	99	88	101	75	78	120	129	95
	1989 March	83	355	100	138	103	105	113	88	90	125	130	98

(1) Free market prices in FR of Germany, Denmark, France, the Netherlands, and the United Kingdom; controlled prices in the other Member States.

Source: EC Oil Bulletin.

Table 9
Specific duties on petroleum products at mid-March 1989
(ECU/hectoliter for premium and diesel oil, ECU/tonne for heavy fuel oil) (3)

	B	DK (1)	D	GR	E	F (2)	IRL	I	L	NL	P	UK
Leaded premium gasoline	275.3	455.6	312.1	153	304.0	433.0	389.2	540.5	228.5	361.1	421.9	315.5
Unleaded premium gasoline	252.4	410.1	273.7	N/A	304.0	433.0	367.7	540.5	205.6	336.6	421.9	273.5
Automotive diesel oil	138.8	216.7	213.3	59	181.6	222.8	286.1	230.5	98.6	121.3	194.1	266.9
Heating oil	0.0	216.7	27.9	59	70.2	57.5	47.8	230.5	0.0	50.6	0.0	17.0
Heavy fuel oil	0.0	243.8	14.4	53	17.5	18.7	10.2	6.5	2.3	17.1	23.7	12.1

(1) HFO duties are refundable to industrial consumers. A tax of 2.3% calculated on the same basis as VAT is also applicable since 1 January 1988.

(2) The excise tax on unleaded premium gasoline will be reduced to ECU 383.7 on 1 July 1989.

(3) Amounts shown include all excise tax and other special taxes, including counter-cyclical taxes such as the Renta in Spain and the ISP in Portugal.

Source: EC Oil Bulletin.

Table 10
VAT rates
End of March 1989

(%)	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK
Premium gasoline	25.0	22.0	14.0	36.0	12.0	18.6	25.0	19.0	12.0	18.5	8.0	15.0
Automotive diesel oil	25.0	22.0	14.0	36.0	12.0	18.6	25.0	19.0	12.0	18.5	8.0	15.0
Heating oil	17.0	22.0	14.0	6.0	12.0	18.6	10.0	19.0	6.0	18.5	0.0	0.0
Heavy fuel oil	17.0	22.0	14.0	6.0	12.0	18.6	10.0	9.0	6.0	18.5	8.0	0.0

Source: EC Oil Bulletin.

- Heavy fuel oils: the most common quality of heavy fuel oil contains 2% of sulphur in the Federal Republic of Germany, 1% in Denmark, Luxembourg and the Netherlands, and 3.5 to 4% in the other Member States. Besides the ordinary quality, which is still the most widely used, there are also fuel oils on the market that have a very low sulphur content that can be less than 0.5%.

Refining

Transfers of property

Over the last few years, a certain number of refineries have changed ownership following purchases of companies or withdrawal or acquisition of stock. Since the middle of 1987, several operations of this kind have modified quite profoundly the face of the industry.

In the Federal Republic of Germany, Deutsche Texaco was taken over by the RWE group on 1 January 1988. A new structure was formed to regroup this entity with Union Rheinische Braunkohlen-Kraftstoff AG: the new company, which was to take on the trade name DEA (Deutsche Erdoel), will have a total refining capacity (atmospheric distillation) of 11.4 million tonnes per year.

In Belgium, the BP group has given up its 50% holding in the Belgian Industrial Oil Company, in which Petrofina Ltd now has 100% control.

In Italy, the most important event has been the forming in September 1987 of 'Monteshell', a joint partnership between the Shell group, back in that country after a 15-year absence, and the Montedison group, which had just bought the Total Italiana refining and distribution sector (2 500 stations, the Trieste refinery and a 20% holding in the Rome refinery).

In the Netherlands, the BP and Texaco groups have just announced their intention of bringing their refineries on the Rotterdam site to a joint company.

Finally, in Portugal, the Finnish oil group Neste Oy has just taken a share in the Sines refinery.

Adaptation of State monopolies

In Greece, the imports monopoly has been relaxed, allowing distributors in theory to supply a part of their needs with products coming from EC refineries; however, the terms and conditions of this opening have been submitted to the scrutiny of the Court of Justice.

The Spanish Government has modified the regulations concerning distribution of automotive fuels, thus permitting the creation of a network 'parallel' to that of CAMPSA, a network which, however, can only be supplied by products imported from other EC countries.

In Portugal, the distribution of automotive fuels is carried out by the State Company Petrogal and, for the last 10 years, by Shell, BP and Mobil by monopoly transfer. From now on, new authorized operators have the chance to set up service stations in the framework of an administrative authorization procedure; these stations can be supplied either by imports within the limits of import quotas granted each year or through purchases from Petrogal or processing in Petrogal refineries.

Rationalization of the refining industry

The reduction in distillation capacity has continued — after a pause in 1986 and 1987 — through 1988 and the beginning of 1989. The definitive closure of the Trieste refinery - transformed into a depot and workshop for special production - has been confirmed by Monteshell. In February 1988 the Duisburg refinery (Petrofina, 2 million tonnes per year) was closed as was the Genoa refinery (ERG, 5.8 million tonnes per year) in March 1988. In January 1989 Wintershall discontinued refining operations at Mannheim (3.5 million tonnes per year). Furthermore, several distillation columns have been closed or mothballed in the Federal Republic of Germany (Holborn) and in France (Elf and Shell). The result is that the capacity for primary distillation in operation in the Community is in June 1989, 587 million tonnes per year, a reduction of 24 million tonnes per year (-4%) compared to the beginning of 1988.

The regrouping announced for the BP and Texaco refineries in Rotterdam would lead to a further reduction in capacity of 9 million tonnes per year (resulting in a total Community capacity of 578 million tonnes per year).

The most severe cuts have been carried out in the Federal Republic of Germany and in France; they total 48% of the reduction implemented in the EC between 1980 and 1989. If we do not take into account the refineries which are not equipped with conversion units but which are equipped with units for the manufacture of special products (solvents, chemical products, lubricating bases or bitumens), there are now no more than four simple refineries in

the Community for an overall distillation capacity of 14 million tonnes per year.

Table 11
Distillation capacity by country (1)

(million tonnes)	1980 (2)	1986	1987	1989 (3)	change (1)
EC	891	615	606	587	-34
Belgium	54	35	35	35	-35
Denmark	11	9	9	9	-18
FR of Germany	150	85	85	79	-47
Greece	20	19	19	19	-5
Spain	70	62	62	62	-11
France	168	97	97	91	-45
Ireland	3	3	3	3	0
Italy	177	130	125	117	-34
Netherlands	90	70	67	67	-26
Portugal	18	15	15	15	-17
United Kingdom	130	90	91	90	-31

(1) Reduction %, June 89/80.

(2) End of year figures 1980-87.

(3) End of June figures 1989.

Source: National Statistics.

At the same time, the increase in conversion capacity has continued with the starting up of a new 'deep conversion' unit in the Netherlands and with extensions in existing plants. The hydroconversion process inaugurated by Shell Netherlands in April 1989 will, by cracking and hydrogenation of heavy residues following the 'Hycon' process developed by Shell, allow the transformation of heavy residues into light products; what is involved here is a type of conversion currently unique in Western Europe, with a processing capacity of 1.5 million tonnes per

year. Besides this achievement, numerous extensions of catalytic or thermal cracking processes (including viscoreduction) took place between 1986 and 1988. This brings the conversion capacity in the EC to nearly 181 million tonnes per year in FCC cracking equivalent.

The ratio between conversion capacity and distillation capacity increased from 16.9% in 1983 to 20% in 1985 and 26% in 1989.

At present, two new viscoreduction plants are under construction in Italy, one in Venice (0.7 million tonnes per year), the other in Sardinia (1.2 million tonnes per year); they are expected to come into operation at the end of 1989. Extensions of cracking processes are under way in France (Esso at Fos-sur-mer) and in Spain (Petromed).

As for the rest, refiners' investments are currently being concentrated mainly on gasoline manufacturing units (isomerization in particular) or processing of gasoils (desulphurization by hydro-processing or gradual hydro-cracking as distinct from hydro-cracking of distillations under vacuum). These plants are necessary to adapt the manufacturing process to the new specifications for products (unleaded gasoline, gasoil containing 0.3 or 0.2% of sulphur, heavy fuel oil).

Finally, renewing and modernization of units or of whole refineries — such as, for instance, that of Shell at Pernis (Netherlands) — are under way.

Table 12
Cracking capacity and distillation capacity

(million tonnes)	CC	HC	VR	CT	CK	Flex. and Hyd.	Total CC eq.	Conv/DA (%)
1983 EC	68.8	8.3	47.1	9.9	9.1	0.0	117.0	16.0
1985 EC	74.5	8.8	59.5	9.5	10.3	0.0	129.0	20.0
1989 EC	84.7	12.2	60.8	9.8	10.2	3.1	151.0	26.0
Belgium	5.4		4.0				6.7	19.0
Denmark			3.5	.2			1.2	14.0
FR of Germany	10.4	4.9	8.0	4.3	4.6		30.0	38.0
Greece	2.7	1.2	1.0				4.6	24.0
Spain	6.9	.7	8.7		.7		11.9	19.0
France	16.9	.7	9.4				20.9	23.0
Italy	14.8		16.4	2.5	1.5		24.4	21.0
Netherlands	6.4	1.5	7.0			3.1	19.0	28.0
Portugal	.5	.5					1.2	8.0
United Kingdom	20.7	2.7	2.8		3.4		30.9	34.0

CC: Catalytic cracking.

HC: Hydrocracking of vacuum distillates.

VR: Visbreaking (soft thermal cracking).

CT: Thermal cracking.

CK: Coking plants.

Flex: Flexicoker (coking and gazolification).

Hyd.: Hydroconversion of ready residues.

Conv./DA: Ratio of conversion in CC equivalent to atmospheric distillation capacities.

Source: CPDP.

Refinery production

Total refinery production, which in 1987 had gone down by 2% compared to 1986, rose again in 1988 to 456 million tonnes (an increase of 4.4%). During the last three years, heavy fuel production continued declining, whereas production of gasoline and kerosene increased noticeably.

Table 13
Refinery production by principal products

(million tonnes)	1986	1987	1988	1988 %
LPG	13.7	14.1	14.6	3.2
Naphtha	17.0	14.7	16.2	3.5
Gasoline	100.5	103.4	108.1	23.7
Kerosene	29.2	30.0	32.9	7.2
Gasoil	160.0	150.6	160.6	35.2
Heavy fuel oils	99.3	95.1	91.6	20.1
Other products	26.0	29.1	32.3	7.1
Total	445.7	437.0	456.5	100.0

Source: Eurostat (Sirene).

On an EC level, this production structure leads to a net export surplus for gasoline and kerosene (7 million tonnes each per year), a net importing position of gasoil (13 million tonnes) and of naphtha, an approximate balance being attained for heavy fuel oil (excluding refinery feedstocks).

However, production structures are very different from one country to another.

Table 14
Refinery production by principal products for Member States

(%)	LPG	Gasoline, naphtha	Kerosene, gasoil	Heavy fuel oil	Other products
EC	3.2	27.3	42.4	20.0	7.1
Belgium	2.1	25.2	42.3	24.1	6.3
Denmark	2.1	19.4	44.0	29.5	5.0
FR of Germany	3.4	28.4	47.2	10.1	10.9
Greece	2.4	24.6	35.0	34.8	3.2
Spain	3.8	22.0	37.9	27.3	9.0
France	3.7	27.7	45.7	16.0	6.9
Ireland	4.0	24.3	36.5	35.2	0.0
Italy	2.6	23.6	39.5	29.2	5.1
Netherlands	5.4	25.1	42.5	19.7	7.3
Portugal	4.0	27.7	35.6	31.0	1.7
United Kingdom	2.1	35.4	41.8	15.0	5.7

Source: Eurostat (Sirene).

Three countries, the Federal Republic of Germany, the United Kingdom and France are characterized by their low proportions of heavy fuel oil. On the other hand, the Mediterranean countries and Portugal still produce 29 to 35% of heavy fuel oil but their balances of heavy fuel oil differ considerably.

Table 15
Heavy fuel oil production and balances of major producing Member States

(million tonnes)	Refinery output	Inland deliv.	Bunkers	Balance
Greece	5.3	2.4	2.0	.9
Italy	21.5	25.4	2.8	-6.7
Spain	12.3	6.4	1.9	4.0
Portugal	2.5	2.1	.2	.2

Source: Eurostat (Sirene).

Refinery utilization rates

Any assessment of utilization rates of primary distillation capacity poses a statistical problem because of the increase, over the last 10 years, in the share of feedstocks in refinery throughputs. Some of these feedstocks are for redistillation while others go directly into secondary plants, and the division between the two categories is not drawn up in the statistics in a certain number of member countries. This is why, in its communication to the Council on 'the oil market and the refining industry in the Community', the Commission presented a range consisting of a 'maximum' (the relation of total input for transformation in the refineries to distillation capacity) and a 'minimum', calculated solely on processed crude oil, the actual rate being between the two extremes.

The size of the range is very different from country to country: 12 to 14 points in the Federal Republic of Germany, 10 points in the United Kingdom, only 1 point in Ireland and Portugal, and 5 to 6 points in the other countries as in the Community as a whole.

Observing the maximum from the Eurostat statistics reveals a strong improvement in 1986 which was maintained in 1987 and which was followed by a new advance in 1988. There are, however, important differences between member countries and especially between the north and the south of the Community.

Table 16
Utilization rate of EC production by region

(%)	1985	1986	1987	1988
North	74	81	82	88
South (1)	61	70	67	70
EC	64	76	76	81

(1) Greece, Italy, Spain, Portugal.

Source: CPDP.

The rate of 81% for the 'maximum' attained in 1988 corresponds to an actual rate of the order of 75%, still a long way from a normal performance which

would lie between 85 and 90%, a level which, it is true, has already been reached in several countries in the north (notably in the Federal Republic of Germany and the United Kingdom).

Utilization rates vary during the year with fluctuations in demand. Thus, during the first quarter of 1989, the weak demand for fuels, due to climatic conditions, led to a noticeable reduction in utilization rates in several countries.

Conversion units are generally used at high rates; however, a modulation in use will from now on be more frequent according to variations in individual operations, markets and to seasonal requirements.

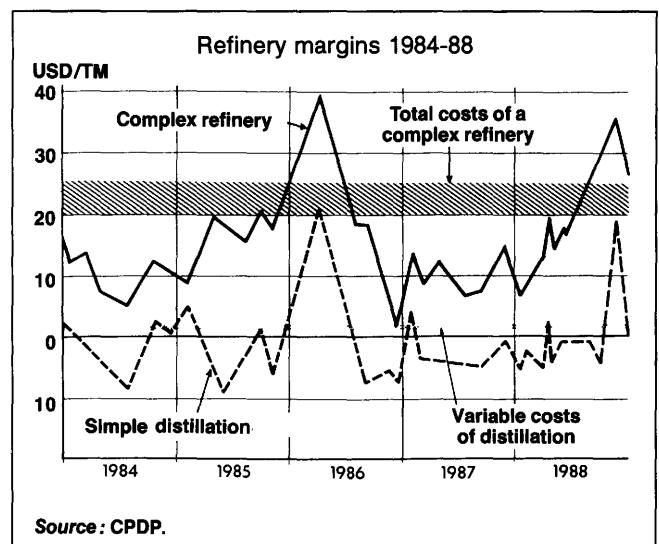
Refining margins

Figure 3 was drawn up based on data from the European Commission and the industry. It traces the development of the gross margin in a complex refinery (distillation, re-forming, cracking and vis-breaking) in north western Europe from 1984 to 1988 and enables us to establish the net margin. It also shows the variations in the margin for simple distillation.

Several observations can be made:

- overall, in the course of the five years observed, the margin remained insufficient: it did not cover the complete costs — of the order of 20 per processed tonne — except over short periods of time in 1986 and 1988;
- the fluctuations are very substantial, but the greatest movements are linked to the developments in crude oil prices: during periods of price stability, for instance in 1984 and in 1987, the net margin remained strongly negative, the variable costs and only part of the fixed costs being covered by the gross margin; it was only during periods of a pronounced fall in crude oil prices that the net margin became positive whereas, when crude was rising, the margin immediately deteriorated;
- the gross margin for simple distillation does not even cover the variable costs of operation, exceptional circumstances of short duration apart, and the same has been true for reforming; the result is that the simple capacity available in the Community (simple refineries themselves + surplus distillation and re-forming capacity in semi-complex or complex refineries) should be out of use from an economic point of view, which explains the gaps in utilization rates between the north and south (see Table 16).

Figure 3



The general trend nevertheless suggests a progressive improvement in the situation. This improvement remains fragile and interspersed with serious relapses. Thus, at the beginning of 1989, the rise in crude oil prices was followed by one in products only with a certain time-lag. The margin was pushed down and the results from the oil companies' refining operations were negative again in the first quarter of 1989.

From mid-April, following the panic provoked by the Valdez disaster in Alaska and the decisions of the American Environment Protection Agency (EPA) to reduce the Reid Vapour Pressure (RVP) of gasoline from 1 June 1989, a strong level of demand in the United States provoked a sudden rise in the spot price of gasoline: margins became positive from the middle of April. But it is doubtful whether the losses recorded for the first quarter can be made up during the rest of 1989, owing to the uncertainties affecting both demand on the American market and the prices of crude oil.

Distribution of petroleum products

Storage of petroleum products

Data referring to stock capacity are relatively scarce and, when they do exist, are presented in a way that is not homogeneous from one country to another. However, a recent publication by the Economist Intelligence Unit tried, as far as it is possible, to standardize the definitions and present a fairly complete panorama of the capacity existing at the end of

Table 17
Storage capacity by country at year's end, 1987

(million barrels)	B	D	GR	E	F	I	NL	P	UK
Primary capacities									
Crude petroleum	27	169	7	45	87	118	101	5	81
Refined products	22	280	7	56	209	145	122	12	83
Secondary capacities (refined products)	N/A	20	N/A	N/A	16	7	46	N/A	N/A
Tertiary capacities (refined products)	N/A	298	N/A	N/A	96	119	10	N/A	N/A

Source: CPDP.

1987 for the majority of European Community countries:

- primary capacity, at the level of crude production and refining, possibly including strategic stocks;
- secondary capacity at the level of distribution, wholesalers and retailers;
- tertiary capacity with the final consumer (manufacturers, transport companies, power stations, farmers, households).

NB: The first group is known quite precisely; the second is somewhat more difficult to assess; as for the third, that is a matter of estimates only.

Transport by pipeline

Data on pipeline traffic of refined products are available for four countries: France, Spain, Belgium and Italy.

In France, the traffic carried out by Trapil from the Lower Seine refineries involved 16.1 million tonnes

in 1988 (16.3 in 1987). The traffic carried by SPMR from the Mediterranean involved 7.1 million tonnes in 1988 (1.0 million tonnes of which were sent to Switzerland).

In Spain, the traffic carried out by the four main pipes for refined products was as follows in 1987: from Rota 2.4 million tonnes, from Puertollano 3.4 million tonnes, from Tarragona 1.7 million tonnes and from Somorrostro 2.6 million tonnes.

In Belgium, the pipeline between Feluy and Antwerp is out of use today because of the dismantling of the Feluy refinery. The PALL that links Antwerp to Geleen transported 216 000 tonnes of products in 1987, essentially naphtha.

In Italy, the four main pipes for refined products go from Sannazzaro (Pavia) to Rho (1.3 million tonnes in 1987), to Chivasso-Volpiano (0.8 million tonnes in 1987), Fiorenzuola (0.9 million tonnes in 1987) and La Casella (1.3 million tonnes in 1987).

Table 18
Number of service stations by Member State

	1980	1981	1982	1983	1984	1985	1986	1987	1988	% change
EC	171 100	166 900	161 400	154 400	151 300	145 000	143 400	138 200	133 300	-22
Belgium	8 637	8 528	7 575	7 068	6 742	6 207	5 633	5 448	4 580	-47
Denmark	4 397	4 208	3 985	3 631	3 733	3 622	3 515	3 364	3 253	-26
FR of Germany	26 145	24 864	23 219	21 049	19 288	18 448	20 320	19 501	18 658	-29
Greece	5 500	5 500	5 500	5 500	5 500	5 800	5 800	6 000	5 950	8
Spain	4 606	4 602	4 608	4 621	4 622	4 616	4 799	4 855	4 821	4
France	40 400	39 500	38 600	37 100	36 000	34 600	33 200	31 100	29 000	-28
Ireland	3 957	3 874	3 828	3 702	3 544	3 428	3 375	3 300	3 250	-18
Italy	38 570	38 255	37 672	36 716	38 500	35 800	35 300	34 700	34 300	-11
Luxembourg	475	473	461	469	447	448	442	420	400	-16
Netherlands	10 800	10 500	9 800	9 400	9 200	9 000	8 500	7 500	7 300	-32
Portugal	2 120	2 100	2 060	2 010	1 970	1 900	1 880	1 830	1 770	-17
United Kingdom	25 527	24 760	24 108	23 097	21 705	21 140	20 641	20 197	20 016	-22

Source: National sources.

Distribution of motor gasoline and automotive diesel

Motor gasoline and automotive diesel are delivered either through a network of retail outlets or directly to the final user (industrial companies and especially road hauliers). Generally speaking, gasoline is mostly sold through the network; the proportion of diesel sold at the pump is much lower, although there is a current trend towards an increase here on account of the growing fleet of diesel-driven private cars.

For motor gasoline, for example, the volume distributed via the network is as high as 98% in the Federal Republic of Germany and France, 97% in the United Kingdom and 83% in Belgium. For automotive diesel, the network represents 69% of total sales in France, 44% in Belgium, 40% in the Federal Republic of Germany and 27% in the United Kingdom.

Developments in the number of service stations

In 1988 there were about 134 000 retail outlets in the 12 EC member countries, that is 22% fewer than in 1980 and 33% fewer than in 1975, the year in which the networks reached their maximum size. Restructuring of networks has been more or less intensive and started earlier or later according to the country; it is not completed and continued in 1988 with the closing down of more than 5 000 service stations in the 12 EC countries, of which 2 100 were in France, 840 in the Federal Republic of Germany, 400 in Italy, 180 in the United Kingdom and 142 in Belgium.

National networks by brand

Note: The total number of sales outlets by country and the distribution of this number by brand can vary according to sources. Transactions involving a certain number of outlets can take place in the

Table 19
Number of service stations by country and network, at December 1988

	Belgium		Denmark		FR of Germany		Greece		Spain (1)		France	
Total outlets	4 580		3 253		18 658		5 950		4 821		29 000	
of which:	Fina	629	OK	648	Aral	2 980	BP	1 074	Campsa	4 821	Elf/Antar	5 860
	Texaco	629	Statoil	407	Texaco	1 798	Shell	900	1 800 are owned by		Total	4 957
	Shell	624	Shell	387	Esso	1 772	EKO	700	Campsa. The		Esso	2 486
	BP	546	UNO-X	355	Shell	1 699	Mobil	646	remainder are		Shell	2 127
	Esso	488	QU (KPC)	586	BP	1 408	Texaco	413	private but linked		BP	1 425
	Seca	317	DK	189	Avia	1 131	Total	162	to Campsa by long		Mobil	729
	Q 8 (KPC)	272	Hydro	137	Fina	521	Aven	80	term contracts.		Fina	861
	Elf	186	Haahr	47	Conoco	434					Agip	159
	Aral	180			Elf	426					Aral	136
	Mobil	173			Agip	394						
	Total	167			Total	257						

(1) Canary Islands not included: 286 outlets of which DISA 107, Shell 67, Mobil 54, Texaco 47.

	Ireland		Italy		Luxembourg		Netherlands		Portugal		United Kingdom	
Total outlets	3 250		34 300		400		7 300		1 770		20 016	
of which:	Esso	630	Agip	7 600	Shell	82	Texaco	940	Petrogal	1 150	Shell	2 886
	Texaco	500	IP	4 600	Aral	56	Shell	912	Mobil	230	Esso	2 685
	Shell	495	Esso	3 700	Q 8 (KPC)	53	BP	607	Shell	225	BP	2 119
	Mavol	400	Mobil	2 200	Texaco	45	Esso	513	BP	150	Burmah/	
	Jet Conoco	340	Monteshell	2 500	BP	44	Total	323	Anka	10	Major	1 403
	BP	331	Erg	2 500	Esso	44	Fina	31	Total	6	Texaco	1 364
	Burmah	38	Tamoil	1 900	Fina	29	Aira	286			Q 8 (KPC)	1 078
			API	1 700	Elf	19	Elf	280			Jet	1 051
			Fina	1 600	Total	7	Mobil	295			Mobil	878
			KPC	1 600			Q 8 (KPC)	219			Fina	795
							Aral	198			Total	612
											OK	512
											Elf	451

Source: National statistics.

course of the year and the date retained for their entry in the books is not always the same.

Average annual throughput

The average annual throughput ⁽¹⁾ per retail outlet varies a great deal from country to country: at present it ranges from 450m³ in Greece to 3 600m³ in Spain; although it increased considerably since 1980 (doubling in France and increasing by more than 50% in the United Kingdom), it remains low in some countries.

Table 20
Average throughput of retail outlets
per year per outlet
(motor gasoline and automotive gasoil)

(m ³)	1986	1987	1988
Belgium	820	850	1 080
Denmark	890	930	960
FR of Germany	1 950	2 060	2 230
Greece	400	430	450
Spain	3 170	3 412	3 600
France	998	1 094	1 258
Italy	751	796	830
Netherlands	785	890	915
United Kingdom	1 460	1 560	1 670

Source: CPDP.

Self-service

The number of retail outlets equipped for self-service varies a great deal from one country to another according, in particular, to national mentality. While 92% of sales outlets are fitted for self-service in the Federal Republic of Germany, 44% in Belgium and the United Kingdom and 29% in France, this percentage is less than 9% in Italy and below 2% in Spain and Portugal.

In 1988 the number of self-service stations noticeably increased in Belgium and France.

Automatized truck centres have recently been set up in Europe; besides the sales of diesel, they ensure all the services of use to road hauliers. There are about 400 of these in the EC countries at present and others are in the process of being established.

(1) The figures for the mean volumes sold must be considered as orders of magnitude rather than definitive statistics. The share of the fuel sold by the networks is still not known with certainty. What is more, the total number of points of sale changes over the year. The mean volume per point of sale is usually calculated by means of the following ratio: volume sold by the network/number of POS at year's end.

Table 21
Proportion of retail outlets equipped
with self-service facilities

(%)	1986	1987	1988
Belgium	30.0	35.0	44.0
Denmark	99.0	99.5	99.5
FR of Germany	84.0	87.0	92.0
Greece	2.0	5.0	6.0
Spain	23.0	26.0	29.0
France	4.6	6.6	8.5
Italy	67.9	73.6	85.0
Netherlands	68.0	74.0	86.0
Portugal	2.0	2.0	3.0
United Kingdom	43.1	45.0	44.2

Source: CPDP.

Unleaded gasoline

The distribution of unleaded gasoline has necessitated new logistics, entailing extra distribution costs, all the higher because the volumes sold per service station are still low in most countries except the Federal Republic of Germany.

Table 22 shows that the Federal Republic of Germany and Denmark are the two main markets for unleaded gasoline. The proportion of unleaded gasoline in total gasoline consumption is also high in the Netherlands and Luxembourg; it is still low in the other EC countries but shows a trend towards rapid development. This unequal development results from a certain number of factors:

Table 22
Number of retail outlets distributing
unleaded gasoline
(at year's end)

	1986	1987	1988	% of all retail outlets	Estimates for summer 1989
Belgium	50	105	700	15	3 500
Denmark	900	2 000	2 930	90	2 900
FR of Germany	13 000	19 200	18 658	100	18 500
Greece	50	215	215	4	230
Spain	65	82	98	2	100
France	89	330	1 200	4	4 000
Ireland	0	30	400	13	400
Italy	72	1 258	5 120	15	5 200
Luxembourg	21	179	375	94	380
Netherlands	7 500	7 500	7 300	100	7 300
Portugal	0	35	50	3	50
United Kingdom	174	715	4 157	21	10 000

Source: CPDP.

- Tax incentives. Such measures have been taken for some years in several countries: the Federal Republic of Germany, Denmark, the Netherlands

and, more recently, the United Kingdom, Luxembourg, Ireland and Belgium. A similar decision has been taken in France, coming into effect on 1 July 1989. Measures in this direction are being examined in Italy. However, tax advantages in favour of unleaded gasoline are more or

less far-reaching depending on the country. They are quite limited in Belgium and the United Kingdom, about 3% in relation to the pump price of leaded gasoline, 4 to 5% in the Federal Republic of Germany and the Netherlands, over 6% in Denmark and nearly 10% in Luxembourg. Similarly, some countries have set up tax advantages in favour of vehicles equipped with catalytic converters.

Table 23
Share of unleaded gasoline in total sales
of motor gasoline

(%)	1986	1987	1988	Sales volume 1988 ⁽⁵⁾
Belgium	.1	.2	.5	1.0
Denmark	10.3	29.7	33.0	663.0
FR of Germany ⁽¹⁾	10.9	25.7	44.5	15 430.0
Greece	0.0	0.0	0.0	0.0
Spain	0.0	0.0	.1	20.0
France	0.0	.1	.2	64.0
Ireland	0.0	0.0	0.0	.2
Italy	0.0	.2	.7	113.0
Luxembourg ⁽²⁾	1.0	1.8	10.2	44.0
Netherlands ⁽³⁾	15.3	20.4	26.0	1 170.0
Portugal	0.0	0.0	0.0	0.0
United Kingdom ⁽⁴⁾	0.0	.1	1.1	343.0

⁽¹⁾ March 1989 — 54%.

⁽²⁾ February 1989 — 15.6%.

⁽³⁾ January 1989 — 31.3%.

⁽⁴⁾ February 1989 — 5.7%.

⁽⁵⁾ 1 000 m³.

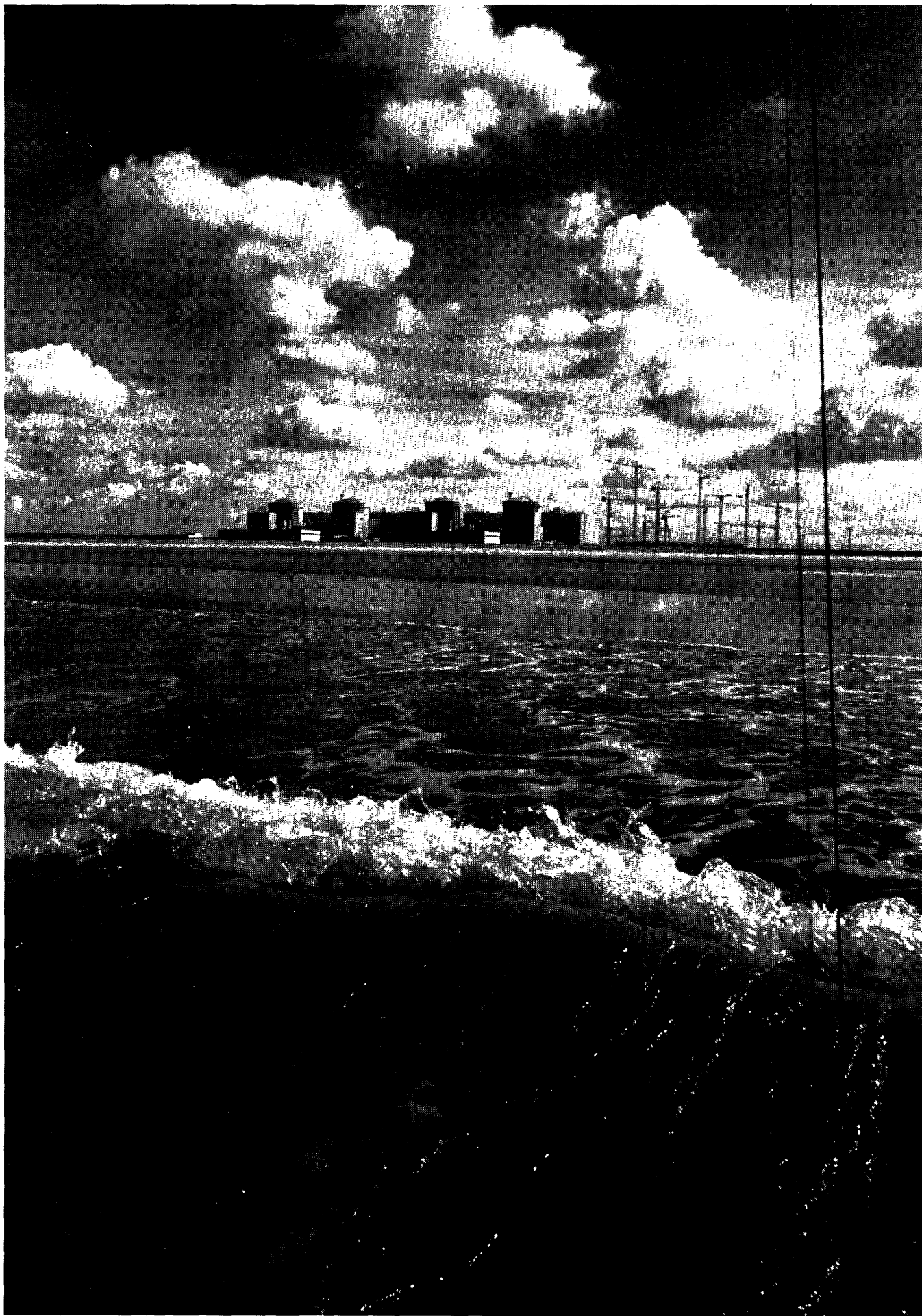
Source: National sources.

- Regulations such as the withdrawal of leaded regular gasoline and its replacement by an unleaded gasoline in Denmark in 1986, in the Netherlands in 1987 and in the Federal Republic of Germany in February 1988. Leaded regular gasoline was phased out in Belgium on 1 June 1989 and unleaded gasoline sales should now increase substantially. Moreover, leaded regular gasoline is disappearing in the United Kingdom, where it should no longer be available by the end of 1989.
- Greater or lesser sensitivity of national public opinion to ecological problems.

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NUCLEAR FUELS

Summary

In 1988 nuclear energy accounted for 14% of total energy consumption and 34% of electricity production in the EC. With 25% of the primary energy production, it is also the largest single energy source produced in the Community. The national situations, however, vary considerably: in France and Belgium almost 70% of the electricity is generated by nuclear power stations, while Denmark, Greece, Ireland, Luxembourg and Portugal do not use this form of energy.

Description of the sector

The Community's energy objectives for 1995 take into account the importance of the nuclear industry to the Community's energy supplies and place emphasis on the need to ensure that all aspects of the planning, construction and operation of nuclear installations meet optimum safety standards.

To a greater extent than other energy sources, nuclear energy has to be backed up by a complex combination of industrial activities. These relate to the mining of natural uranium, the preparation of nuclear fuel and the construction of sophisticated power stations. These characteristics are reflected in the electricity cost structure. Only 28% of the cost is accounted for by expenditure on fuel: 11% for natural uranium and 17% for the various processing stages of the nuclear fuel cycle. However, the greater part, or 57%, arises from amortization of the investment cost of the nuclear power stations. The remainder, or 15% is accounted for by the station operating costs.

Current situation

Uranium production

The annual consumption of uranium in the EC is around 14 000 tonnes (of natural uranium, i.e. tU). Uranium requirements in the Community will remain more or less constant throughout the coming decade, despite the moderate increase in the installed nuclear power capacity. This phenomenon is due both to better fuel management and to the recycling of reprocessed plutonium and uranium. The annual production of uranium in the Community amounts to about 3 800 tU. The remainder is imported from 10 countries.

The electricity-producing companies have made it a practice to diversify sources of supply and to ensure security of supply and, therefore, have built up stocks which may vary from two to four years of consumption. It should be emphasized that it is just as expensive to store the equivalent of three months of consumption of petroleum or coal as to store the equivalent of two years of natural uranium requirements.

In 1988 the Community paid approximately ECU 70/kgU (USD 87/kgU) for its uranium under long-term contracts (source: *Euratom Supply Agency Annual Report* for 1988). At that price, the value of the uranium mined in the Community is approximately ECU 260 million.

Uranium is produced in five Member States: France, Spain, Portugal, the Federal Republic of Germany and Belgium.

Table 1
Installed nuclear power capacity and share
in electricity production

(GWe)	1988		1990		1995	
	Capacity	(share %)	Capacity	(share %)	Capacity	(share %)
EC	101.3	33.9	106.4	35.0	110.6	36.5
Belgium	5.5	65.5	5.5	65.0	5.5	62.0
FR of Germany	21.5	34.0	23.0	35.0	23.0	33.0
Spain	7.6	36.1	7.6	38.0	7.6	34.0
France	52.8	69.9	56.3	76.0	61.6	79.0
Netherlands	.5	5.2	.5	5.0	.5	5.0
UK	13.4	19.3	13.5	21.0	12.4	20.0

Source: DG XVII.

France

There are six uranium production plants in France, details of which are presented in Table 2. These plants extract uranium from ores mined from 15 to 30 different deposits, usually within the region in which the plants are located. France is by far the leading producer, with an annual production of over 3 400 tU/yr.

Already discovered uranium resources, recoverable at costs of up to USD 80/kgU (USD 30/lb U308), could support production at the present level for a further 20 to 30 years. There are currently no plans to increase the annual rate of production.

Table 2
Uranium production centres in France

Name	Location	Annual capacity (tU/yr)	Owner
L'Ecarpière	Vendée	650	SIMO
Bessines	Haute-Vienne	1.500	SIMO
Le Cellier	Lozère	200	CFM
Bertholène	Aveyron	70	TCMF
Mailhac/Bernardan	Haute-Vienne	500	TCMF
St Martin du Bosc	Hérault	900	SIMO

SIMO	— Société industrielle des minerais de l'Ouest — subsidiary of Cogema.		
CFM	— Compagnie française de Mokta — subsidiary of Cogema.		
Cogema	— Compagnie générale des matières nucléaires — entirely owned by the Commissariat à l'énergie atomique (CEA).		
TCMF	— Total Compagnie minière France — Total's mining operator in France.		

Source: DG XVII.

Spain

In 1988 uranium production in Spain amounted to about 220 tU. Nearly all this uranium (200 tU) was produced at the Sealices el Chico plant in Ciudad Rodrigo from ore mined from the Fe uranium deposit. The remainder was produced at the small experimental La Haba production plant (with a capacity of 30 tU/yr) in Don Benito. The Government agency Empresa Nacional del Uranio SA (Enusa) owns and operates the uranium production centres. Already discovered resources in Spain, which could be recovered at costs of up to USD 80/kgU, total nearly 27 000 tU. Most of these resources are located at or near the Sealices el Chico production plants. There are plans to increase the capacity of this plant to about 950 tU/yr by 1991.

Portugal

Uranium production in Portugal in 1988 was about 120 tU. All the uranium was produced at the Urgeiria plant from ore mined from several small

deposits in the Beira Alta area. Plant capacity is 170 tU/yr.

Work has been started on the construction of a new production centre, Nisa, in the Alto Alentejo region. This plant, which will process ore from a number of deposits in the area, should have a capacity of 200 tU/yr. Start-up is scheduled for 1990.

The public company Empresa Nacional de Uranio (ENU) is responsible for uranium production in Portugal. Any other company wishing to conduct uranium exploration or mining activities in Portugal must first conclude an agreement with ENU.

Discovered uranium resources in Portugal, which could be recovered at a cost of USD 80/kgU or less, are sufficient to support an expected production capacity of 370 tU/yr for at least 20 years. Since Portugal does not have a nuclear programme, it exports the uranium it produces, some of it to other Member States.

Federal Republic of Germany

About 50 tU/yr are produced in Germany at the Ellweiler plant which processes ore derived from underground exploration activities (as opposed to industrial scale mining) at the Menzenschwand and Grosschlophen uranium deposits. The production capacity of the Ellweiler plant is 125 tU/yr, but it operates below this capacity owing to the limited supply of ore.

The plant is operated by the company Gewerkschaft Brunhilde, which also extracts the ore from the Menzenschwand deposit. Another company, Interuran (formerly Saarberg Interplan Uran), is actively exploring the Grosschlophen deposit. There are no plans to expand uranium production in Germany, although the Grosschlophen deposit could support a production facility with a capacity of 250 tU/yr. Discovered resources recoverable at costs of up to USD 80/kgU amount to about 2 500 tU.

Belgium

Approximately 40 tU/yr are produced in Belgium from imported phosphates. Belgium has no known uranium resources.

Nuclear fuel cycle

After the mining and refining operations, the nuclear materials undergo many processing stages before they are loaded as nuclear fuel into the reactor: conversion, enrichment and fuel-assembly fabrication. After having been irradiated in the reactor, the fuel is then stored or reprocessed with a view to recovering the recyclable materials and separating the

radioactive waste. The firms within the Community have developed industrial know-how which is applicable to all these activities.

Uranium conversion

Conversion results in a uranium compound (uranium hexafluoride) which is suitable for the subsequent processing (enrichment and fabrication) and possesses the requisite chemical purity. Conversion accounts for a small part of the discounted fuel cost, around 3%.

Two firms are currently carrying out conversion operations in the Community: British Nuclear Fuels Ltd in the United Kingdom and Comurhex in France. The other converters in the western world are in Canada and the United States. The production capacities are presented in Table 3.

The Community's conversion requirements are almost the same as those for natural uranium which amount to about 14 000 tonnes/year. They will remain stable throughout the coming decade. The conversion sector is characterized at world level by considerable and persistent excess capacity (about 45%).

Table 3
Conversion capacities and requirements in the European Community

(1 000 tU)	1988	1990	1995
Comurhex	12	14	14
BNFL	9	9	9
Total	21	23	23
Requirements	14	14	14

Source: DG XVII.

One uranium producing country has a policy of only exporting uranium in a converted form. This limits the share of the Community market accessible to domestic suppliers. The firms within the Community therefore meet only 75% of the EC requirements. However, in spite of intense competition, they have been able to obtain a significant market share in non-EC Europe and outside Europe and to ensure a satisfactory rate of utilization of their installations.

The average cost of conversion is about ECU 6.5/kgU and the turnover on the Community market is approximately ECU 90 million.

The issue of converting reprocessed uranium is receiving increased attention in Europe. In France, Comurhex and Cogema have jointly formed the marketing company Urep, with the aim of offering utilities their range of services in the field. In the United Kingdom, BNFL has converted the repro-

cessed uranium recovered from Magnox fuel in its existing plant.

Enrichment

Enrichment is a stage in the fuel cycle which consists of increasing the fissile isotope content of the uranium. This stage is necessary in the case of fuel for light-water reactors (either pressurized water or boiling water) and for advanced gas-cooled reactors. These types of reactors fuelled with enriched uranium account for 90.4% of the Community's installed nuclear capacity.

Uranium enrichment is an important stage because, on the one hand, it involves advanced technology which requires the development of a high level of expertise and, on the other hand, the operation accounts for about 27% of the total discounted cost of the fuel cycle. Thus, a secure supply of enriched uranium at acceptable prices is a major factor in the implementation of nuclear programmes. Production is carried out in the Community by two competing multinational groups, Eurodif and Urenco.

Cogema is in charge of marketing the enrichment services provided by Eurodif. In the Eurodif plant, use is made of the gaseous diffusion process, developed by the CEA, France. France associated various European partners, Belgian, Italian and Spanish, with the 1973 decision to construct a large-scale plant. A large capacity was adopted with the aim of obtaining the maximum benefit from economies of scale, which are important in the case of gaseous diffusion. The choice was also influenced by the optimistic climate concerning the development of nuclear energy which prevailed following the first oil crisis in 1973.

The plant at Tricastin, now named after its founder, Georges Besse, is one of the largest in the world with a capacity of 10.8 million separative work units per year (SWU/y). (Enrichment capacity is measured in separative work units per year. Fuelling a 1-GWe LWR reactor with a load factor of 70% requires annually about 25 tonnes of uranium enriched to 3% ²³⁵U which, in its turn, requires about 150 tonnes of natural uranium and 95 000 SWU). Products originating from the Tricastin plant presently satisfy around 40% of world needs. After the plant achieved full production capacity in 1982, it had to adapt its production rate in line with market requirements. Significant production modulations were achieved. The flexibility of the process allows the adaptation of the plant to lower market demand.

Table 4
Enrichment-service requirements and capacity
in the European Community

(1 000 SWU)	1988	1990	1995
Eurodif	10 800	10 800	10 800
Urenco	2 200	2 500	3 000
Total	13 000	13 300	13 800
Requirements	8 500	9 000	9 500

Source: DG XVII.

The firm Urenco Ltd (United Kingdom) was set up on an equal shares basis by Uranit GmbH, Germany, British Nuclear Fuels plc (BNFL), United Kingdom, and Ultracentrifuge Nederland (UCN), the Netherlands. Its purposes was to develop and apply the technique of enrichment by means of ultra-centrifugation on an industrial scale; Urenco Ltd coordinates the production of the consortium and the marketing of the enrichment services. The firm Centec is responsible for coordinating the research and development programmes and for the exchange of technological information between the partners. The construction and operation of the installations in each of the countries are in the hands of three national firms comprising the partners in Urenco Ltd, with the national partner in each case taking the majority shareholding. The present capacity of the installations of the Urenco group amounts to 2.2 million SWU/y. There are plans to increase capacity to 2.5 million in 1990 and to continue increasing capacity in line with the orders obtained.

The centrifugation technology does not require the construction of large-scale plants. The capacity of the plants can be increased gradually by successively adding modules, relatively rapidly if necessary. This feature makes it possible to plan investment as a function of the contracts concluded and hence to ensure that the installations enjoy a high utilization rate.

Requirements for enrichment services within the Community are expected to expand gradually from 8.5 million SWU in 1988 to 9.5 million SWU in 1995. In contrast to uranium requirements, there should, therefore, be a moderate increase in enrichment requirements. Technological advances with respect to better uranium utilization in reactors do not, in fact, reduce requirements for enrichment services as much as they do for the consumption of natural uranium. Furthermore, the recycling of reprocessed uranium does not have an appreciable impact on enrichment requirements.

At present 14% of the Community's requirements are covered by imports from the United States and the

USSR under long-term contracts. In the future, it will be possible to cover requirements under advantageous economic conditions by making use of the enrichment plants located in Europe. The enrichment industry in the Community has also gained a substantial share of the export markets.

The present world-wide production capacities are considerable and will continue to exceed requirements beyond the turn of the century. This situation sharpens competition. The price of enrichment services is gradually decreasing in real terms as a result of the amortization of old plants and of commercial competition. The value of the SWU is estimated at about ECU 130/SWU and the turnover on the Community market is hence about ECU 1 100 million. Application on an industrial scale of the laser enrichment process, which is being developed in the United States, Japan, France and other countries in Europe, could alter the market perspectives towards the end of the century.

Fuel-element fabrication

This stage comprises the operations in which uranium fluoride, whether enriched or not, is used to produce complete fuel elements ready to be inserted into reactors. It accounts for about 11% of the discounted cost of the fuel.

The industrial structures at Community level are predominantly national. In Germany the firm Siemens is capable of fabricating 900 tU of LWR fuel per year in its Hanau, Karlstein and Lingen plants. Siemens acts as designer, vendor and manufacturer of the fuel elements.

In Spain the firm Enusa has a plant at Salamanca with a capacity of 200 tU/yr.

In France the firms Cogema, Framatome and Pechiney are associated in the fuel fabrication industry. Framatome is in charge of design, while Framatome, a subsidiary of Framatome and Cogema and owned in equal proportions by them, is responsible for marketing reloads. Fabrication is carried out in the FBFC plants Romans and Pierrelatte in France and at Dessel in Belgium. The total capacity of the plants is 1 600 tonnes/year. The plant at Dessel is owned by FBFC International, a subsidiary (100%) of the French firm FBFC, in which Cogema and Framatome are associated with Pechiney (25%-25%-50% respectively).

In Italy AGIP controls Fabbricazione Nucleari, which possesses a plant at Bosco Marengo with a capacity of 200 tonnes/year and a plant at Saluggia with a capacity of 50 tonnes/year.

In the United Kingdom, BNFL has hitherto been active mainly in the fabrication of fuel for British Magnox and advanced gas-cooled reactors. However, the firm also has a plant for the fabrication of LWR fuel with a capacity of 200 tonnes/year.

A considerable excess capacity is now evident in the fabrication sector. The total capacity is 3 450 tonnes/year, while the requirements for LWR fuel in the Community are in the region of 2 300 tonnes/year. There is also excess capacity world-wide. Despite the sharp competition, European manufacturers have been able to obtain orders for approximately 200 tonnes/year on export markets.

At present the electricity producers are laying down varied and special requirements in respect of the manufactured product in order to keep up with load-following and achieve higher burnup rates. These requirements call for continuous innovation on the part of the manufacturers, but enable the operators to achieve savings in the cost of the cycle. However, the gradual trend towards high burnup results in a reduction in the number of fuel elements required to produce a given quantity of energy and this limits the growth rate of the fuel market.

The average cost of fuel-element fabrication amounts to approximately ECU 230/kg and the turnover on the Community market corresponds to about ECU 530 million.

Table 5
Requirements and capacities for the fabrication of LWR fuel elements in the European Community

(tU/year)	1988	1990	1995
Siemens	1 200	1 200	1 200
Enusa	200	200	200
FBFC	1 600	1 600	1 600
AGIP	250	250	250
BNFL	200	200	200
Total	3 450	3 450	3 450
Requirements	2 300	2 400	2 500

Source: DG XVII.

Dependent upon the development of plutonium reprocessing and recycling, the fabrication of plutonium fuel elements is increasing in importance. The special plants set up in Germany, Belgium, France and the United Kingdom have a total capacity of about 100 tU of mixed oxides per year. They have made it possible to acquire the technical experience needed for construction of the larger-scale units which are now under construction, particularly in France and Germany. A total capacity of over 200 tonnes of MOX fuel will progressively be needed in the 1990s to meet the requirements of the programmes for the thermal recycling of plutonium.

Storage and reprocessing of spent fuel

Reprocessing is a complex operation involving the spent fuel discharged from nuclear power stations; this spent fuel is a mixture of reusable products (unconsumed uranium and plutonium created during radiation of the fuel in the power station reactor) and of highly radioactive fission products that may be considered as the ashes arising from combustion of the fissile material. The reprocessing operation enables these different products to be separated.

In the medium term, it ensures that a decrease in requirements for natural uranium will be brought about by the recycling of recovered materials in thermal nuclear power stations. In the long term it provides the prospect of achieving almost total independence from external uranium supplies with the fast-breeder concept, that is to say, by reusing plutonium in fast-breeder reactors.

Finally, separating out the fission product in the spent fuel elements makes it possible to treat and condition them for a safe disposal.

Most of the countries in the EC (France, the United Kingdom, Germany, Belgium, Italy and the Netherlands) have chosen the option of fuel reprocessing after a period of interim fuel storage either at the power station sites or in special installations for dry storage or storage under water. Spain and a number of countries outside the Community have chosen longer term interim fuel storage (from 20 to 50 years) pending reprocessing or direct disposal of spent fuel elements in deep-lying geological formations.

Fuel reprocessing and waste management account for a considerable proportion of the discounted cost of the fuel: close to 20% if account is taken of the value of the recovered fissile materials and 30% if it is not taken into account.

Present experience in reprocessing has been derived mainly from the reprocessing of metal fuels from natural uranium fuelled gas-cooled reactors, a type of reactor which was initially adopted by France and the United Kingdom but is now no longer being constructed. So far, over 40 000 tonnes of uranium from spent fuel of that type have been processed.

In the case of uranium oxide fuel from LWR and AGR reactors, the tonnage reprocessed amounts to 2 850 tU. Of this, 2 500 tonnes was dealt with in the only commercial plant in service at present, namely the UP2-400 plant at La Hague, France, operated by Cogema. The capacity of this plant is 400 tonnes/year. France decided to expand the La Hague installations. The current construction work involves two plants. There is the reconstruction of the UP2 plant

with an increase in its capacity to 800 tU/yr and the construction of a new plant UP3, with a capacity of 800 tU/yr. The civil engineering work of the UP3 plant began in mid-1982 and the plant is planned to be in service in 1989. The first new workshops forming part of the extension of the UP2 plant are also under construction. The extension will come into service in 1992.

Reprocessing capacities over and above those needed to cover national requirements will be allocated to the provision of services for other electricity producers in Community countries (Germany, Belgium and the Netherlands) and non-Community countries (Japan and Switzerland).

In the United Kingdom, BNFL is constructing a reprocessing plant, Thorp, at Sellafield, which will be capable of reprocessing 7 000 tonnes of irradiated fuel during its first 10 years of operation. Entry into service is scheduled for 1992. Its capacity is intended to cover both national requirements and those of electricity producers in Community countries (Germany, Italy and the Netherlands) and non-Community countries (Japan, Switzerland and Sweden).

Germany abandoned its plans to build a nuclear reprocessing plant at Wackersdorf and agreed to

Table 6
Reprocessing requirements and capacities
of uranium oxide in the European Community

(tU/year)	1988	1990	1995
Cogema UP2	400	400	800
Cogema UP3	0	800	800
BNFL-Thorp	0	0	700
Total	400	1 200	2 300
Requirements (1)	2 100	2 350	2 500

(1) Tonnage of fuel discharged annually.

Source: DG XVII.

improve cooperation with France in joint handling of spent uranium fuel. It is also exploring a reprocessing offer from BNFL's Sellafield complex.

On the basis of the start-up schedules of the three installations referred to above, it may be expected that about 12 000 tU and 27 000 tU of oxide fuel will have been reprocessed in the Community by the end of 1995 and 2000 respectively.

The total quantities of fuel discharged from nuclear power stations in the Community by the end of those years will amount to about 25 000 tU and 38 000 tU respectively. If the quantities for reprocessing from non-Community countries are taken into account, it can be estimated that the provisional storage require-

ments will be about 20 000 tU during the 1995-2000 period. Storage capacity covering such requirements is already available today.

The reprocessing contracts provide for a financial contribution from the customers as soon as construction of the plants is started. As a result of this practice, the average discounted cost in the Community is presently in the order of ECU 950/kg U, including the waste transport and conditioning costs.

Nuclear power station construction

The following discussion mainly concerns the industry which constructs nuclear power stations of the LWR type, which is the most common type in the Community. The nuclear power station construction industry presents a very varied picture within the Community. A distinction should be made between the following functions:

- the function of industrial architect, which corresponds to design services, often for complete power stations, and to general project coordination services. Industrial architects play an important role as intermediaries between all the parties concerned, principally the electricity producer, the other suppliers and the authorities responsible for safety;
- the supply of the nuclear island, that is to say, the supply of the specifically nuclear part of a power station, including the nuclear steam supply system in which most of the nuclear technological know-how is concentrated;
- the manufacture of major non-nuclear equipment, e.g. steam turbine, alternator and other conventional equipment, which represents in weight twice the amount of nuclear equipment and whose quality is essential for the availability of the plant.

To these major supplies can be added the supply of varied services and equipment by a large number of companies of varying size, sometimes very diversified or very specialized. These companies possess skills in such fields as soil mechanics, civil engineering, piping, electrical equipment (cables, motors, etc.) and mechanical equipment (valves, pumps, etc.), handling equipment, project management, construction site management and quality assurance and control.

The principal companies active in the nuclear sector are listed in Table 7. Their activities are not necessarily limited to the nuclear sector; in particular, they can be extended to the construction of conventional power stations and the manufacture of heavy

mechanical components, an area in which such companies were often originally active. These industries hence possess a real diversification capacity and are therefore protected to a certain extent against possible market fluctuations. Nevertheless, nuclear energy is characterized by such technological specificity that it deserves a special analysis.

In the last decade the main European companies have succeeded in penetrating the export markets and in competing with the American companies there, although the latter originally developed the basic skills of the nuclear industrial sector (see Table 8). At the production stage, the technological quality and reliability of the EC industry are fully satisfactory. The European industry has also been capable of gaining an important position in the world because of its expertise in specialized maintenance operations of nuclear power stations.

Finally, in order to put its development on firm ground, the European nuclear industry has undertaken and brought to fruition extensive research, development and demonstration work. In particular, the achievements in the field of fast-breeder reactors, where the European industry is far ahead of the USA and Japan, could play a major role to satisfy the demand surge likely to occur when the present generation of nuclear power plants have to be replaced.

Until recently, the European industry had enjoyed a high level of protection. However, the scarcity of orders in Europe and throughout the world has increased the pressure on the industry to rationalize and the structure of the industry is evolving rapidly.

A series of mergers and alliances is creating a web of relationships among large companies. The rationale for setting up these large groupings is to gain direct access to many markets through having a geographic spread of manufacturing plants, to lower costs through rationalization and to develop the full range of power generating equipment, conventional and nuclear.

The deal that began the merger wave was the formation in 1987 of ABB out of the electrotechnical interests of Asea of Sweden and Brown Boveri of Switzerland. Besides its basis outside of the EC, ABB has manufacturing plants in Germany and other EC countries.

A counterweight to this was formed with the merger at the end of 1988 of the power equipment and other interests of GEC (General Electric Company) of the United Kingdom and Alsthom of France. The new company GEC-Alsthom is equally owned by GEC and the French telecommunications and heavy engineering group CGE (Compagnie Générale d'Électricité).

Table 7
The LWR power plant industry in the European Community

	Architect-engineers	NSSS	Heavy nuclear components	Balance of plant heavy equipment	
				Steam turbine	Alternators
Belgium					
Tractebel	x				
CMI			x		
ACEC					x
Germany (FR)					
KWU-Siemens	x	x		x	x
GHH			x		
Spain					
Empresarios Agrupados	x				
Initec	x				
Ensa			x		
France					
Framatone	x	x	x		
Alsthom-Atlantique				x	x
Italy					
Ansaldo	x	x (1)	x	x	x
United Kingdom					
GE Ltd/NNE	x			x	x
NEI — Rolls Royce			x		
Babcock Power			x		

(1) Under licences.

Source: DG XVII.

In the nuclear sector, the European leading suppliers Framatome of France (40% owned by CGE) and Siemens-KWU of Germany have recently signed an agreement to jointly develop and market pressurized water reactors for the international market. Under this pact, Framatome and KWU are setting up an equally owned joint company: Nuclear Power International (NPI), which will handle the marketing and sales of its parents' PWRs and coordinate development of a common PWR technology for the world market. It is generally accepted that this agreement can pave the way for a wider cooperation between the French and German nuclear industries.

The voluminous French nuclear programme has brought about technological developments of high quality and appreciable economies of scale. The electricity producer EdF plays an important role, being responsible for all the functions of industrial architect. Alsthom has been the sole supplier of turbo-alternators and associated equipment and services, in the non-nuclear part of the plant. Framatome is the sole supplier of nuclear islands and the manufacturer of the major nuclear components. Besides its deal with Siemens-KWU, Framatome is negotiating the setting up of joint ventures with Babcock and Wilcox of the United States for nuclear services, maintenance and possibly reactor development. The two companies are already cooperating in the nuclear fuels sector with two other French companies, Cogema and Pechiney. Framatome is also actively seeking to diversify into non-nuclear sectors and has acquired the American company Burndy specialized in connectors and the French company Souriau.

In the Federal Republic of Germany, the nuclear power station industry is grafted onto the conven-

tional power station industry around Siemens-KWU. Practically all the Siemens-KWU nuclear power stations have been built on a turnkey basis. Siemens-KWU performs the functions of industrial architect and is also the supplier of the nuclear island, but subcontracts the manufacture of heavy mechanical components to a highly qualified and very diversified manufacturing industry which it supervises. This practice is a major argument in favour of penetrating the markets of countries which are capable of constructing, but are not sufficiently advanced in the field of design. Siemens-KWU benefits from the experience acquired by Siemens in the conventional power-station sector, i.e. turbine and alternator. Besides the recent deal with Framatome, Siemens-KWU has entered into an agreement with ABB to set up a joint venture company, HTR-GmbH, to further develop and market high temperature gas reactors.

In the United Kingdom, after having developed the national reactor concepts Magnox and AGR, the industry, with American cooperation, is developing know-how with the PWR concept. The CEBG is assuming the function of industrial architect for the first British PWR at Sizewell. Westinghouse is supplying the nuclear island, while the reactor vessel is supplied by Framatome and the other major nuclear components are being subcontracted by Westinghouse to the UK manufacturing industry. The turbines and the alternators are being supplied by GEC. GEC has also become the sole owner of NNC (National Nuclear Cooperation) which has an agreement with Westinghouse for the introduction of the PWR technology in the United Kingdom. NNC and Westinghouse both hold 50% of PPP (PWR Power Project Company). The present arrangements

Table 8
Structure of exports of nuclear power stations
during the 1975-88 period

Importing country	Reactor type	Project	MWe (gross)	Date of order	Exporting company NSSS
Argentina	PHWR	Atucha 2	745	80	KWU
Belgium	PWR	Doel 4	1059	75	West. (Acecowen)
	PWR	Tihange 3	1048	75	West. (Acecowen)
Brazil	PWR	Angra 2/3	2x1325	76	KWU
China	PWR	Guandong 1/2	2x936	86/86	Framatome
Korea	PWR	Kori 3/4	2x950	78/80	Westinghouse
	PWR	Y'wang 1/2	2x996	79/79	Westinghouse
	PWR	Uljin 1/2	2x950	82/82	Framatome
South Africa	PWR	Koeberg 1/2	2x965	76/76	Framatome
Spain	PWR	Vandellos 2	982	75	Westinghouse
	BWR	Valdeca-Balleros	2x975	75	GE
	PWR	Trillo 1	1040	75	KWU
Taiwan	PWR	Maanshan 2	951	77	Westinghouse
United Kingdom	PWR	Sizewell B	1182	87	Westinghouse

Source: DG XVII.

foresee a build-up of resources in PPP to enable the company to take on the future role of a PWR nuclear design and construction company. At the subcontractor level, Rolls Royce has recently acquired NEI (Northern Engineering Industries). Besides potential benefits over a wide range of conventional engineering, the new structure will help to reinforce the nuclear design and construction capabilities of both companies. The UK industry is also very actively involved in the export of conventional power stations and has entered into partnership with foreign suppliers of nuclear islands (GEC with Westinghouse and Framatome) for the purpose of supplying the conventional part of nuclear power stations.

In Belgium, Italy and Spain the supply industry is also suffering from the nuclear slowdown and is partly losing its independence.

In Belgium, detailed design, construction management and nuclear power stations' start-up are entrusted to the design offices associated with the electricity producers, now merged in Tractebel. Design work relating more specifically to the nuclear steam-supply system is entrusted to a foreign supplier, hitherto Framatome or Westinghouse. Following the decision by the government not to build the next nuclear power station proposed by the electricity producers, Tractebel will concentrate its nuclear activities on providing services to the existing reactors. Among the subcontractors, which used to participate in the production of equipment, ACEC has been acquired by Alstom and CMI is looking for a partnership.

In Italy, Ansaldo is able to supply a LWR nuclear island under licences from General Electric and Westinghouse. Nevertheless, as a result of the moratorium on the Italian nuclear programme, the national industry has had limited prospects in the nuclear sector, but could benefit from a revival of the conventional power-station market, on which it has already achieved export successes. ABB has taken over Franco Tosi and Marelli and has established joint ventures in a number of conventional sectors with the State-owned Finmeccanica, which controls Ansaldo.

The Spanish nuclear programme has led to the development of the industrial architect sector along the lines of the American model. Several firms are active in this sector, the most important being the

nationalized company Enitec (Empresa Nacional de Ingeniería y Tecnología) and the privately-owned Empresarios Agrupados. The nuclear islands for the Spanish nuclear power stations were initially supplied by the American companies General Electric and Westinghouse and then by the German firm KWU. The principal manufacturer of large equipment, ENSA (Equipos Nucleares), is also a nationalized company. The Spanish companies are now switching from plant design to operating support and spent fuel and waste management.

It should also be noted that ABB has established with Westinghouse a new company which brings together the existing operations of the two companies in light water reactor services in Europe. The new company will have its headquarters in Brussels and operating units in Madrid and Mannheim.

Outlook

In the medium to long term, the European nuclear fuel and power station construction industry will continue to adapt to the requirements of the electricity generating industry. The share of nuclear-generated electricity is expected to continue increasing until 1995 (with a slowdown after 1990) (see Table 1). At that time, nuclear capacity should amount to 110 GWe.

The nuclear fuel industry should benefit from this moderate increase in EC requirements, covering most of the additional needs. It should maintain its technological development and know-how in order to strengthen its share of the world markets.

The nuclear power station construction industry, although it has proved capable of developing remarkable industrial technological know-how and of competing successfully with American and Japanese companies, will continue to feel the pressure to diversify and simplify structures, following the continuing low level of orders for equipment in Europe and throughout the world. In this respect, the prospects for the nuclear sector are similar to those for the conventional power station construction sector.

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ELECTRICITY GENERATION AND DISTRIBUTION

(NACE 161)

Summary

Electricity consumption has grown faster than GDP until recently. As a result, electricity has been playing an increasing role in the Community's energy balance. Growth has slowed down since 1986, partly as a result of the decline in fossil fuel prices, partly because of saturation effects. In the future, growth in electricity consumption is expected to be slower than growth in GDP. Nuclear power has been playing an increasing role in generating electricity. However, prospects for further nuclear expansion are relatively gloomy. Growth in electricity demand will, therefore, benefit fossil fuels, especially natural gas which becomes more attractive because of increasing environmental concerns. The structure of the EC electricity supply industry will be subject to substantial changes as a result of EC unification and increasing environmental concerns.

Description

NACE 161 includes generation of electric power for public supply from thermal energy (161.1), hydro-power (161.2) and nuclear energy (161.3), distribution of electricity (161.4) and generation of electricity for own consumption (161.5 to 161.7).

Consumption trends

Electricity consumption in the EC increased 60% between 1970 and 1985 (or 3.2% per annum on average). Growth continued over the last three years

but at a somewhat slower growth rate (2.9% per annum on average over the period 1985-88). Except for a short period in the early 1980s (during the recession), growth in electricity demand was stronger than growth in GDP over the first period

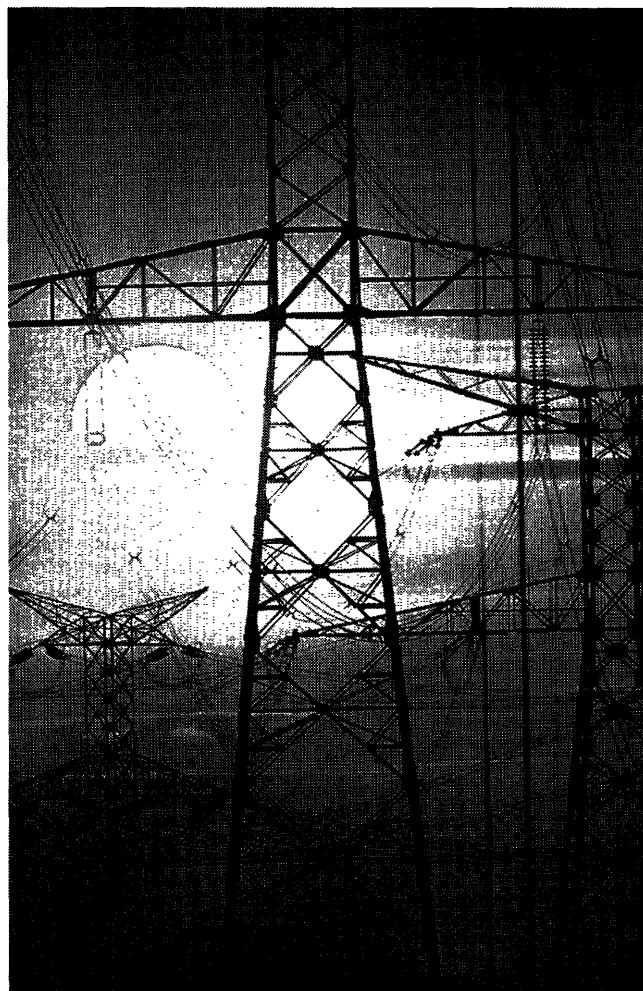


Table 1
Main indicators, 1980-90
Electricity supply industry (1)

(billion kWh)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Apparent consumption	1 418	1 424	1 422	1 460	1 518	1 585	1 626	1 677	1 725	1 789	1 854
Net production (2)	1 209	1 206	1 203	1 230	1 420	1 486	1 524	1 568	1 610	1 671	1 731
Electricity consumption as % of final energy consumption	14.7	15.3	15.7	16.2	16.6	16.7	16.8	17.1	N/A	N/A	N/A

(1) Electricity delivered to market (excludes electricity consumed and losses within power stations).

(2) 1980-83 EC 10.

Source: Eurostat (Sirene), DG XVII.

and, therefore, the electricity intensity of GDP increased between 1970 and 1985, at an average annual rate of 1.1%.

Table 2
Electricity intensity of GDP (1)

(kWh per 1 000 ECU)	1970	1985	1986	1987	1988	Change 1985/70 (%)
EC	518.3	612.7	613.0	617.0	612.9	18.2
Belgium	474.8	600.1	601.6	618.4	617.7	26.4
Denmark	383.3	510.3	513.5	539.6	548.0	33.1
FR of Germany	512.3	618.5	608.1	608.1	597.3	20.7
Greece (2)	N/A	856.2	878.0	916.2	961.2	N/A
Spain (2)	N/A	717.1	710.0	697.2	693.4	N/A
France	405.0	588.2	604.4	611.5	602.3	45.2
Ireland	633.1	706.7	738.4	728.0	719.5	11.6
Italy	479.1	547.8	544.3	554.0	560.3	14.4
Luxembourg	1 007.6	1 020.5	975.9	973.5	951.8	1.3
Netherlands	420.8	512.1	510.0	525.8	528.7	21.7
Portugal (2)	N/A	1 084.1	1 080.4	1 079.6	1 127.0	N/A
United Kingdom	725.5	648.7	649.2	644.5	636.9	-10.6

(1) At 1980 constant prices for GDP; consumption is defined here as electricity available for the internal market.

(2) IEA figures for the change from 1973 to 1986 are: Greece 44.7%, Spain 31.7%, Portugal 65.3%.

Source: Eurostat (Sirene, Sec 1).

The increase in intensity was uneven across countries, as indicated in Table 2. The countries where the electricity intensity increased more than the European average are those where nuclear power penetrated the most rapidly between 1970 and 1985 or those that were at a lesser stage of economic development in 1970. At the EC level, the electricity intensity of GDP has been virtually stagnant since 1985.

Several factors explain why electricity intensity stopped increasing after 1986:

- the oil price collapse and the general decline in fossil fuel prices, while electricity prices remained much more stable; as a result, electricity has become less competitive;
- the slowdown in nuclear power expansion, which is partially the result of the Chernobyl accident: the share of nuclear power in electricity generation increased rapidly in the 1970s and early 1980s to reach 31% in 1985 (compared to only 5% in 1970), but has increased only slightly since then;
- saturation effects in some applications and some countries: this is more visible in the most economically advanced countries, while there is still scope for increasing penetration of electrical appliances in the Mediterranean countries;
- the development of more efficient appliances and processes in general.

Most of these factors will continue to limit the rate of increase of electricity consumption in the future. Saturation effects will become widely spread as all the member countries reach an advanced stage of economic development. As a result, the electricity intensity of GDP is expected to remain stable until 1991, and then to continue declining.

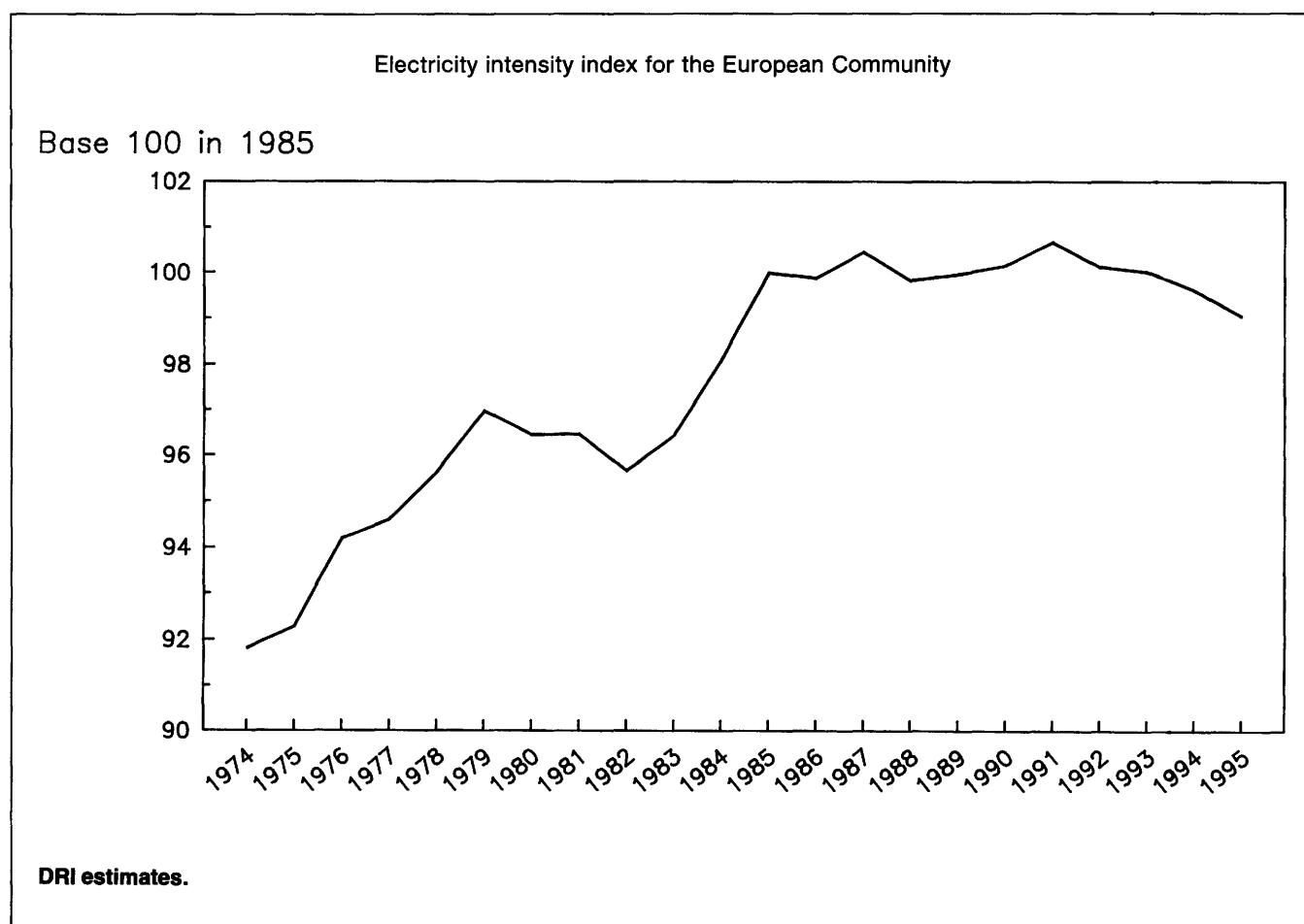
Electricity has increased its penetration, with the share of electricity in final energy demand increasing from 14.7% in 1980 to 17.1% in 1987. As indicated in Table 3, this share varies substantially across countries, reflecting such diverse factors as the structure of industry (the importance of industries which are

Table 3
Share of electricity in total final energy consumption, by sector and by country

(%)	1980			1987		
	Total	Industry	Households	Total	Industry	Households
EC	14.7	19.6	18.5	17.1	24.2	22.6
Belgium	11.7	15.8	12.1	15.0	21.7	15.9
Denmark	12.8	15.3	16.6	16.7	26.7	22.2
FR of Germany	15.2	19.6	18.3	16.9	23.3	20.8
Greece	16.1	21.3	31.7	17.6	24.7	33.8
Spain	17.6	24.3	28.7	20.7	30.1	35.4
France	14.2	18.1	18.4	19.2	24.8	27.5
Ireland	12.9	17.0	19.5	13.8	18.8	18.4
Italy	14.3	21.2	15.7	16.2	25.4	19.8
Luxembourg	8.9	9.0	15.6	11.4	13.3	19.3
Netherlands	11.4	17.9	18.8	13.1	11.4	14.9
Portugal	17.3	22.6	34.8	21.3	31.3	39.3
United Kingdom	15.8	19.7	22.0	16.7	24.0	23.1

Source: Eurostat (Sirene).

Figure 1



heavy consumers of electricity), the level of automation in industry, the use of electricity for space

Table 4
Share of electricity in final energy consumption by sector

(%)	1973 (1)	1980 (2)	1986	1987
Industry	50.6	47.1	43.6	43.3
Households	25.7	28.6	30.4	30.3
Other	23.7	24.3	26.0	26.4

(1) EC 9.

(2) EC 10.

Source: Eurostat (Sirene).

heating and the level of appliance ownerships in the domestic sector. There is scope for further penetra-

tion of electricity both in the industrial and the domestic sector.

The residential and commercial sector is the dominant market for electricity at the EC level, but the structure of electricity markets is very different across countries.

Production

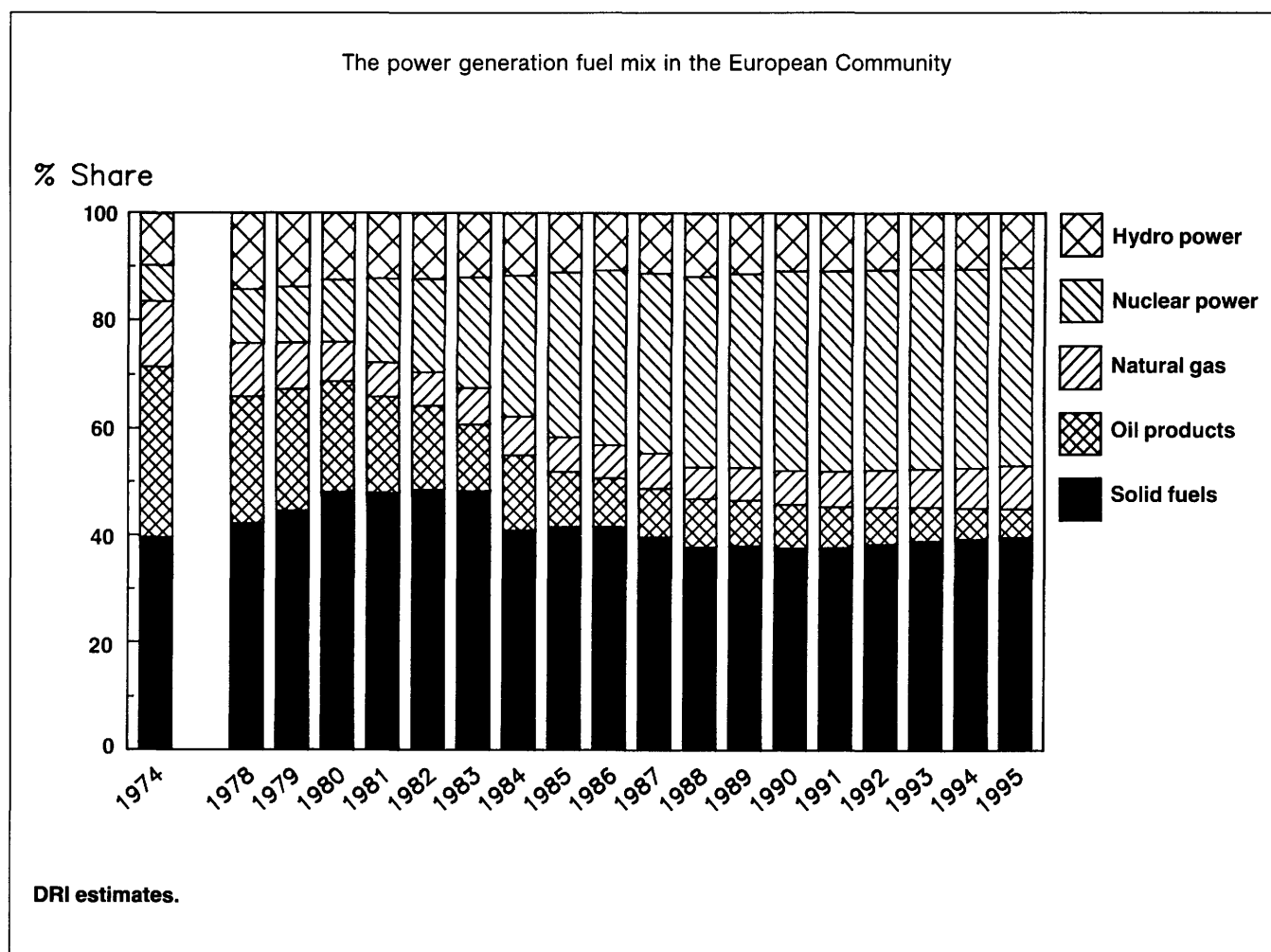
Three countries account for two-thirds of total EC electricity production — Germany (25%), France (23%) and the United Kingdom (18%) — and five countries (with the addition of Italy and Spain) account for 90%. France has considerably increased its share of total EC electricity production over the

Table 5
Share of electricity in final energy consumption by sector, 1987

(%)	EC	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK
Industry	43.3	52.1	28.4	44.5	42.8	53.2	37.0	36.9	52.4	62.4	45.4	53.6	36.1
Households	30.3	28.3	33.2	27.8	34.1	23.4	35.3	40.0	25.5	16.4	25.5	25.3	36.1
Other	26.4	19.6	38.4	27.7	23.1	23.3	27.8	23.2	22.0	21.2	29.1	21.1	27.8

Source: Eurostat (Sirene).

Figure 2



last 8 to 10 years, as a result of the French energy policy centered on the massive development of nuclear power and on the promotion of electricity. The other countries where electricity production increased by a large amount were the countries which were still at a low level of economic development at the end of the 1970s.

Table 6
Net electricity production by country

(billion kWh)	1980	1987	% change
Belgium	51	60	17.6
Denmark	26	28	11.5
FR of Germany	347	393	13.3
Greece	21	28	33.3
Spain	104	127	22.1
France	247	361	40.1
Ireland	10	12	46.1
Italy	177	191	7.9
Luxembourg	1	1	0.0
Netherlands	62	66	6.5
Portugal	15	20	33.3
United Kingdom	266	282	6.0

Source: Eurostat (Sirene).

Fossil fuels, used in conventional thermal power plants, continue to dominate energy consumption for power production. However, their contribution to electricity production has declined substantially over the 1970s and early 1980s, to 56% in 1987 (as compared to 83% in 1973). This decline in the use of fossil fuels for power generation was made possible by the strong penetration of nuclear power, which increased its contribution to electricity production from only 5.4% in the early 1970s to 32.3% in 1987. Hydro power (including geothermal energy) has maintained a relatively stable share of power production at around 12%.

Among fossil fuels, oil has been accounting for a declining share of energy use for power production, with a share of only 9.7% in 1987. The 1986 oil price collapse did induce a moderate switch back to oil in the power-generating sector in some countries, but this did not show in aggregate statistics for the EC in total, as it was compensated by continued phase-out in other countries. The contribution of natural gas has so far been relatively small for the EC as a whole (although one country, the Netherlands, relies

heavily on natural gas for electricity production). However, increasing environmental concerns could favour the use of gas in the future, if the price is right. Coal and other solid fuels were displacing oil for power generation in the 1970s but had to face increasing competition from nuclear power in the early 1980s. Their contribution to electricity production has been stable over the last five years. The price relationship between coal and natural gas will be critical in determining the future role of coal in the power-generating sector.

Table 7
Structure of electricity production

(%)	1973 (1)	1980 (2)	1987
Hydro	11.5	12.3	11.7
Nuclear	5.4	12.4	32.3
Thermal	83.0	75.3	55.8
Oil	31.0	21.9	9.7
Natural Gas	10.3	8.9	6.8
Solid Fuel	38.5	42.2	37.5
Other	3.2	2.3	1.8
Total (billion kWh)	98	120	157

(1) EC 9.

(2) EC 10.

Source: Eurostat (Sirene).

The rate of increase of nuclear capacity is expected to slow down and the contribution of nuclear power

to electricity production is forecast to reach a peak in the early to mid-1990s. However, the structure of the capacity of power plants is very different across member countries. France alone accounts for 55% of EC nuclear power capacity; 70% of French electricity is generated by nuclear power plants. On the other hand, countries such as Denmark and Greece do not use nuclear power at all and rely entirely on thermal power plants to produce electricity (see Table 8).

Electricity trade between Member States

The nature of electricity production requires that electricity be transmitted to the point of use within areas, regions and Member States and also across frontiers. This imposes technical requirements for the operational management of electricity transmission to reduce the inevitable power losses to a practical minimum, in the interests of economy and energy efficiency. Electrical interconnection across national frontiers has developed over many years as a logical extension of local, regional and intra-national interconnections, driven by the economic and technical advantages of more economical use of production facilities and increased reliability of supply. In the EC this has resulted in one of the most closely integrated high-voltage international net-

Table 8
Power generating capacity by country, 1987

(MW)	Nuclear	Thermal	Hydro	Other	Total
EC	89 271	254 417	77 292	572	421 552
Belgium	5 500	7 225	1 328	5	14 058
Denmark	0	8 317	8	113	8 438
FR of Germany	18 928	69 890	9 335	0	98 153
Greece	0	8 059	2 137	2	10 198
Spain	6 479	19 554	15 119	0	41 152
France	49 400	24 200	24 100	0	97 700
Ireland	0	3 368	512	450	3 880
Italy	1 273	36 754	17 879	0	56 347
Luxembourg	0	106	2 232	0	2 338
Netherlands	507	16 758	0	0	17 265
Portugal	2 111	3 617	3 233	1	6 851
United Kingdom	7 184	56 578	1 409	1	65 172

Source: Eurostat (Sirene).

Table 9
Electricity trade, 1988

(GWh)	Total	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK
Total exports	65.5	7.8	1.4	11.4	0.0	4.7	38.0	0.0	.2	.7	.1	1.0	13.0
Total imports	64.5	5.7	0.0	8.7	0.0	3.4	6.5	0.0	13.3	4.5	6.0	3.4	12.8
Net exports	1.0	2.1	1.4	2.7	0.0	1.3	31.5	0.0	- 13.1	- 3.8	- 5.9	- 2.4	.2

Source: Eurostat (Sirene).

works in the world, although Ireland and Greece are still not directly interconnected with any other Member States. Table 9 gives, for 1988, both the balanced interchanges with other countries (including non-EC) and the net exports or imports of electrical energy for each Member State. International exchanges are managed, without executive powers, by cooperative organizations of electricity utilities. These are UCPT (Austria, Belgium, France, Germany, Italy, Luxembourg, Netherlands, Switzerland, Greece, Portugal, Spain, Yugoslavia), UFPTE (France, Iberian Union), Sudel (Austria, Italy, Yugoslavia) and Nordel (Denmark, Norway, Sweden, Finland and Iceland).

The utilities themselves enter into commercial arrangements for the exchange and net transfer of electrical energy. Commercially, transfer arrangements are of three types:

- hour-by-hour exchanges on a cost basis;
- contracts (usually short-term) for net transfers;
- permanent arrangements for the transfer of energy from jointly-owned production plant in a neighbouring country.

Furthermore, it should be noted that all the elements of the international interconnection system are owned by monopolies, and transfer arrangements are cooperative and not mandatory. These interconnections do not, by any definition, constitute a common carrier system.

Electricity trade (between EC countries and non-EC countries) is very small, amounting to only approximately 14 TWh (10⁶ MWh) in 1986 (or less than 1% of EC consumption). This volume corresponds to electricity supplied by Austria and Switzerland to Italy and Germany and by Norway and Sweden to Denmark. Electricity trade between Member States has expanded considerably over the last 15 years. The volume of electricity traded has increased twice as fast as consumption, to represent now approximately 7% of electricity consumption. Exchanges of electricity between member countries increased to 188 TWh in 1988 (as compared to trade in Western Europe of only 58 TWh in 1973).

France is the only major net exporter of electricity in the EC. This situation has developed as a result of the excess nuclear power capacity in France, capacity which was planned on the basis of much higher electricity demand than has actually materialized. France exported 39 TWh in 1988. The major export markets for France are the United Kingdom (13 TWh in 1988), Italy (13 TWh), the Federal Republic of Germany (6.4 TWh) and Switzerland

(5.2TWh). The objective of EdF (the French electric utility) is to increase exports to 40 to 50 TWh in the mid-1990s. This is not an unrealistic target, given the available surplus capacity in France and the fact that the creation of the internal energy market should encourage electricity exchanges.

Industry structure

The electricity supply industry (production, transmission and distribution) in the EC is characterized by the existence of national monopolies, either statutory monopolies or *de facto* monopolies (e.g. by contract to municipalities in Germany). The supply of electricity involves many different activities: fuel inputs, power generation, transmission, maintenance of transmission grid, local distribution. Competition could potentially arise at each of the vertical stages, except local distribution. The electricity supply industry in the member countries can be classified into three broad categories:

- integrated State-owned
- decentralized mixed ownership,
- mixed dominant State incumbent.

France has the highest degree of vertical and horizontal integration, while, at the other extreme, Germany and the Netherlands have the most decentralized structures. In Belgium, electricity generation is mostly in the hands of private companies. The three major companies, with their share of public generation, are: Ebes (42%), Intercom (42%), Unerg (13%). The public generating undertakings are grouped under Société Coopérative de Production d'Electricité (SPE) and account for 3% of public generation. Several bodies have coordinating roles:

- the 'Pool des calories' ensures efficient supply of fuels to all power stations;
- the 'Comité de gestion des entreprises d'électricité' (CGEE) is responsible for investment planning and for establishing tariffs;
- the 'Société pour la coordination de la production et du transport de l'énergie électrique' (CPTE) coordinates production and transmission at the national level.

Municipalities are responsible for electricity distribution for lighting, domestic use and to industrial customers of less than 1000 kW. In Denmark, electricity production is in the hands of 12 companies, most of them private, except for two which are owned by municipalities. Power-generating utilities are grouped into two associations, Elsam and

Elkraft, which are responsible for coordination and planning of generation and transmission capacity, coordination of daily operations and fuel purchasing for power stations. The transmission grid is operated by 28 companies, including 5 of the 12 generating utilities. Electricity distribution is carried out by 111 companies: 5 are also producing companies, 54 are municipal undertakings and 52 are cooperatives or foundations.

In France, *Électricité de France (EdF)* was given in 1946 the monopoly of production, transportation and distribution. EdF accounts for 88% of installed generating capacity and 96% of electricity distribution.

The electricity supply industry is highly decentralized in Germany, with some 960 individual electric utilities. However, the industry is heavily regulated and electric utilities are far from operating in a free market. Several federal and regional bodies are responsible for the coordination and regulation. Nine main 'first level' utilities (two of which are publicly owned) own and operate most of the generating capacity, including all nuclear plants, and nearly the entire national high-voltage grid. The 74 regional utilities ('second level') own some generating capacity and have transportation and distribution activities. The municipal utilities ('third level') only distribute electricity via the low-voltage grid.

In Greece, the Public Power Corporation has a monopoly over production, transmission and distribution. A similar situation exists in Ireland under the Electricity Supply Board.

In Italy, *Ente Nazionale per l'Energia Elettrica (ENEL)* is a State company responsible for production, importation and exportation, transmission, transformation and distribution of electricity throughout Italy. Exceptions to ENEL's monopoly exist in the following cases:

- municipal undertakings that existed before 1962;
- autoproducers who consume more than 70% of their production;
- production in CHP plants of less than 3MW; production from renewable resources.

In the Netherlands, production, transmission and distribution of electricity are in the hands of municipal and provincial undertakings. After reorganization of the industry in 1987, there are now seven provincial companies and one municipal company responsible for producing and transmitting electricity. They are grouped in the 'Cooperative of Electricity Producers' (SEP), which is responsible for

planning capacity and coordinating inter-provincial and international electricity exchanges. Sixty-seven municipal companies distribute electricity and are grouped in VEEN. In Portugal, *Electricidade de Portugal (EdP)* has a quasi-monopoly over production and transmission. Independent production and distribution is allowed in areas not covered by EdP's distribution network.

In Spain, the electricity industry consists of a large number of utilities. Twenty-one of them generate electricity and are grouped in *Unidad Electrica (Unesa)* which is responsible for coordinating production and transmission activities. The electricity grid was nationalized in 1984 and is operated by Redsa.

Currently the electricity supply industry in the United Kingdom consists of four public utilities:

- the Central Electricity Generating Board (CEGB), serving England and Wales;
- the South of Scotland Electricity Board (SSEB), serving the industrial south of Scotland;
- the North of Scotland Hydro Electric Board (NSHEB), serving the north of Scotland and the islands off the mainland;
- the Northern Ireland Electricity Service (NIES), serving Ulster.

In England and Wales the CEGB (the largest of the four utilities) generates and transmits electricity, while sales and distribution are handled by 12 'Area Boards'. The SSEB, NSHEB, and NIES are fully integrated, self-contained utilities. SSEB and NSHEB are closely linked, however. None of these utilities is in a monopoly position.

This status was confirmed by the Energy Act of 1983 which permits private companies and individuals to generate and sell electricity, and to use public grids for this purpose. The electricity industry will be privatized by January 1, 1990. The CEGB's generating capacity will be split 70%/30% between two generating companies, National Power and Power Generating Co. (PowerGen). National Power will own all the nuclear plants. The ownership of the transmission grid will be placed in the hands of the 12 Area Boards, though its operation will be independent. The two Scottish utilities will be sold as fully integrated electricity supply companies. The Area Boards will be allowed to generate power themselves or buy from another supplier. National Power, PowerGen, the Scottish Utilities, *Electricité de France*, Area Boards, industrial co-generators and anybody else generating electricity will compete to

supply power to the Area Boards as well as to large contracting consumers. The responsibility for final supply of electricity to consumers is given to the Area Boards.

Implications of EC unification for the electricity industry

In order to achieve a more open internal market in electricity, the Commission has identified a number of potential obstacles that will need to be removed and has defined several potential problem areas that should be given priority consideration:

- (1) Improvement of cost and price transparency: there is a lack of harmonization of pricing and tariff structures; although electricity prices have in general a high degree of transparency, prices to large consumers are non-transparent; there is a definite lack of transparency in electricity production costs, prices for electricity transfer between systems and fuel prices for electricity production;
- (2) Differences in taxation of electricity (VAT and excise taxes);
- (3) Differences in fiscal treatment of electric utilities and in conditions of access to the financial market;
- (4) Variations in standards and administrative constraints, such as differing standards for environmental protection and security requirements for power plants;
- (5) Monopolies and exclusive rights: lack of liberal access to fuel supplies by electricity producers; exclusive rights of operations and use of interconnecting transmission systems and of distribution systems (this is the so-called 'common carriage' issue — 'common carriage' should benefit the consumers by offering them the ability to obtain supplies from any suitable low-cost production source; the exact concept of 'common carrier', as well as the related obligations, has not been clearly and specifically defined yet);
- (6) Lack of high-tension electricity interconnection of Ireland and Greece with the rest of the Community.

Environmental issues

The Directive on control of emissions from large combustion installations (LCI) was finally adopted by the Council in November 1988, after four years of

lively debate. The Directive is made up of two parts and is based on the use of the best technology available at a reasonable cost. Applying this technical constraint helps to ensure the evolution of new and better technologies for pollution abatement.

The first part of the directive applies to new combustion plants built after 1 January 1990 and exceeding 50 MWh. Under the Directive, all new large combustion plants will be subject to a licensing procedure to ensure that they meet specified emission limits for SO₂, NO_x and dust. The second part applies to existing stationary combustion sources (those for which authorization was given before 1 July 1987), and specifies target values for reduction of emissions based on the 1980 level. SO₂ emission must be cut by a total of 60% on 1980 levels in three stages (10% by 1993, 40% by 1998, and 60% by 2003). Similarly, NO_x must be cut by 30% on 1980 levels in two stages (15% by 1993 and 30% by 1998). Plants authorized before 1987 and built before 1990 must either conform to new plant standards or be taken into account in the global emission levels, without raising the global ceiling value.

Although new plant emission standards are uniformly established, those for global targets vary from country to country. Moreover, exceptions have been included at the insistence of individual countries, and countries may demand a relaxation of their targets for technical reasons or for 'substantial and unexpected change in energy demand, or in the availability of certain fuels or certain generating installations'.

The newly agreed EC emission limits for LCI favour the penetration of natural gas in the power generating sector and the construction of small power plants. Though limits imposed on NO_x emissions in new plants can be met without the need for expensive NO_x emission abatement equipment, proposed SO₂ emission limits are relatively constraining for the use of coal. Strict compliance with the directive could nearly double the quantity of natural gas burnt in power plants in the late 1990s (compared to a situation of no change in legislation in 1988).

The impact of emission control on electricity prices is highest in Denmark, the Netherlands, the Federal Republic of Germany and the United Kingdom. However, were emission abatement costs to be paid equally by all electricity users, consumer pre-tax prices would be affected by less than 7%.

Outlook

Electricity demand is forecast to continue growing in the future, but at a slower rate than in the past, and at a slower rate than GDP, for reasons explained above. From an average 3.1% between 1970 and 1988, the average rate of growth in electricity demand is expected to fall to 2.6% between 1988 and 1995. Among the end-use sectors, growth is projected to be strongest in the domestic sector, because of healthy growth in consumer expenditures and of increasing appliance ownership in some of the Member States. Among member countries, growth will be strongest in Greece, Ireland, Portugal and Spain.

Apart from plants now under construction or already planned, very little additional nuclear capacity is expected. Most of the nuclear capacity addition will take place in France. As a result, the contribution of nuclear power to electricity production is projected to reach a peak of 37% in the early 1990s and then to decline slowly. The only country where the share of nuclear power is expected to con-

tinue increasing is France, where it could reach 80% by the mid-1990s. France will export increasing volumes of electricity until the mid-1990s. Increasing concerns over air pollution and the greenhouse effect could revive the prospects for nuclear power but the impact will not be felt until the end of the century, given the long delays in planning and commissioning new nuclear power plants.

Oil consumption in power plants is forecast to continue falling and the contribution of oil to electricity generation will be further reduced. The bulk of the additional generation requirements will be met by solid fuels and natural gas. Gas consumption in power plants could increase by 50% — or more in a price/environmental scenario particularly favourable to natural gas — between 1988 and 1995, raising gas contribution to power generation to 8% to 10% (compared to 6% now). Although solid fuel consumption in the power-generating sector will increase by 14% over the same period, the share of solid fuels in fuel input power plants is expected to be virtually stable.

DRI Europe

TRANSMISSION AND DISTRIBUTION OF NATURAL GAS

(NACE 162)

Summary

The year 1987 was a good one for the gas industry. The 6% increase in gross inland consumption compared favourably with the rather sluggish growth of previous years. The share of gas in gross energy consumption rose from 17.9 to 18.7%, a more marked gain than in immediately preceding years. In order to cover this higher demand, both Community primary production and extra-Community imports increased. Competitive gas prices were a main factor behind the rising consumption trends, and gas made advances not only in the domestic but also in the industrial market. The power-station market also showed significant growth.

Provisional data for 1988 show a slight fall in gross inland consumption and a corresponding decline in Community production and imports.

In 1987 there was a fall in investment levels, reflecting the downward trend in construction of the transmission lines, in the integrated continental grid. However, in Greece and Portugal, plans were announced for a new infrastructure necessary to implement energy policies in which natural gas is to make an increasingly important contribution.

Description of the sector

The term natural gas industry covers a range of activities designed to bring natural gas to the customer, which is available at the turn of a tap. Three principal activities may be distinguished: exploration and production, transmission and distribution.

Although a few gas companies have exploration and production activities, this activity is generally considered to be outside the gas sector since it is mainly the province of major oil companies. This chapter concentrates on the transmission and distribution of natural gas.

The term transmission applies to:

- the purchase of gas from producers or from other transmission companies
- the transportation and storage of the gas
- the sale of gas to other transmission companies, to industrial consumers and power stations and to local distribution companies.

The distribution activity is concerned with the supply of gas by a local network, to domestic and non-domestic consumers linked to this network. In most of the Member States a two-tier structure has developed with one or more large companies responsible for transmission activities and other undertakings, operating on a regional or local basis, responsible for distribution. In the United Kingdom, however, a single large company purchases, transports and resells gas to end consumers, and a similar system prevails in France.

Supply and demand trends

Supply patterns

In 1987 Community production was almost 6 million TJ, an increase of 3% over 1986. The two largest producers, the UK and the Netherlands, increased production by over 3% and 2% respectively, the Federal Republic of Germany by 13% and Denmark by

Table 1
Main indicators, 1982-90
Natural gas

(GCV) (1)	1982	1983	1984	1985	1986	1987	1988	1989	1990
Apparent consumption	6 253.4	6 616.8	7 031.5	7 367.1	7 660.6	7 519.4	7 082.6	7 342.7	7 621.7
Net exports	-857.9	-1 037.3	-1 451.3	-1 453.6	-1 867.4	-1 543.7	-1 567.4	-1 612.5	-1 756.6
Primary production	5 395.5	5 579.5	5 580.2	5 913.5	5 798.3	5 975.7	5 515.2	5 730.2	5 865.1

(1) GCV = gross calorific value; 1 000 TJ (TJ = 10 KJ).

Source: Eurostat (Sirene), IEA.

Table 2
Trade by origin

(GCV) (1)	1982	1983	1984	1985	1986	1987
Primary production	5 395.5	5 579.6	5 580.2	5 913.5	5 798.3	5 975.5
Supplies from EC	1 297.4	1 306.2	1 207.0	1 307.2	1 109.0	112.5
Imports from third countries	2 226.3	2 436.0	2 777.9	2 858.8	3 101.4	3 427.2
Norway	1 007.8	1 005.1	1 090.6	1 036.1	1 042.1	1 133.2
USSR	841.7	823.8	949.4	979.8	1 216.9	1 294.7
Algeria	333.7	530.0	684.6	793.4	800.4	961.5
Other	43.2	77.1	53.5	49.4	42.1	37.8
Import penetration (%)	29.8	31.3	33.8	33.3	35.7	37.0
Exports to third countries	1 368.4	1 398.8	1 326.5	1 405.2	1 239.0	1 210.4

(1) GCV = gross calorific value; 1 000 TJ (TJ = 10 KJ).

Source: Eurostat (Sirene), IEA.

27.5%. However, domestic production in France fell by about 7%. Although, in volume terms, Community production was higher than in 1986, it continued to fall as a percentage of gross inland gas consumption, from 67 to 64.8%. The Netherlands continued to be the principal Member State gas supplier. In 1987 the Netherlands exported 1 121 900 TJ to the other Member States, 3.5% less than in 1986.

Imports from outside the EC totalled 3.43 million TJ in 1987, an increase of 10.5% over 1986 (and about 37% of gross inland consumption). The USSR remained the major non EC country supplier with a volume increase of 6% although the share of Soviet supplies in total gas imports dropped slightly to 37.8% (39.3% in 1986). The volume of Norwegian gas increased by 9% but its share in EC gas imports remained steady at just over 33% and Algeria increased its volume by over 20% and share to 28% (25.8% in 1986). Norway increased its exports most to Germany and France, the USSR to Germany and Italy, Algeria to France and Italy.

In the five years 1983-87, Community production increased by an overall 7%, but fell as a percentage of gross inland consumption from 71% to 64.8%.

Over the same period, third-country imports rose from 31% to 37% of natural gas consumption. In 1983 Norway was the main supplier, but was overtaken in 1986 by the USSR. Algeria's exports to the Community have almost doubled since 1983.

The provisional figures for 1988 indicate a fall of primary production (declining to about 62% of gross inland consumption), as well as in intra-Community imports. In contrast, extra-Community imports are believed to have increased; the Soviet Union remained the principal third-country supplier, increasing its exports by more than 4%.

Share in gross energy consumption

The share of natural gas in gross energy consumption in 1987 was 18.7%, an increase of 1.3% since 1983 and the largest year-on-year increase since 1982-83. Excluding Greece and Portugal, the 1987 shares ranged from 3.9% in Spain to 51.5% in the Netherlands. In Italy and the UK, the share of gas was over 20%.

Table 3
Trends in external trade

(GCV) (1)	1982	1983	1984	1985	1986	1987
Imports extra-EC	2 226.3	2 436.0	2 777.9	2 858.8	3 101.4	3 427.2
Index (1985 = 100)	77.9	85.2	97.2	100.0	108.5	120.0
Exports extra-EC	1 368.4	1 398.8	1 326.5	1 405.2	1 239.0	1 210.4
Index	97.4	99.5	94.4	100.0	88.2	86.1

(1) GCV = gross calorific value; 1 000 TJ (TJ = 10 KJ).

Source: Eurostat (Sirene), IEA.

Table 4
Share of natural gas in gross inland consumption

(%)	1982	1983	1984	1985	1986	1987
EC	16.6	17.4	17.8	18.0	17.9	18.7
Belgium	16.4	17.6	17.6	17.6	14.6	16.1
Denmark	0.0	0.0	.6	3.0	5.7	7.1
FR of Germany	15.4	15.9	15.8	15.8	15.5	17.1
Greece	0.0	.4	.5	.4	.6	.6
Spain	3.1	3.2	3.0	3.3	3.6	3.9
France	12.0	12.7	12.6	12.5	12.3	12.5
Ireland	20.5	22.3	22.6	22.2	14.3	14.3
Italy	17.3	17.8	20.5	20.5	21.7	22.9
Luxembourg	9.2	9.1	9.2	9.7	9.8	11.2
Netherlands	48.3	50.6	51.2	52.8	51.2	51.5
United Kingdom	21.0	21.9	22.6	23.1	23.2	23.3

Source: Eurostat (Sirene), IEA.

Consumption trends

In 1987 the gross inland consumption was 9.22 million TJ, an increase of 6% over 1986. This compares with a very modest increase of just over 1% in 1985. Steady growth continued in 1987 in the domestic sector which accounted for about 50% of gross inland consumption. The industrial and power-station sectors also increased their consumption of gas. In 1987 consumption in the industrial sector increased by 306 806 TJ (+ 12%), and in the power-station market by 87 973 TJ (+ 8%).

Consumption increased in all the Member States except for Ireland, where it fell by just over 1%. In Denmark where natural gas was introduced relatively recently and is penetrating rapidly, consumption increased by 27% (55% in the industrial market and over 32% in the domestic market). In Spain, where gas use is also growing rapidly, consumption increased by almost 12%; industrial consumption increased by about 29% and domestic use by 14%. In countries with more mature gas industries, increases in consumption ranged from just over 1% (UK) to

about 11% (BLEU and Italy). In Italy, the increase was mainly due to increased use of gas in electric power stations.

Provisional estimates indicate that the gross inland consumption in 1988 was slightly lower than in 1987, at about 8.9 million TJ, a fall of about 4%. However, this downward trend was not uniform across all countries.

The European grid

Investment

The physical infrastructure of the gas industry consists of pipelines and of other equipment needed to regulate the passage of gas through the pipelines (notably compressors) as well as for storage and gas treatment. Table 7 shows the investment undertaken in recent years in ecu. The data given concern only transmission and distribution investment.

The outlay in 1987 was ECU 4.47 billion, a decline of about 3% from 1986. Investment decreased by

Table 5
Trends in consumption and uses

(GCV) (1)	1982	1983	1984	1985	1986	1987	1988
Gross inland consumption	7 458.6	7 791.5	8 217.0	8 592.3	8 689.6	9 221.9	8 905.7
% of total energy consumption	16.6	17.4	17.8	17.9	17.9	18.7	N/A
Final non-energy consumption	540.3	569.0	646.2	626.6	529.7	5 272.2	N/A
Transformed in power stations	965.0	1 046.7	1 152.4	1 055.0	1 020.0	1 108.0	N/A
Final energy consumption	5 666.4	5 807.5	6 135.4	6 536.7	6 698.6	7 184.6	N/A
Of which:							
Industry	2 151.3	2 260.9	2 331.9	2 376.7	2 341.7	2 648.6	N/A
Households	3 502.9	3 634.5	3 791.5	4 148.8	4 355.5	4 524.8	N/A

(1) GCV = gross calorific value; 1 000 TJ.

Source: Eurostat (Sirene), IEA.

Table 6
Trends in natural gas consumption by country

(GCV) (1)	1982	1983	1984	1985	1986	1987
EC (2)	8 153.2	7 796.0	8 208.0	9 068.2	9 119.9	9 221.8
Belgium, Luxembourg	328.3	343.3	345.8	355.0	317.7	356.1
Denmark	.6	4.6	4.6	502.4	478.4	60.7
FR of Germany	1 781.8	1 843.0	1 896.1	1 918.2	1 908.5	2 115.7
Greece	3.5	3.2	3.5	3.3	4.5	5.2
Spain	97.3	99.5	94.8	109.4	118.8	132.7
France	981.8	1 042.6	1 090.2	1 129.1	1 131.8	1 168.3
Ireland	771.2	82.6	87.8	90.5	63.2	62.5
Italy	1 022.8	1 048.6	1 234.0	1 265.2	1 343.3	1 491.5
The Netherlands	1 274.2	1 356.7	1 433.7	1 503.7	1 512.9	1 563.6
United Kingdom	1 891.7	1 971.9	2 017.5	2 191.4	2 240.8	2 265.5

(1) GCV = gross calorific value; 1 000 TJ (TJ = 10 KJ).

(2) Excluding Portugal.

Source: Eurostat (Sirene), IEA.

20% in transmission activities but increased by around 4% in distribution activities. The year 1987 was the first year in which overall investment fell. The increase of 1987 over 1983 was about 16% but, within this global increase, investment in transmission activities fell by about 29%, while investment in distribution activities increased by about 50%. This reflects the maturity of the transmission grid in the majority of Member States, and the continuing expansion of the distribution lines to supply new end-users.

Planned expansions

In 1987 and 1988 there were important developments to consolidate the role of natural gas in those countries where it is still relatively under-developed or non-existent.

Greece announced plans to import gas from the Soviet Union and Algeria to meet the country's energy needs from 1992, over a 20 to 25 year period. The necessary infrastructure is in the planning stage, consisting of a proposed pipeline of about 480 km to transport Soviet gas from the Greek-Bulgarian border to Athens, and of an LNG terminal off the Attic coast to import Algerian gas. The project will also involve the construction of a gas distribution network in Athens and northern cities.

Portugal, which as yet has no natural gas supply, has also announced plans to import gas from 1992. The project will involve construction of a terminal and transmission lines to Lisbon and other main cities.

In Spain, progress was made on the project for a pipeline to link, across the Pyrenees, a gas-field in

Table 7
Investment by gas industries

(million ECU)	1982	1983	1984	1985	1986	1987
Transmission	1 653.8	1 594.2	1 480.7	1 391.4	1 400.8	1 132.8
Distribution	2 169.9	2 265.7	2 640.5	3 007.0	3 217.0	3 338.2
Total	3 823.7	3 859.9	4 121.2	4 398.4	4 617.8	4 471.0

Source: Industry sources.

Table 8
Investment, 1987

(million ECU)	B	DK	D	E	F	IRL	I	NL	UK
Transmission	18.4	29.7	307.0	66.5	150.0	22.6	331.1	90.9	116.6
Distribution	77.3	182.9	1 034.5	129.6	437.3	13.5	825.9	213.9	396.4
Total	95.7	212.6	1 341.5	196.1	587.3	36.1	1 184.0	304.8	513.0

Source: Industry sources.

the north of Spain to the French field of Lacq, and hence the main continental grid. Within Spain, new lines are planned to supply gas to cities which are as yet unconnected.

Natural gas and the environment

Natural gas is an environmental-friendly fuel. Gas combustion produces only one significant pollutant, nitrogen oxides (NO_x) but much less per unit of energy produced than other fossil fuels.

Various NO_x abatement techniques are under development. The options involve reducing the formation of NO_x by modifying combustion conditions or subsequently cleaning up the flue gases, either by injecting a chemical which converts the NO_x to some other form, or by using some method of scrubbing the combustion products. One technique, low NO_x burner design, can reduce emissions by between 30% and 60%.

Natural gas has a potentially important role to play in preventing global climatic changes (a result of the greenhouse effect). In common with other fossil fuels, natural gas produces one of the greenhouse gases CO₂, but quantities produced per unit of energy used are less than for other fuels. Switching to fuels emitting less CO₂, together with energy conservation and increased fuel efficiency, will help reduce overall CO₂ emissions.

Outlook

The outlook for natural gas remains favourable. Demand is forecast to increase into the next century, as a result of the development of new markets in Greece and Portugal, and of continuing growth elsewhere. Various factors continue to influence the rate of growth of gas demand in Europe, including:

- environmental concerns, and their consequence for the pattern of fossil fuel use;
- developments in the other fuel markets, notably the trends in oil availability and prices, and the policy on the role of nuclear generation of electricity;
- the competitive position of natural gas in the different end-markets.

Of the above points, the environmental concerns could have an increasing influence. Issues which previously have been confined to specialist scientific fora have entered into the political arena and into the consciousness of public opinion. Natural gas could make an important contribution to solving environmental problems.

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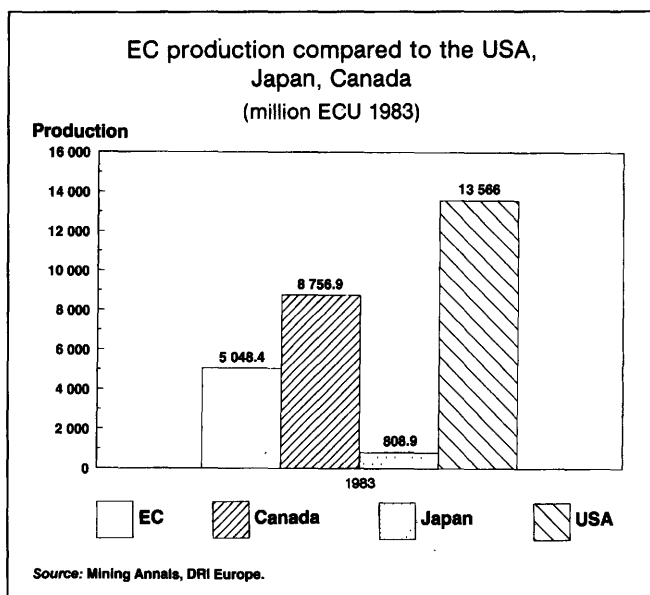
MINING INDUSTRY

(NACE 21 and 23)

Summary

In terms of turnover, the European mineral mining industry stands far behind the USA and Canada. For some economically strategic minerals, the European Community relies entirely on non-European production. However, the significance of this dependence is lessened by European direct investments outside the EC, which allow European mining companies to control part of the non-European supply. The EC mining industry experienced a downturn in the late 1970s and early 1980s, but its prospects are now much better as both productivity and profitability have improved. Furthermore, the entry of Greece, Spain and Portugal have enlarged its mineral base.

Figure 1



The economic importance of the industry in the EC economy

The mining industry provides the world industry with all required mineral raw materials, both metallic (NACE 21) and non-metallic (NACE 23). It thus plays the role of a starting-point for many manufacturing chains.

Table 1
Comparative importance of the mining sectors of the EC, USA, Canada and Japan

1983 (1)	Production		Value/ GNP (%)	No main products mined
	Value (million ECU)	Density (ECU/km ²)		
EC	5 048.4	2 570.2	.16	31
USA	13 566.2	1 448.8	.30	35
Canada	8 756.9	878.0	2.09	25
Japan	808.9	2 178.0	.05	22

(1) Latest available statistics, summer 1985.

Source: Mining Annals.

The products are mined by surface or underground methods. This industry requires a high degree of technology, which was already attained in the 19th century, and was further developed during the 20th century, enabling Europe to obtain its minerals despite sometimes difficult conditions.

Current situation

Table 1 illustrates the economic importance of the mining sector in comparison with competing coun-

Table 2
Metallic ore production

(tonnes, metal content)	1980	1981	1982	1983	1984	1985	1986	1987
Copper	6 274	7 430	4 968	71 149	70 100	64 700	56 600	19 500
Zinc	N/A	N/A	636 000	656 000	727 000	719 000	612 000	634 000
Lead	N/A	N/A	N/A	218 000	227 000	209 000	195 000	199 000
Bauxite	5 069 300	4 984 000	4 543 443	4 115 000	3 925 699	3 828 000	3 497 700	3 681 000

Source: Eurométaux.

Table 3
Non-metallic ore production, 1987

(1 000 tonnes)	Barytes	Fluorspar	Gypsum	Kaolin	Magnesite (1)	Potash	Salt
Belgium	40	0	0	0	0	0	0
FR Germany	154	85	1 707	588	0	2 200	12 862
Greece	5	0	650	145	843	0	160
Spain	29	184	5 500	330	558	835	2 580
France	105	183	5 409	309	0	1 539	4 860
Ireland	70	0	284	0	0	0	0
Italy	113	137	1 300	126	0	177	3 694
Netherlands	0	0	0	0	0	0	3 979
Portugal	1	0	0	117	0	0	525
United Kingdom	90	130	3 500	3 059	0	714	2 000
EC	607	719	19 010	4 674	1 400	5 465	30 660
World	4 300	4 700	80 700	22 400	12 400	30 200	173 900

(1) Raw magnesite.

Source: National data, EC data.

tries such as the USA, Canada and Japan. In terms of production value, the EC ranks only third, far behind the USA and Canada. Japan's production is more than six times lower than that of Europe. However, in terms of production density, the Community is the world leader, followed by Japan, the USA and Canada. Similarly, the number of substances mined is particularly high.

Production and consumption

Metallic ore production

Bauxite production is the most significant. At the moment, copper is produced in only marginal quantities within the EC. The position will alter radically, however, once Neves Corvo in Portugal is fully on stream. It is expected that this mine alone will produce 150 000 tonnes per year, making Portugal a copper producer of major importance. The jump in copper ore production in 1983 is explained by the inclusion of data for Spain and Portugal.

Non-metallic ore production

Turning to the non-metallic sector, apart from salt the most important production in terms of volume is that of gypsum, followed by potash. The major gypsum producers are Spain (5.5 million tonnes) and the UK (3.5 million tonnes). Potash production is headed by the Federal Republic of Germany (2.2 million tonnes), followed by France, with 1.5 million tonnes. Two other minerals deserve mention — the UK's production of kaolin (3 million tonnes) and Greek production of magnesite (840 000 tonnes).

Employment

At Community level, employment is estimated at 76 000 people, divided up as follows:

Table 4
Employment

(1 000)	Estimated employment
Belgium (1)	1
FR of Germany	16
Greece	10
Spain	13
France	12
Ireland	2
Italy	7
Netherlands (1)	1
Portugal	4
United Kingdom	10
EC	76

(1) Less than 1 000.

Source: National data.

This estimate is probably on the low side, however, and disregards the fact that employment in the downstream sectors of minerals-related industries, such as processing/refining and mining equipment manufacture, is also important.

These employment figures stress the significance of the mining industry in some southern countries, which in terms of GDP have a lower European importance. In fact, the Spanish and Greek workforces rank respectively second and third, behind the Federal Republic of Germany and in front of France, Italy and the United Kingdom.

External trade

The degree of European dependence on minerals produced outside the EC is shown in Table 5. Imports are given as a percentage of domestic consumption plus exports. There are a number of minerals for which the EC relies totally on external production. Among these are boron, cobalt, manganese, molybdenum, phosphates, the platinum group, rare earths, tantalum, vanadium and titanium. These minerals are among those which are vitally important in certain areas of industrial production — especially the manufacture of special steels. Furthermore, as far as the steel sector is concerned, it can be seen that Europe relies on imports to supply 94% of total iron ore consumption (as compared with only 23% in the case of the USA).

Taking other areas of base metal production such as aluminium, copper and tin, it can be seen that dependence rates remain over 90%. Lead and zinc, however, differ from the other minerals mentioned in so far as domestic EC production is of propor-

tionately more significant dimensions. Lead has an import dependence rate of 44% and zinc of 62%. Some of these imports are inevitably supplied by European companies operating outside the Community.

Structure of the industry

The Community mining industry comprises concerns of all shapes and sizes. Table 6 classifies production in order of importance, and per type of mine (underground or open-cast).

The majority of underground operations provide less than 1 million tonnes of ore per year. This again tends to stress the importance of small and medium-sized producers within the Community. This fact is especially true of Ireland, Portugal and Spain.

Figure 2

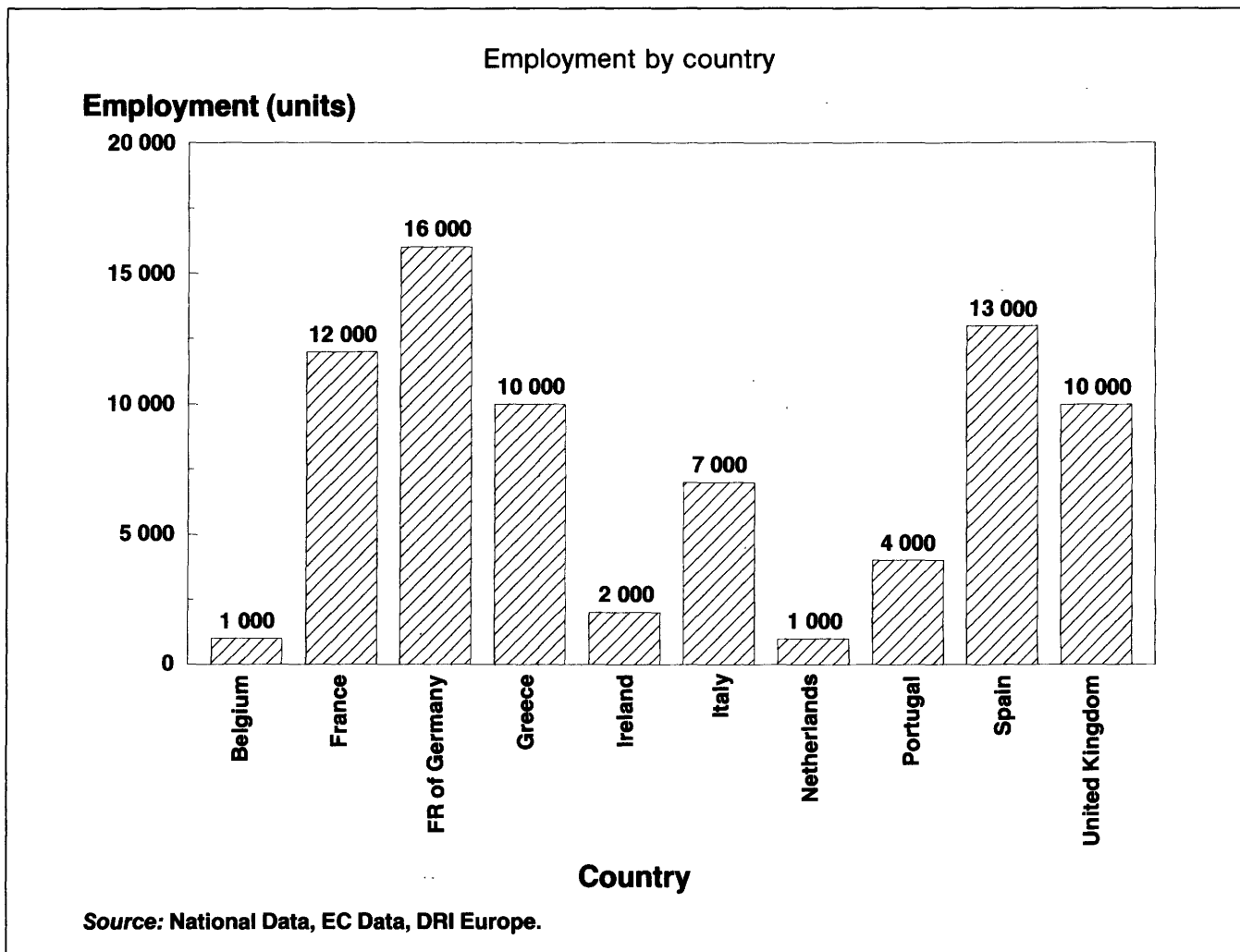


Table 5
Import dependence, 1985-86 (1)

(%)	EC	Japan	USA
Aluminium (inc. bauxite and alumina)	80	77	73
Antimony (2)	97	98	98
Arsenic	N/A	N/A	84
Asbestos	55	100	67
Barytes	19	47	85
Beryllium	100	100	19
Bismuth	79	0	76
Boron	100	100	8
Cadmium (refined)	27	0	58
Chromium	91	99	76
Cobalt (2)	100	100	100
Copper	82	91	22
Fluorspar	32	100	86
Germanium (refined)	25	22	N/A
Indium	N/A	25	0
Iron ore	94	100	23
Lead	44	61	17
Lithium	100	100	0
Magnesium metal	50	37	4
Manganese	99	99	100
Mercury	N/A	7	N/A
Molybdenum	100	100	0
Nickel	88	100	83
Niobium	100	100	100
Phosphate	97	100	0
Platinum group (2)	100	98	100
Potash	25	N/A	28
Rare earths	100	100	15
Rhenium	100	100	19
Selenium	100	100	55
Silicon	44	100	58
Silver	53	21	100
Sulphur	21	0	15
Tantalum	100	100	87
Tellurium (3)	N/A	5	N/A
Tin	86	95	72
Titanium	100	100	86
Tungsten (4)	89	53	63
Uranium	75	100	N/A
Vanadium	100	100	36
Vermiculite	100	0	10
Zinc	62	61	57
Zirconium	100	100	37

(1) Annual average. Imports as a percentage of domestic consumption. In calculating these ratios no allowance has generally been made for changes in stocks.

(2) Before allowing for secondary recovery.

(3) USA figure is less than 22%.

(4) Figures for the EC and Japan do not make allowance for secondary recovery.

Source: *Minerals Handbook* 1988-89 (PCF Crowson).

EC direct investments in the rest of the world

The annex provides an indication of selected external mining interests from four EC Member States: Germany, France, the Netherlands and the United Kingdom. Eleven minerals are covered in total, ranging from bauxite to zinc. The majority of operators identified have an EC member interest of 25% and over. A minimum threshold of roughly 5% has been applied, however.

A glance at the table reveals that EC mining investment is spread throughout the world, ranging from Canada to Guinea, Brazil to Papua New Guinea. There are differences in emphasis between the Member States. France, for instance, has a strong presence in the uranium sector, whereas the UK has major interests in gold and copper production. The Federal Republic of Germany is the only country identified in the table to have interests in the chromium sector. In short, European mining interests outside the EC are both diverse and extended in terms of geographical coverage. Companies such as Pechiney, Metallgesellschaft and Metaleurop from France and Germany, RTZ and Consolidated Gold Fields of the UK, are in themselves global operators. Equal mention should be given to Billiton of the Netherlands and Union Minière of Belgium, which also have significant external interests outside the EC.

Table 6
Number of EC mines
producing more than 150 000 Kt of ore per year

	Total	150-300	300-500	500-1 000	1 000-3 000+	3 000+
Open pit						
FR of Germany	0	0	0	0	0	0
Greece	1	0	0	0	0	1
Spain	16	4	0	3	5	4
France	5	4	1	0	0	0
Ireland	0	0	0	0	0	0
Italy	1	0	0	0	1	0
Portugal	1	1	0	0	0	0
United Kingdom	0	0	0	0	0	0
Total	24	9	1	3	6	5
Underground						
FR of Germany	12	0	2	3	5	2
Greece	7	1	2	2	2	0
Spain	14	4	1	4	5	0
France	28	9	3	6	8	2
Ireland	1	0	0	0	1	0
Italy	11	3	4	3	1	0
Portugal	6	3	1	2	0	0
United Kingdom	3	2	0	0	1	0
Total	82	22	13	20	23	4

Source: *Mining Magazine*.

In a period when investment in mining projects often demands capital funds beyond those available to any single company, joint ventures are becoming increasingly significant. The table annexed helps to pinpoint a few examples of European joint ventures within mineral sectors. Thus, in the bauxite sector, Dutch, German and French interests are all present in Halco in Guinea. Similarly, in the uranium sector, both French and German interests can be identified

in Somnair, located in the Niger, and a British-French-German participation in Rossing Uranium is apparent. The need for such external investment is outlined below.

Outlook

During the past decade, the mining industry has reportedly nearly collapsed. The magnitude of this downturn is greatly exaggerated, however. Mining activity has varied, and will doubtless always experience large cyclical fluctuations. The downward cycle experienced during the late 1970s and early 1980s has become associated in the minds of many people with permanent decline. The picture today is radically different, and Europe's mining industry is in much better shape than before. Productivity has improved and full use of the EC's history of mining expertise is being pursued in order to guarantee a profitable future.

There are two other aspects to this achievement, one within the EC, the other externally:

- Europe's mineral base has yielded new, economically viable deposits recently — witness the Neves

Corvo project in southern Portugal, the Chessy Parys Mountain polymetallic project in the UK, the chromite deposits at Vourino in Greece, and the lead-zinc deposits at Navan in Ireland and La Troya in Spain.

- Europe's mining industry is not confined within the borders of the EC. Mining activity has always tended to follow exploration of economic deposits regardless of location. In this respect, the mining industries of France, Germany, the Netherlands and the United Kingdom in particular represent a European tradition of global mining activity (see Annex).

A special mention of the entry of Spain, Greece and Portugal in the EC must be made. The second and third enlargements of the Community have, of course, increased its mineral wealth but they have also stressed the economic contribution of mining within less prosperous European countries.

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DRI Europe

Annex Selected EC world mining interests

Mineral	D	F	NL	UK
Bauxite	Halco (Guinea) Frialco (Guinea)	ADG (GR) Halco (Guinea) Frialco (Guinea)	MRN (BRA) NV Billiton (Surinam) Halco (AUS) Worsley (AUS)	Comalco (AUS)
Chromium	Comisa (BRA) Rustenburg Chrome Mines (RSA) Alamag Processing (Philippines)			
Copper	OK Tedi (PNG) Teck Corp. (CDN) Afton Mining (CDN) Highmont Mining (CDN) MIM (AUS) Copper Range (USA)		Cuajone (Peru)	Tsumeb (Namibia) Les Mines Selbaie (CDN) Kennecott (USA) Magma Copper Co. (USA) Pinto Valley (USA) RGC (AUS) Lornex Mining (CDN) Bougainville Copper (PNG) Palabora (RSA) Olympic Dam (AUS)
Silver	Kemco (Thailand) MIM (AUS)	Buenaventura (Peru)		Tsumeb (Namibia) Kennecott (USA) Les Mines Selbaie (CDN) Black Mountain (RSA)

Continued overleaf

Annex (cont.)

Mineral	D	F	NL	UK
Tin	PT Preussag (Indonesia)			MMC (Malaysia) RGC (AUS) East Kemptville Tin Corp. (CDN)
Uranium	Key Lake (CDN) Crow Butte (USA) Rossing Uranium (Namibia) Soc de Mines de l'Air (Niger) Energy Resources of Australia (AUS)	Pathfinder (USA) Minatone Corp. (USA) Amok (CDN) Cluff Mining (CDN) Cigar Lake Mining Corp (USA) Minatco (USA) Comuf (Gabon) Rossing Uranium (Namibia) Cominak (Niger) Soc des Mines de l'Air (Niger) Total Mining (AUS)		Western Mining Corp (AUS) Rio Algom (CDN) Rossing Uranium (Namibia) Palabora (RSA) Sohio Western Mining (USA) Olympic Dam (AUS)
Zinc	Kemco (Thailand) Teck Corp. (CDN) MIM (AUS) Cominco (CDN)	Buenaventura (Peru)	Pering Mine (RSA)	Black Mountain (RSA) AM & S (AUS)
Gold	OK Tedi (PNG) Pancontinental (AUS) Teck Corp. (CDN) Afton Mining (CDN) Star Lake (CDN)	Total Erikson Resources (CDN) Cheni Gold Mines (CDN) Soremib (Burkina Faso)	Choquilimpi (Chile) Boddington (AUS) Lebong Tandai (Indonesia)	Unisel (RSA) Alligator Ridge (USA) Les Mines Selbaie (CDN) Kennecott (USA) Driefontein Cons (RSA) Kloof Gold Mining (RSA) Deelkraal Gold Mining (RSA) Doornfontein Gold Mining (RSA) Libanon Gold Mining (RSA) Newmont Gold (USA) Gold Fields Mining Corp. (USA) Ashanti Goldfields Corp. (Ghana) Corsyn Cons (Zim) Eastern Gold Holdings (RSA) Independence Mining (Zim) Palabora (RSA) Rio Tinto Zimbabwe Bougainville (PNG) Moro d'Ouro (BRA)
Iron Ore	Bong Mining (Liberia) Ferteco Minercao (BRA)			Goldsworthy Mining (AUS) Hamersley (AUS)
Lead	Kemco (Thailand) MIM (AUS)		Pering Mine (RSA) Cadje-but (AUS)	Black Mountain (RSA) AM 1 S (AUS)
Manganese		Comilog (Gabon)		

CRYSTALLIZED SALT

(NACE 233)

Summary

In 1988 Community production of crystallized salt was between 22 and 23 million tonnes. Consumption (sales) amounted to less than 18 million tonnes. Overcapacity remains one of the main features of the salt sector, together with a demand fluctuating with economic and climatic conditions.

North America	25.8%
Latin America	10.0%
Europe	38.2%
Africa	2.2%
Asia	20.5%
Oceania	3.3%
Total	100% (251 million tonnes)

Description of the sector

Salt production basically involves either dry mining (rock salt), solution mining (vacuum salt) or solar evaporation (sea salt).

In what follows, unless otherwise mentioned, salt in brine will be excluded.

Current situation

Between 170 and 190 million tonnes of salt (including salt in brine) are produced in the world each year. World resources of salt are virtually unlimited. The oceans comprise an inexhaustible supply of salt, and so do the deposits of rock salt (which correspond to geological seas). Nearly every country in the world has salt deposits (rock salt, vacuum salt) or solar salt evaporation facilities of various sizes.

According to the US Bureau of Mines, world salt capacity represents 251 million tonnes. Geographically this can be broken down as follows:

Figure 1

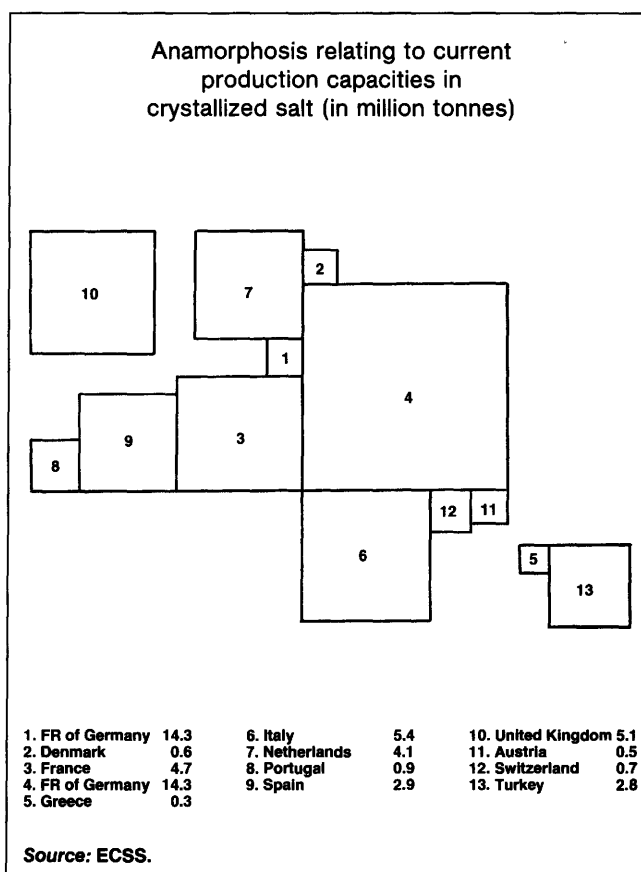


Table 1
Main indicators 1980-89
Crystallized salt

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	19.8	18.6	17.4	16.3	17.1	21.1	20.2	20.8	17.8	17.1
Production (1)	24.7	25.5	23.3	21.4	22.3	24.6	23.8	23.3	22.6	22.0

(1) 1988 estimated.

Source: European Committee for the Study of Salt.

Production and consumption

Production

Limiting the analysis to Western Europe, the anamorphosis that is presented in Figure 1 shows current production capacity (excluding salt in brine).

Crystallized salt production in the EC amounted to 23.3 million tonnes in 1987 and 22.6 million tonnes in 1988. Recent figures are included in Table 2.

Table 2
Crystallized salt production in the EC

(1 000 tonnes)	Rock salt	Solar salt	Vacuum salt	Total
1980	12 156	3 832	8 665	24 653
1981	12 330	4 360	8 811	25 501
1982	10 536	4 145	8 604	23 285
1983	9 367	3 896	8 152	21 415
1984	10 060	3 901	8 313	22 274
1985	12 049	3 697	8 814	24 560
1986	11 806	3 728	8 284	23 818
1987	11 176	3 724	8 413	23 313
1988	10 700	3 500	8 400	22 600
capacity used	49 %	76 %	74 %	60 %

Source: European Committee for the Study of Salt.

The downwards trend prevailing for 1988 figures (that are still estimates) results from the influence of climatic conditions on demand for sea salt and rock salt. Production of salt from solar evaporation indeed depends on favourable weather (sunshine and wind). Demand of rock salt on the other hand is mainly affected by the climate during the winter because this type of salt is mainly used as road salt (except in the Federal Republic of Germany).

The de-icing market is a constant source of concern to salt manufacturers because demand fluctuates widely with the weather. We can assume that the sale of road salt averages 5 million tonnes per campaign, the real consumption in the past four years that is given below clearly shows that variations around this average can be huge.

1985	6.15
1986	6.25
1987	3.90
1988	2.35

Such ups and downs in demand obviously have an important impact on mine production.

Consumption

In 1988 the EC market for crystallized salt was as follows:

	(%)
Food grade salt	12.3
Misc. industry	18.0
Chemical industry	54.5
Subtotal	84.8
Road salt	15.2

Recent data on salt sales (including imports) are given in Table 3 and Figure 2.

Food grade salt

Sales of food grade salt amounted to 2 195 million tonnes in 1988. These sales however do not correspond to 'dietary use' of this type of salt, and even less do they mean 'intake'. Calculations from one of

Table 3
Salt consumption in the EC and comparison with the US

(million tonnes)	Food grade salt	Miscellaneous industries	Chemical industry	Subtotal	Road salt	Total
1980	2.4	2.9	9.7	15.0	4.8	19.8
1981	2.5	2.6	8.3	13.4	5.2	18.6
1982	2.5	2.6	7.9	13.0	4.4	17.4
1983	2.5	2.7	8.3	13.6	2.7	16.3
1984	2.1	2.8	8.6	13.5	3.6	17.1
1985	2.2	3.2	9.3	14.7	6.4	21.1
1986	2.2	3.2	9.2	14.6	5.6	20.2
1987	2.2	3.3	9.5	15.0	5.8	20.8
1988	2.2	3.2	9.7	15.1	2.7	17.8
1989	2.0	3.1	9.8	14.9	2.2	17.1
US (1)						
1987	1.0	8.7	3.3	13.0	9.6	22.6
1988	1.0	9.1	3.4	13.5	11.2	24.7

(1) Approximately 80% of US consumption of chloralkalis relates to salt in brine.

Source: ECSS and SI.

the EC Member States illustrate this, on a per capita basis:

Sales of food grade salt	19 to 20 g/day
Dietary use of this type of salt	13 to 14 g/day
Dietary salt intake	6 to 7 g/day

Food industries are doing well but households are curtailing their needs in cooking salt. Recent EC proposals relating to nutrition labelling could pave the way to a further shrinkage of demand.

Chemical industry

Sales of crystallized salt amounted to 9 696 million tonnes in 1988.

By far the biggest market for salt is chloralkali manufacture by electrolysis. Three technologies are currently used (mercury-cell, diaphragma and membrane) and they may be supplied with salt in the form of brine or as crystallized salt, dissolved in the site.

The increase in demand for chloralkalis continues, especially in caustic soda. This sector seems to be in a better position than the chlorine one. The outlets for chlorine, except for the production of PVC (35%), are expanding moderately. With global demand for PVC growing around 4% per year (in 1988 the mild winter buoyed demand from the construction industry), European plants are operating at 95% of their nameplate capacity.

Road salt

This sector is the most unstable as already mentioned. Only 2 758 million tonnes were sold in 1988, as a direct result of two consecutive mild winters (1987/88 and 1988/89).

Salt producers would like to share their burden of holding stockpiles with local authorities and highway maintenance services.

The debate regarding environmental aspects is going on more objectively. Comprehensive studies have shown the excellent cost effective ratio of salt spreading, and emphasized the lower number of accidents after roads have been serviced with salt.

Miscellaneous industries

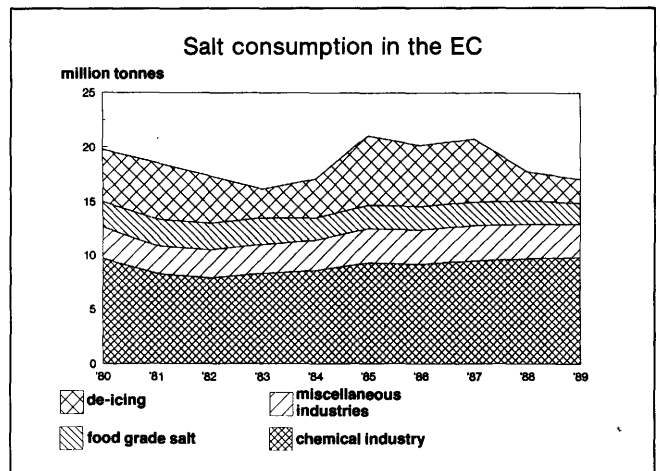
In this sector, which includes agriculture, water softening and other outlets, sales amounted to 3 123 million tonnes in 1988.

Water softening is said to be buoyant again, despite a variety of attitudes and techniques regarding water hardness.

Salt is not used as a water softener but as a regenerating agent for the ion-exchange resins used in small-scale softening (unlike central softening). In most of the EC countries water is of good quality except for its hardness. And hard water means scaling, increases in energy consumption and the utilization of washing agents.

Growth in demand in this sector depends on the objective information given to the households and the improvement of living standards.

Figure 2



Trade

In 1987 EC imports from third countries amounted to 0.7 million tonnes and EC exports to third countries reached 3.6 million tonnes; intra-EC trade represented 3.5 million tonnes i.e. 83% of total imports and 49% of total exports.

Total exports (including intra-EC trade) decreased from 7.1 million tonnes in 1987 to 6.6 million tonnes in 1988, showing a 7% decline.

Structural change

AKZO, the Dutch group (the world's largest salt producer), has announced that it will spend around ECU 40 million on the modernization of the salt processing plant (packing, bagging, palettizing, etc.) at Hengelo (The Netherlands). This programme is scheduled to start in 1989, for completion in mid-1991. The plant, which produces and processes salt specialities for the consumer, agricultural and food

sectors, will be equipped to better meet customer demand.

In 1988 the AKZO acquisition, through its US subsidiary company International Salt Co, of Diamond Crystal Salt Co was approved by the US Federal Government. At the end of the year AKZO integrated its two US subsidiary companies.

Solvay & Cie, the Belgian group, has taken a 90% stake in Union Salinera de Espana SA, reinforcing its position as the world's second largest salt producer after AKZO.

ICI from the UK, Europe's second largest chlorine producer, is gearing up to convert the entire mercury-cell chloralkali capacity (750 kt/year) at Run-corn, in Cheshire, to its commercially proven FM21 membrane-cell technology. The first part of this conversion is planned for the early 1990s.

Whereas, as predicted, the membrane process market is developing in the near future thanks to the power advantage this process has over other technologies (electricity represents 70% of chlorine production costs), the trend towards cleaner technology in Europe is now reviving existing conversion plans in other companies. The impact of membrane-cell on crystallized salt will only be measured later on.

Outlook

Chloralkalis

There is some concern regarding the future availability of caustic soda although demand for this product is still rising steadily, especially from the

pulp and paper industry and aluminium industry. It is mainly environmental regulation which is threatening chlorine usage. With these threats to chlorine, European producers could be reluctant to invest in new chloralkali units.

None of the outlets for caustic soda is under threat, although there could be some substitution by soda ash. The pulp and paper industry can use soda ash as neutralizing agent for example.

Experts are reporting a clear trend on producing chlorine at its place of use because of the high costs of transporting chlorine due to expensive safety regulations. The on-site chlorine production is mainly based on crystallized salt.

Some of them are considering that chloralkali industry will shift even further towards membrane technology in the future. This technology requires crystallized salt.

Nutrition

The downward trend in food grade salt consumption is still a matter of concern to salt manufacturers.

Adequate nutritional labelling of foodstuffs constitutes a priority for the Community. Since the lack of precise rules may confuse the consumer, the EC Commission has decided that the situation should be clarified legally, and has presented to the Council a double proposal on nutritional labelling.

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PRODUCTION AND PRELIMINARY TRANSFORMATION OF FERROUS METALS

(NACE 221, 222, 223)

Summary

The revival which began in 1987 was confirmed in 1988, with real growth standing at over 8% and turnover in excess of ECU 90 billion. This revival comes after a period of crisis, dating back to the 1970s, which was linked to low growth in the main customer sectors, as well as to the emergence of new producing countries. The 1980s have been characterized by the continuation of the process of rationalization and reducing capacities, initiated at the end of the 1970s, which gave rise to major cutbacks in employment. This restructuring made possible sizeable productivity gains, and also allowed most European firms to return to profitability.

The importance of the industry in the EC economy

Current situation

In 1988, the production of ferrous metals in the broad sense of the term, that is to say including the preliminary transformation of ferrous metals, reached more than ECU 90 billion. The contribution of this sector to the European balance of trade amounted to more than ECU 10 billion.

The 1987 revival has been confirmed since, and has even quickened in intensity, in so far as the growth level for real production passed from 6.37% in 1987 to 8.05% in 1988. Moreover, for the first time since the beginning of the decade, employment has stabilized and has even risen slightly. This good result is linked to the sound performance of domestic demand, but also to a revival in exports.

Production and consumption

From 1980 to 1986, real production within the Community fell nearly continuously (at a yearly average

of -2.8% between 1980 and 1986). However, the origins of this crisis go back to the 1970s and the first oil shock. Indeed, the sector is a major supplier of intermediate goods to the following industries:

- the metal products industry,
- the electrical products industry,
- mechanical engineering,
- the transport equipment sector,
- the construction sector.

Most of these sectors went through difficult times in the course of the second half of the 1970s and in the first half of the 1980s, reducing their consumption of intermediate products.

None the less, other factors of a structural nature may be added to those mentioned above. These include the emergence of substitute products, such as plastics, and the emergence of new competitors, particularly the newly industrialized countries. Lastly, the necessary modernization of the industry in Europe was undertaken fairly late, since it only began at the end of the 1970s. This explains why the return to profitability dates back only as far as the second half of the 1980s. The modernization, which was reflected in a number of mergers, as well as in considerable productivity gains and no less important reductions in capacity, explains how the industry in the EC was able to widely exploit the revival in the world ferrous metals market in 1987 and 1988. During those two years, real production in Europe rose by more than 7% per year on average.

Lastly, it should be noted that a change in product offering is taking place, in the nature of European

offer, with high value-added products growing in importance.

Foreign trade

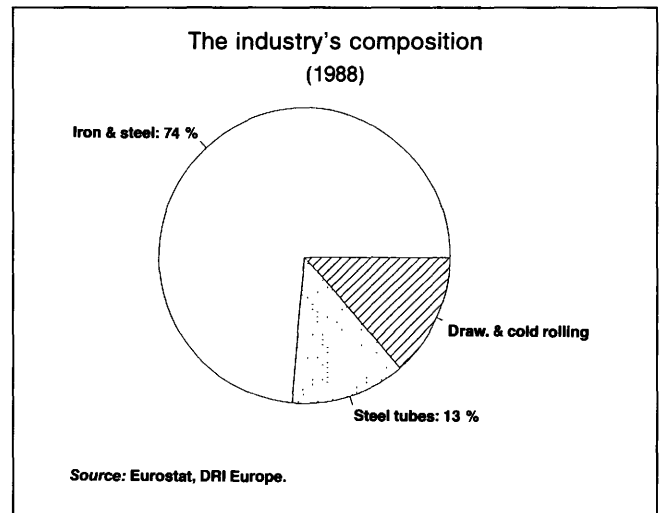
The trade balance for the sector is in large surplus. However, this sound result should not obscure the fact that, since 1985, imports have, on average, increased rapidly (by 4.75% per year), while exports have fallen over the same period (-1.7% on average per year). These figures remain fully significant, even though they are slightly biased by the entry of Spain and Portugal into the EC.

Clearly, the export/import ratio fell continuously throughout the abovementioned period.

Viewed from this angle, the year 1988 very much speaks for itself, since the revival in exports (up 14%) is somewhat tempered by a no less important rise in imports (up 18%).

Finally, the relatively slow growth in trade among Member States between 1980 and 1988 is easily explained by the already long-standing existence of an integrated European market in this field (ECSC Treaty).

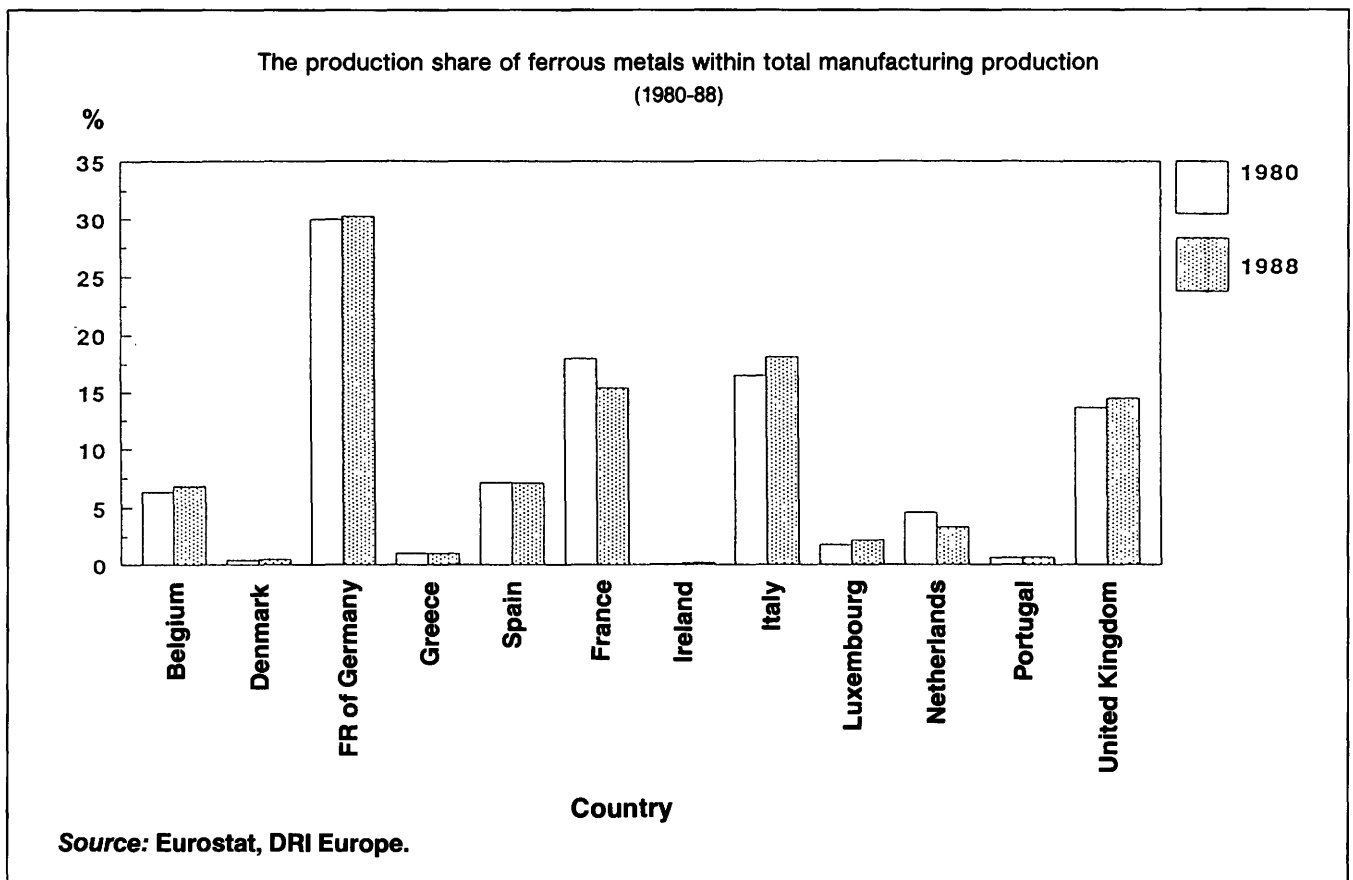
Figure 1



Employment

In the wake of the considerable efforts to rationalize and reduce production capacities, employment fell continuously in the course of the 1980s. By 1988, around 40% of the jobs which existed in 1980 had been cut. For its part, production rose constantly from the beginning of the decade, with the exception of 1982 and 1986, during which the fall in production was too sizeable for cutbacks in the labour force

Figure 2



to keep pace with it. Over this period, productivity improved by an average of 5.7% per year.

Description of the sector

The production and preliminary transformation of ferrous metals, which is presented in this chapter, covers both the steel industry in the strict sense of the term, that is to say as defined by the ECSC Treaty, and the preliminary processing of ferrous metals. According to NACE, it includes the following branches:

- iron and steel, as defined in the ECSC Treaty (NACE 221),
- the manufacturing of steel tubes (NACE 222),

- cold-rolling, cold forming and cold steel wire drawing (NACE 223), and cold steel wire drawing itself (NACE 223.4)

Geographical features

The distribution of production among Member States does not closely reflect the ranking in terms of GNP. The ranking for the 'Big Four', from where more than 75% of the production originates, is as follows: the Federal Republic of Germany comes top with around 30% of real production, followed by Italy (17%), France (16%) and the United Kingdom (around 14.5%). This distribution has been markedly altered in the course of the 1980s, a decade which has seen Italy take second place from France. In addition, Figure 2 enables us to evaluate the importance of the ferrous metals industry in smaller countries such as Belgium.

DRI Europe

IRON AND STEEL

(NACE 221)

Summary

In 1988 the production and consumption of steel reached record levels in the industrial world. Production of finished products in the European Community increased by 10% compared to 1987. This good result was mainly fostered by the high activity level of steel-based industries. However, the industrial world steel industry suffered serious set-backs between 1974 and 1987 owing to reduced production in steel-based industries, a decrease in the quantity of steel required to produce a given product and increased competition from newly industrialized countries. A major restructuring effort was undertaken in the 1980s in the European Community. It led to large capacity cuts and important productivity gains and allowed European companies to take advantage of the favourable economic climate in 1988.

Description of the sector

The steel industry encompasses steel production from raw-material processing to the production of finished and final rolled steel products. Contrary to accepted practice in most other parts of the world, tube manufacture is not considered to be part of the steel industry, but is classified as a primary processing industry. This restriction is no doubt due to long tradition, reinforced by the limits which the Treaty of Paris imposes on the powers of the ECSC. Steel and coal were the subject of the first European agreement in 1952 and the special provisions governing these two products remained in force after the two administrative bodies of the Community were merged. The steel industry as defined by the Community covers the following operations:

- coke manufacture (except when coke is purchased from coal- industry or independent coking plants)
- ore preparation, especially in the manufacture of briquettes
- pig-iron processing in blast furnaces
- steel processing from pig iron in converters
- steel processing from scrap in electric furnaces
- continuous casting and/or hot rolling of semi-finished products
- hot rolling of long and flat products
- cold rolling of flat products
- metal and organic coatings

The finished and final products of the steel industry, including ordinary, special and alloyed steels, are as follows:

(i) Hot-rolled:

- flat products: coils, rolled strip or strip cut from coils, heavy or medium plate rolled or cut from coils
- long products: heavy sections; light sections, including reinforced concrete rounds; wire rod

(ii) Cold-rolled:

- thin-sheet steels and coated-sheet steels (tinplate, galvanized, electro-galvanized, lead-covered, aluminium-coated, plastic-coated, pre-painted, etc.)

Table 1
Main indicators 1980-89 (1)
Finished products

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988 (2)	1989
Apparent consumption	86	82	77	76	80	77	89	90	103	N/A
Net exports	13	17	10	10	14	17	14	15	12	N/A
Production	99	99	87	86	94	96	103	105	115	119
Employment (1 000)	635	573	533	494	460	438	475	440	413	406

(1) 1980 EC 9; 1981-85 EC 10.

(2) Provisional

Source: Eurostat (Sidr, Soci).

Table 2
International comparison of production, exports
and imports of steel (1)

(million tonnes)	1980			1987			1988 (2)		
	Prod. crude steel	Exports finished products	Imports finished products	Prod. crude steel	Exports finished products	Imports finished products	Prod. crude steel	Exports finished products	Imports finished products
Total	718.6	140.0	140.0	739.0	131.0	131.0	779.0	N/A	N/A
EC (1)	127.7	22.2	9.0	126.0	23.7	8.8	137.0	21.0	9.0
USA	104.0	3.2	9.7	82.1	.8	14.8	91.0	2.0	19.0
Japan	111.4	22.6	1.0	98.5	20.7	4.7	106.0	23.0	11.0
Others	375.5	92.0	120.3	432.4	85.8	102.7	445.0	N/A	N/A
of which, USSR	148.0	7.0	9.0	162.0	7.8	8.5	163.0	N/A	N/A
(%)									
Total	100	100	100.0	100	100	100	100	100	100
EC (1)	18	16	6	17	18	7	18	N/A	N/A
USA	15	2	7	11	1	11	12	N/A	N/A
Japan	16	16	1	13	15	4	14	N/A	N/A
Others	52	66	86	59	66	78	56	N/A	N/A

(1) 1980 EC 9.

(2) Provisional.

Source: Eurostat (Sidr).

Current situation

In 1988 there was an overall increase in the consumption and production of steel in the industrial world. The basis of this positive development was the improvement in the activity level of most industrial sectors and in particular steel-consumer sectors such as construction, the car industry and mechanical engineering.

This is particularly true in the European Community. In 1988 the production and consumption of steel attained record levels. Production of finished products for the Community as a whole rose to 115 million tonnes in 1988, an increase of 10% in comparison with production in 1987. The effect of the restructuring undertaken since 1980 has been positive, leading to a progressive reduction of the pro-

duction capacity of the European steel industry. The financial results of the steel companies were also positively affected and their position was strengthened to the point where they could take advantage of the favourable economic climate.

It must be noted that while exports in this period declined due to the necessity of servicing the exceptionally high demand on domestic markets, imports, even if they were relatively stable in terms of tonnage tended to be concentrated in particular products.

As regards employment, the industry had a 413 000-strong workforce in 1988—a reduction of 6% in comparison with 1987. This continued the trend that between 1980 and 1988 resulted in a personnel cutback of over 35%.

Table 3
Final consumption of steel (1)
(Crude steel equivalent)

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Final consumption	97.8	89.0	84.5	82.3	85.0	85.6	97.4	97.7
Consumption per capita (kg)	362.0	328.0	311.0	303.0	313.0	315.0	302.0	301.0
Direct net exports	15.8	20.4	11.3	11.8	16.8	18.8	15.5	17.4
Indirect net exports	15.0	20.3	17.4	16.2	17.5	16.3	14.3	12.3
Stock variation	-0.7	-3.4	-1.6	-0.6	1.0	.2	-1.3	-1.2
Scrap consumption in rolling mills	.2	.2	.2	.2	.2	.3	.3	.2
Total Community production	127.7	126.1	111.4	109.5	120.1	120.6	125.6	126.0

(1) 1980 EC 9; 1981-85 EC 10.

Source: Eurostat (Sidr).

Table 4
Trends in Community production by product (1)

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988 (2)	1989
Pig iron	89	88	77	74	83	86	85	86	93	96
Crude steel	127	126	111	110	120	121	126	126	137	141
Hot-rolled products	102	101	90	90	98	100	107	109	119	123
Finished products	99	99	87	86	94	96	103	105	115	119

(1) 1980 EC 9; 1981-1985 EC 10.

(2) Provisional.

Source: Eurostat (Sidr).

Production and consumption

Despite the sharp increase in demand in most developed countries in 1988, there are a number of factors that caused a drop in the share of the European Community (and of industrialized countries in general) in world steel production in recent years. These include:

- A reduction in the tonnage consumed, which has affected all industrialized countries. This is no doubt due to recession-related production cuts carried out in a number of steel-based industries and a decrease in the quantity of steel required to produce a given product. This drop can be attributed to major improvements in the quality, properties and performance of steel products themselves, which mean less tonnage is required for the same consumption levels.
- A substantial increase in production levels in newly industrialized countries, resulting not only in their breaking into Community markets but also in a reduction in the EC producers' share of

the international market, where vast quantities are often dumped at prices that bear no relation to production costs.

It was practices of this sort which led to the sudden jump in imports from third countries, which rose from 5 to 11% of apparent consumption between 1975 and 1977. The buoyant climate on the international market of 1974, when there was a steel shortage, and the relative openness of the EC market prepared the way for this increase, and the subsequent downturn in the economic situation confirmed it. Since 1978, however, imports have stabilized at around 10% of apparent consumption.

In response to this reduction in consumption induced by the structural and economic factors listed above, a massive restructuring effort took place in the 1980s, partly aided between 1980 and 1986 by assistance from national governments under the terms of the State Aids Code approved by the Council and the production controls regulated by Article 58 of the ECSC Treaty (the controls expired 30 June 1988). As far as crude steel is concerned, this resulted in a 44-million-tonne reduction in produc-

Table 5
Production and external trade (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988 (2)	1989
Production										
Current value	32 000	35 000	35 000	41 000	43 000	43 000	43 000	44 000	53 000	57 000
Index	74	81	81	95	100	100	100	102	123	133
Constant value	44 000	44 000	39 000	45 000	44 000	43 000	46 000	47 000	51 000	53 000
Index	102	102	91	105	102	100	107	109	119	123
Imports extra-EC	2 950	2 227	3 321	3 298	3 514	3 906	3 813	3 390	3 990	N/A
Index	76	57	85	84	90	100	98	87	102	N/A
Exports extra-EC	7 010	8 274	7 438	7 525	9 774	11 298	8 773	8 254	8 770	N/A
Index	62	73	66	67	87	100	78	73	78	N/A
X/M	2.4	3.7	2.2	2.3	2.8	2.9	2.3	2.4	2.3	N/A

(1) 1980 EC 9; 1981-85 EC 10.

(2) Provisional.

Source: DG III, Eurostat (Comext).

tion capacity, which represents a 19% cut in capacity. Furthermore, by the end of 1988, 34 million tonnes of hot rolling capacity in the Community of 12 had been terminated, which amounted to an 18% decrease.

Investment

Enormous technological advances in production techniques accompanied the termination of production capacity thereby enabling the remaining installations to operate with greatly reduced costs and enhanced efficiency. The proliferation of continuous-casting plants, whereby one step in the production process is eliminated and the requirements for crude steel consequently lowered is but one example of this. The share of the continuous casting method in crude steel production rose from 35% in the Community of 10 in 1980 to 81% in 1988. In some countries, it is more than 90%, and in some companies it reaches 100%.

Employment

Workforce reductions have also taken place, due principally to plant closures and lower production in those that remain open. To keep production costs down, major productivity gains were necessary. Discarding inefficient production methods, investing in rationalization programmes and constant technical research have achieved these gains. Staff reduction is extremely expensive for companies in the short term, so that support schemes have been organized, based on a broad interpretation of the ECSC provisions on redeployment. These have helped to alleviate the

worst social effects by introducing early retirement, job-creation projects and vocational training programmes for redundant workers. These measures, like those introduced for mine workers, have been mainly financed from funds drawn directly or indirectly from the contributions paid by steel companies and, to a lesser extent, mining companies.

Industry structure

Steel producers can be classified according to a number of different criteria:

Manufacturing methods

- The first category is made up of integrated companies, which account for 70% of production. These produce pig iron in their blast furnaces and convert it in oxygen-based steel works, using a certain tonnage of scrap to maintain the temperature of the molten steel. The proportion of iron processed in this way varies from 5% to 35%, depending on the techniques used and the relationship between the price of pig iron and scrap. Companies using this method are usually geared to the production of flat products, including subsequent cold rolling into thin sheet steel, which may be coated, and the production of heavy sections and rod wire.
- The second category is made up of companies with more specialized types of production. It includes small companies that use electric furnaces to treat scrap from rolling-mill crops or other recycled steel. The cost of raw materials

Table 6
Production of crude steel and employment per country

	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK
Production of raw steel (1 000 tonnes)												
1980	12 321	734	43 838	1 067	12 643	23 172	242	26 501	4 619	5 272	659	11 278
1987	9 783	605	36 248	908	11 691	17 432	220	22 859	3 302	5 082	732	17 136
1988(1)	11 222	650	41 023	959	11 795	18 584	272	23 762	3 661	5 518	811	19 062
Employment (1 000)												
1980	47.4	2.5	201.0	N/A	N/A	113.6	.7	100.6	16.0	21.0	N/A	133.4
1987	28.9	1.6	137.3	4.0	47.5	62.8	.6	65.1	11.6	18.8	5.7	55.1
1988 (1)	28.3	1.6	131.1	4.0	43.1	55.3	.6	61.3	10.7	18.4	5.5	55.2

(1) Provisional.

Source: Eurostat (Sidr, Soci).

largely determines the price of the finished products. These include laminated commercial products, reinforced concrete rounds and rod wire.

Size

- Integrated factories often have large-scale production capacity ranging from 2 to 10 million tonnes of finished products. They reap the benefits of economies of scale, thereby reducing costs, but they also enjoy very little production flexibility.
- Plants organized around an electric furnace usually have much smaller capacity, which allows them more freedom to adapt their production. Their production costs depend to a large extent on the cost of electricity, but the most important factor is the price of scrap, which is subject to wide fluctuations.

Production quality

- Ordinary mass-produced steel products. This consists of two broad categories: long products and flat products. The manufacture of flat products is becoming more and more important with the movement towards more sophisticated products in response to market developments, such as coated sheet.
- Special alloyed and non-alloyed steels, whose importance is growing even though they account for only a very low tonnage compared with ordinary steels. In 1980 they represented 16% of crude-steel output. Their share is now 21%.

Location

- There are steel plants throughout the European Community, with varying levels of production capacity. A number of them were built inland, usually near the coal or iron-ore fields from which they used to draw their supplies, or near steel consumers.
- Those built more recently are on the coast, where they have easy access to imported raw materials without the cost of land transport. They are also better placed to capture international markets.

The companies falling into this category represent about 25% of total production.

Financial structure

- Companies financed by private capital, which represented the vast majority before the 1974 crisis.
- Companies in which the State holds some or all of the capital. These grew in number due to the impact of the crisis on the steel industry in the late 1970s and early 1980s. In more recent years, as companies' profitability has been restored, a reverse tendency in State participation has begun to be noticed, particularly in the United Kingdom.

The impact of '1992'

In 1952 the ECSC Treaty created for coal and steel the necessary conditions for the 'single market', which in 1992 should extend to all other industrial sectors. Consequently, for the Community steel industry, the formation of a single market is an imminent reality, and it can await with confidence this new stage in the progress towards a unified Europe. Such a situation can only be considered as a new opportunity for reinforcing open competition and the complete freedom of intra-Community exchanges.

Environmental protection

The steel industry is extremely conscious of its responsibility with regard to the maintenance of environmental protection. It should be remembered that in 1987 this sector consumed 56 million tonnes of steel scrap, the bulk of which was collected from discarded used steel-containing products. This recycling of scrap, which represents about 45% of total steel production, is one of the highest recycling rates for any industry.

Efforts to improve further the extensive environmental-protection equipment already in existence are now under way. The restructuring of the industry in the 1980s has resulted in the closure of many older installations and their replacement by modern plants fully equipped with a whole range of pollution-con-

trol equipment, which upgraded these plants to the level of the best available technology in this field.

European steel producers continue to work with the European Commission in the framework of the

Environmental Protection Research Programme established under Article 55 of the Treaty of Paris.

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INDEPENDENT STEEL

(NACE 221)

Summary

The steel producers belonging to the European Independent Steelmakers Association have a total annual production capacity of some 15 million tonnes of steel and employ a total of about 25 000 people (about 6.1% of total iron and steel employment). They export primarily to European countries. Their world market share is minimal.

The independent steel mills mostly use the electric arc furnace for direct reduction of recycled steel (raw material = steel and scrap). This method relies on electric energy for rapid smelting. Many technological innovations have been added, including continuous casting, which is ideal for producing thin steel sections. As a result, these mills' chief products are reinforced concrete bars, wire rod and welded wire mesh, in addition to the various types of commercial quality steel.

Current situation

The iron and steel sector has enjoyed an unusual market situation since end-1987 characterized by a rise in demand that has made price increases possible.

There has been a burst of activity in the building sector everywhere in Europe. This sector is the main outlet for EISA members' products.

As a result, the EISA members' economic performances have been particularly brilliant. Their turn-overs rose by 25-35% between 1987 and 1988, while their total production of steel rose by about 25% over the same period.

Investments have focused on new high-tech facilities. These improvements have been not to raise production, but to switch to very high-quality product lines. The mini-mills have also given priority to energy savings and environmental protection in their strategic choices. The pollution-control investments made have taken national standards into account.

While the emergency measures enacted by the European Commission in 1980 (quota systems, minimum prices etc.) have been abolished, transparency is far from re-established on the European iron and steel market.

Indeed, a whole series of problems remain, notably:

- unfinished restructuring
- a risk that the production capacity goals will not be reached either on our domestic markets or along our borders
- some steel mills continue to receive government aid. Aid also in the form of capitalization of their debts (this is the exclusive prerogative of State-run companies);
- there is also the problem of carrying over certain companies' debts and the tax reliefs that they enjoy.

Outlook

Finding lasting solutions for the abovementioned problems is critical if a long-term forecast for independent steel mills is to be made.

Clear, fair competition rules both within the EC market and outside our borders are necessary to maintain our independent steel mills' competitiveness.

The completion of the single market in 1992 should not have much impact on these companies. The iron and steel sector has always been an international sector in terms of its markets, sources of raw materials and technology.

It is nevertheless clear that European harmonization (for example, with regard to transport and energy policies, including harmonization and transparency of electricity rates) cannot but have a favourable impact on production costs and thus improve the competitiveness of these companies.

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THE STEEL TUBE SECTOR

(NACE 222)

Summary

The steel tube industry is of great interest to a number of sectors. Its products are marketed either on a mass consumption basis or for use in plant and investment. The energy markets, i.e. oil, gas, nuclear, steam generation industries, as well as the car industry, machines, structural steel works and construction are some of the main users of steel tubes.

Description of the sector

The sector of activity 222 covers the manufacture of steel tube fittings and compressed gas cylinders in addition to the manufacture of steel tubes.

In order to concentrate in this monograph on facts relevant to the steel tube industry, reference has only been made to figures produced by surveys conducted by professional organizations located in the Member States.

The steel tube manufacturing branch covers three kinds of activities which differ greatly in their manufacturing procedures, the raw materials they use and the amount of investment they require.

The three branches of activity are classified in the following subheadings of Chapter 73 of the harmonized commodity description and coding system.

No 73.04: seamless steel tubes

No 73.05: round welded steel tubes over 406.6 mm in outside diameter

No 73.06: round welded steel tubes up to and including (uti) 406.6 mm in outside diameter and

welded steel tubes of non-circular section of any perimeter.

The market trends for each of these product areas vary widely because they are used in different sectors.

Current situation

The steel tube industry has faced a severe downturn since 1981 due to overcapacity. It underwent a further setback in 1986 and 1987, especially in seamless tubes and welded tubes of an outside diameter greater than 406.6 mm that were deeply influenced by the oil crisis and by the quotas introduced in the USA.

In 1988, the production of seamless tubes and of welded tubes of an outside diameter uti 406.6 mm substantially increased while the production of welded tubes of an outside diameter over 406.6 mm decreased.

In world ranking, the EC is ahead of Japan and the USA which in 1988 was in second place with 13.3 million tonnes, 19% of world production. The top of the list is still occupied by the Soviet Union with 20.8 million tonnes.

The newly industrialized and developing countries are competing fiercely in this branch. Foreign trade has been steadily deteriorating and despite productivity gains achieved over the last few years through restructuring, the best one can hope for in 1989 and 1990 is a repeat performance of the results achieved in 1988.

Table 1
Main indicators, 1980-88 (1)
Steel tubes

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	N/A	N/A	N/A	N/A	5 580	6 245	5 718	5 627	6 683
Net exports	2 000	4 002	4 316	3 466	3 871	4 108	2 825	2 289	2 364
Deliveries	N/A	N/A	N/A	N/A	9 451	10 353	8 543	7 916	9 047
Employment (1 000)	108.9	107.0	103.9	99.4	99.9	94.8	87.8	74.7	74.9

(1) 1980 EC 9; 1981-83 EC 10.

Source: CDL.

Table 2
World production structure (1)

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
World	71.4	75.9	67.3	63.2	68.3	70.3	66.0	66.3	70.5
Index	102	108	96	90	97	100	94	95	100
EC (1)	13.0	14.4	12.8	12.1	14.4	14.5	13.1	12.9	13.3
Index	N/A	N/A	N/A	N/A	100	100	91	90	92
Share (%)	18.2	18.9	19.0	19.1	21.1	20.4	19.8	19.5	18.9
USA	8.3	9.3	4.6	2.9	3.8	3.7	2.6	3.2	4.0
Index	224	251	124	78	100	100	68	86	105
Share (%)	11.7	12.3	6.8	4.6	5.6	5.3	3.9	4.8	5.7
Japan	12.3	13.1	12.2	9.7	11.5	12.2	10.5	9.7	11.0
Index	100	107	100	79	94	100	86	79	91
Share (%)	17.2	17.3	18.1	15.4	16.8	17.4	15.9	14.6	15.6
USSR	18.2	18.3	17.9	18.7	18.9	19.4	19.8	20.3	20.8
Index	94	94	92	96	97	100	102	104	107
Share (%)	25.4	24.1	26.6	29.5	27.7	27.6	30.0	30.6	29.5
Other	19.6	20.8	19.8	19.8	19.7	20.6	20.0	21.2	21.4
Index	96	101	96	96	96	100	97	103	104
Share (%)	27.5	27.4	29.4	31.3	28.8	29.3	30.4	30.5	30.3

(1) 1980 EC 9; 1981-83 EC 10.

Source: CDL.



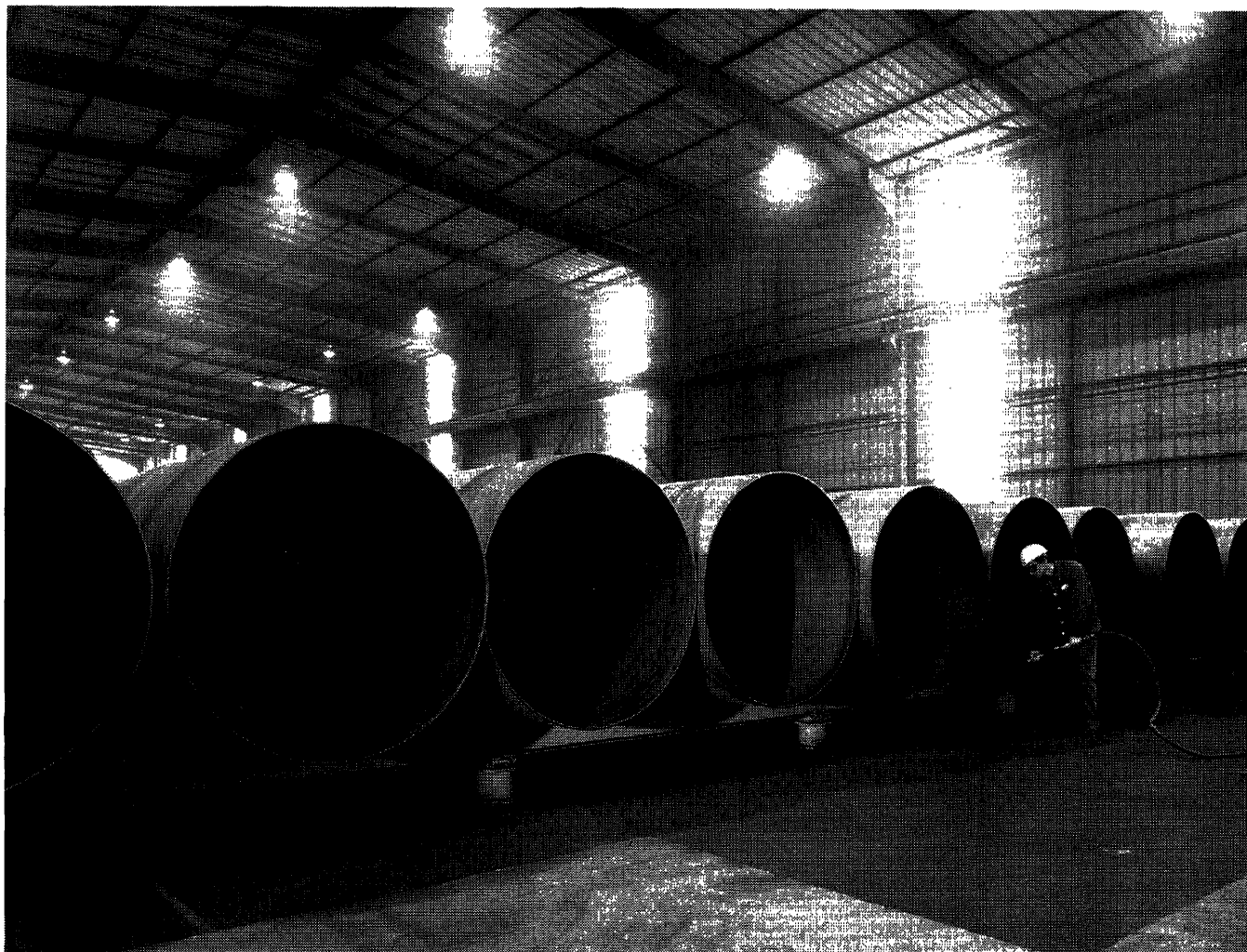


Table 3
Trends in apparent consumption and import penetration rate (1) (2)

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
All steel tubes									
Quantities	8 916.6	8 386.3	7 621.5	6 849.8	8 140.0	8 417.1	8 220.9	8 627.7	9 756.7
Index	N/A	N/A	N/A	N/A	97	100	98	103	116
Imports (%)	8.7	7.6	9.0	10.0	9.3	8.4	9.9	9.8	11.4
Seamless tubes									
Quantities	2 541.0	2 151.0	2 018.2	1 671.9	2 010.6	2 283.7	1 907.2	1 903.2	2 328.2
Index	N/A	N/A	N/A	N/A	88	100	84	83	102
Imports (%)	9.3	12.1	11.8	13.8	12.7	12.5	14.5	17.3	16.8
Welded tubes OD > 406.4 mm									
Quantities	978.4	877.0	874.8	272.8	602.7	667.8	735.3	479.4	598.6
Index	N/A	N/A	N/A	N/A	90	100	110	72	90
Imports (%)	12.2	2.8	2.5	12.7	12.6	3.2	17.8	4.6	4.5
Welded tubes OD ≤ 406.4 mm⁽³⁾									
Quantities	5 397.2	5 358.3	4 728.5	4 905.1	5 526.7	5 465.6	5 578.4	6 245.1	6 829.9
Index	N/A	N/A	N/A	N/A	101	100	102	114	125
Imports (%)	7.9	6.6	9.0	8.5	7.7	7.4	7.2	8.0	10.2

(1) As % of apparent consumption.

(2) 1980 EC 9; 1981-83 EC 10; 1984-88 EC 12.

(3) Includes tubes of non-circular cross-section.

Source: CDL.

Production and consumption

Production

EC production trend indices remain lower than those for world production and fell sharply beginning in 1986. Japanese production, which had recorded a more significant drop than that of the EC in 1987, nearly caught up to the EC index in 1988. US production, which fell drastically in 1986, staged a recovery beginning in 1987 and surpassed the EC index in 1988. The United States managed to recover its competitiveness owing to import quotas imposed on its foreign competitors. Soviet production continues to grow at a steady pace.

Production in the newly-industrialized countries (NICs) and the developing countries continues to advance in part because the industries in these countries often receive State aid. This group of countries includes Yugoslavia, Romania, Turkey, Venezuela, Brazil, Argentina, Taiwan, the Republic of Korea and Thailand.

Consumption trends

Between 1984 and 1988, apparent consumption of steel tubes registered an annual average rise of 4.6%. The corresponding market share of imports was 11.4% in 1988, compared with 9.3% in 1984.

Apparent consumption of seamless tubes rose at an annual rate of 3.8% between 1984 and 1988. The share of imports remained relatively high at 16.8% in 1988, compared with 12.7% in 1984.

Consumption of welded tubes over 406.6 in outside diameter is practically the same in 1988 as in 1984, and underwent a sharp rise in 1986, followed by a fall in 1987. The share of imports is nearly equal to that of 1987 (4.6%), but is far below that of 1984 (12%).

Consumption of welded tubes OD \leq 406.6 mm, which accounted for 70% of total apparent consumption of steel tubes in 1988, rose at an annual rate of 5.4% between 1984 and 1988. In the same period, the share of imports increased to 10.2% in 1988, compared with 7.7% in 1984.

Factors behind production and consumption trends

The following figures illustrate recent trends in the EC's steel tube industry:

Seamless steel tubes

(Index: 1985 = 100)	1984	1985	1986	1987	1988
Production	97	100	78	79	85
Consumption	88	100	84	84	102
Imports	90	100	98	116	137
Exports	105	100	75	78	77

The indices for this category of tubes show that the increased consumption mainly helped imports. Exports have been declining steadily since 1984.

Welded tubes OD > 406.6 mm

(Index: 1985 = 100)	1984	1985	1986	1987	1988
Production	92	100	97	74	67
Consumption	90	100	110	72	89
Imports	349	100	604	102	124
Exports	94	100	98	75	62

These figures show that consumption in 1988 is more or less at the same level as in 1984, while exports, and especially imports, fell sharply.

Welded tubes OD \leq 406.6 mm and welded tubes of other sections

(Index: 1985 = 100)	1984	1985	1986	1987	1988
Production	105	100	97	105	111
Consumption	101	100	102	114	125
Imports	105	100	100	123	173
Exports	123	100	76	69	79

These figures indicate that this category of tubes has been undergoing an increase since 1984, but production has not managed to satisfy demand. Imports rose and exports fell, underscoring a deterioration in the trade balance for these products.

External trade

A study of extra-Community trade and export/import ratios reveal a serious deterioration in the EC external trade between 1984 and 1988.

The EC's trade balance, nevertheless, remains in surplus, but the latter shrank from ECU 3 871 million in 1984 to ECU 2 364 million in 1988. Imports amounted to approximately ECU 900 million in 1988 compared with ECU 640 million in 1984.

Table 4
Turnover and external trade (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Turnover									
Current value	N/A	N/A	N/A	N/A	9 451.9	10 353.7	8 543.7	7 916.6	9 047.2
Index	N/A	N/A	N/A	N/A	91	100	83	77	87
Constant value	N/A	N/A	N/A	N/A	10 076.1	10 353.7	8 727.6	8 285.2	9 148.9
Index	N/A	N/A	N/A	N/A	97	100	84	80	88
EC trade in current value									
Exports extra-EC	2 517.5	4 475.3	4 897.2	4 002.9	4 513.1	4 789.0	3 538.9	2 971.2	3 259.7
Index	N/A	N/A	N/A	N/A	94	100	74	62	68
Imports extra-EC	518.0	472.9	580.8	536.7	642.5	681.2	714.0	682.5	895.3
Index	N/A	N/A	N/A	N/A	94	100	105	100	131
X/M	4.9	9.5	8.4	7.5	7.0	7.0	5.0	4.3	3.6

(1) 1980 EC 9; 1981-83 EC 10.

Source: CDL.

Table 5
External trade by tube category (1)

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Import penetration rate (%) (2)									
All tubes	8.7	7.6	9.0	10.0	9.3	8.4	9.9	9.8	11.4
Seamless	9.3	12.1	11.8	13.8	12.7	12.5	14.5	17.3	16.8
Welded tubes OD > 406.4 mm	12.2	2.8	2.5	12.7	12.6	3.2	17.8	4.6	4.5
Welded tubes OD ≤ 406.4 mm(3)	7.9	6.6	9.0	8.5	7.7	7.4	7.2	8.0	10.2
Export rate (%) (4)									
All tubes	36.1	46.3	46.0	49.1	48.9	46.7	43.6	39.5	35.2
Seamless	42.6	60.7	58.5	61.3	62.3	58.1	56.2	57.9	52.2
Welded tubes OD > 406.4 mm	70.0	74.1	73.2	92.1	83.3	81.3	81.9	82.1	75.1
Welded tubes OD ≤ 406.4 mm(3)	15.0	20.9	19.9	16.7	22.1	18.9	14.7	12.6	12.0
X/M (5)									
All tubes	5.9	10.4	8.6	8.7	9.2	9.5	7.1	6.0	4.2
Seamless	7.3	11.1	10.5	9.9	11.3	9.7	7.5	6.6	5.4
Welded tubes OD > 406.4 mm	16.5	100.7	104.6	79.9	34.7	129.2	20.9	94.7	63.9
Welded tubes OD ≤ 406.4 mm(3)	2.1	3.8	2.5	2.1	3.4	2.9	2.2	1.7	1.2
X/M (6)									
All tubes	4.9	9.5	8.4	7.5	7.0	7.0	5.0	4.3	3.6
Seamless	5.2	9.2	9.3	7.5	7.4	6.9	4.8	4.7	4.4
Welded tubes OD > 406.4 mm	12.5	112.1	85.8	72.3	26.8	103.1	23.7	88.0	58.6
Welded tubes OD ≤ 406.4 mm(3)	2.3	4.0	2.8	2.4	3.1	2.7	2.0	1.7	1.4

(1) 1980 EC 9; 1981-83 EC 10.

(2) As percentage of quantity consumed.

(3) Includes tubes of non-circular cross-section.

(4) As percentage of quantity produced.

(5) Derived from quantity data.

(6) Derived from value data.

Source: CDL.

Table 6
Employment and productivity (1)

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Employment (1 000)	108.9	107.0	103.9	99.4	99.9	94.8	87.8	74.7	74.9
Productivity (tonnes/empl.)	116.9	134.8	123.6	122.0	143.8	152.5	149.6	172.4	178.0

(1) 1980 EC 9; 1981-83 EC 10.

Source: CDL.

Employment

Total staff in the industry in 1988 was 25% lower than in 1984. This sharp reduction in the number of employees is the direct result of restructuring in the steel tube sector in the Member States. This led to a gradual growth in productivity, the rise being particularly high in 1987 and 1988.

Investment

No significant investment has taken place in recent years owing to the reductions of capacity imposed by difficulties on the market since 1985. A number of improvements were nevertheless introduced to step up quality and productivity.

Environmental protection

Costs arising from environmental protection are considerable. They are to a large extent due to costs incurred by the treatment of smoke emissions from raw material production units and by reheating furnaces, treatment of wastewater from the pickling installations and noise control in the production units. These costs can amount to as much as ECU 50 per tonne, or 1% of the turnover of some firms in the EC.

The impact of '1992'

The influence of the advent of the single market will be low for the steel tube sector because today there are very few barriers to trade in the steel tube sector. Nearly 3 million tonnes of tubes move among the Member States every year. Owing to similar production techniques throughout the EC, products are of a comparable quality. This fact has been confirmed by

the well advanced harmonization of EC standards in the steel tube sector.

Geographical diversity

Production is more or less centralized in one or two regions in most Member States. As a result distribution is uneven on the regional level.

Outlook

Efforts made by each company to remedy the situation have led to improved results for 1988, which should be confirmed in the turnover and profits for 1989. As for quantities, the best one can hope for is that performance in 1990 will be the same as in 1989, when a fall was recorded over 1988 results.

The recovery of the steel market and the ensuing price increases have had a positive effect on the steel tube industry. But it is still vulnerable to unfair pricing by third countries on the Community market and more effective means of protection will have to be found. At the same time, aid granted by Member State governments will have to be closely monitored to ensure fair competition between manufacturers and to avoid underpricing, which always disrupts the market.

Concerning the United States, the quota system which has been implemented until 30 September 1989, in keeping with the Arrangement signed by the European Community with the USA, and the Regulations of the EEC Council dated 9 January 1985, no longer reflects the present situation. Production in the USA industry has improved greatly since 1985 and earnings have risen.

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COLD FORMING

(NACE 223.3)

Summary

The drawing, cold rolling and folding of steel constitutes part of the preliminary metal-working sector. Production in terms of current ecu value declined by 2.3% per year between 1980 and 1986. This unfavourable evolution was due to the erosion of foreign trade as well as the poor orientation of internal demand, particularly in the construction industries, which are the leading clients in this sector, representing about a third of the outlets.

Description of the sector

The following concerns only cold rolling of flat steel products.

Steel sections are produced by rod drawing in a die or from flat products by press folding, or by gradual forming on a rolling machine. Only the latter technique will be considered here, since it represents the largest volume and greatest diversity of production.

It is difficult to define this industry precisely because of two factors. Firstly, certain users sometimes carry out cold rolling themselves (manufacturers of door frames, casings, shutters, storage units and silos, and steel) but have recourse to the market for part of their production. Secondly, certain rolling companies are moving more and more towards finished products that can be used directly.

Current situation

Cold rolling in Europe is carried out in factories that usually specialize in this activity, though they may

also produce welded tubes, which are technically very similar, using the same type of raw materials.

The two main families of rolled steel products are generally separated:

- simple-shape sections (L, C, U, omega, Z) for various uses or special complex-shape sections most often designed for a particular use or even for the needs of a single client. The width developed is generally slight compared to the length, which is only limited by conditioning and transport considerations;
- corrugated sheets, profiled sheets and sandwich panels, which are as wide as the sheet metal coil they come from; there is, therefore, a smaller width-to-length ratio. These products are always coated (galvanized or galvanized-lacquered).

Production and consumption

Growth in the production of sections was rapid and sustained until 1973, which marked the beginning of a severe, general economic crisis. Since then the evolution of the two sectors which are simple-shape sections, and corrugated sheets, profile sheets and sandwich panels, has diverged.

Sections for general and specialized use, which include thousands of references, are produced for a large number of user sectors, many of which (the construction industries, the transport equipment industry, durable-goods manufacturing) have been hit by the recession. These are products that are extensively traded within the Community. At the same time, imports from third countries have been increasing since such trade has enabled third coun-

Table 1
Main indicators, 1980-86 (1)
Drawing, cold rolling and folding of steel

(million ECU)	1980	1981	1982	1983	1984	1985	1986
Apparent consumption	7 610	7 167	8 051	8 212	8 939	9 617	9 583
Net exports	970	1 129	1 005	1 037	1 339	1 452	1 118
Production	8 580	8 296	9 056	9 249	10 278	11 069	10 701
Employment (1 000)	134	123	118	109	102	98	93

(1) Excluding Greece, Spain, Netherlands and Portugal.

Source: IPF.

Table 2
External trade (1) (2)

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Imports extra-EC	58	57	59	47	54	60	81	79
Exports extra-EC	68	63	53	46	53	47	49	57

(1) 1980 EC 9; 1981-85 EC 10; 1986-87 EC 12.

(2) Nimex codes 73.11.31; 73.11.39; 73.11.43; 73.11.49.

Source: Eurostat (Comext).

tries to compensate for anti-crisis measures taken to protect the steel market. Owing to this decline in demand and the increase in competition, including that from certain aluminium and plastic products, production has decreased and some companies have ceased operation while others have sought to save themselves through concentration or integration. Such developments have diminished and this adaptation phase may be considered to be all but, if not entirely over.

The production of wide sections, mainly for casing buildings (flooring, cladding, roofing), has hardly been affected by the crisis in the construction industry because the rapid evolution of these products, culminating in the sandwich panel, has given them a dominant position with respect to more traditional materials. As these products are also often produced to specifications (particularly as far as dimensions, colour and fittings are concerned), they are less vulnerable to international competition and consequently their market is partially protected. Europe also has an undeniable technological lead in this field. Production of all these products has expanded and will continue to expand at a satisfactory rate, with the exception of corrugated sheets, where it has declined considerably.

Trade

The firms that are increasingly supplying products perfectly adapted to the needs of their users obviously have to integrate the requirements of these clients at the production level. Such an evolution, which requires heavy investment, cannot take place without volume. It follows that the industry cannot afford to abandon a part of the market to imports from countries where different economic conditions

prevail. It has, therefore, successfully brought several suits in connection with unfair pricing practices and is watching the market situation closely. The figures in Table 2 illustrate the erosion of the market; they cover only some of the various categories of sections. They do show, however, that imports from third countries have increased by 36% between 1980 and 1987. This figure is even higher if the trade between East and West Germany is taken into consideration. At the same time, imports within the Community have declined by almost 4% despite its enlargement.

Further difficulties for the industry have been caused by periodic disturbances in the market for iron and steel products and by fluctuations in the price of certain imported raw materials. There are from time to time considerable irregularities in conditions affecting the supply of raw materials, including the downgrading of certain qualities.

Outlook

Cold-rolled sections are among the preliminary metal-working products that are most affected by measures taken to organize and improve the steel market. It is thus particularly difficult to forecast evolutions in view of the uncertainty reigning over the whole of the iron and steel working sectors.

However, there is hope that past efforts made by the industry to improve its competitiveness and develop new products (as in the case of wide sections for the construction industry) will enable the EC to maintain its production.

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COLD STEEL WIRE DRAWING

(NACE 223.4)

Summary

The European wire-drawing sector consists of some 500 steel mills of all sizes in the Community's eight major steel-producing countries.

These companies employ more than 50 000 people, producing more than 7 million tonnes.

Description of the sector

Wire drawing is 'an operation that consists of stretching a material without adding heat and giving it the shape of wire by pulling it through a tool with an appropriately-shaped aperture called a wire-draw die'.

This is possible only if the material is ductile, that is to say, has the properties of cohesion and plasticity. This ductility, or ability to be drawn into wire, is found in most metals, including steel.

Wire rod is used as an input for the steel wire-drawing industry. Wire rod is hot-rolled by steel mills on their rolling mills' so-called 'wire mills'.

The deformations produced in steel rod by its passage through a wire-draw die or between the rollers of a rolling mill result in a general change of its original mechanical properties.

For example, its hardness, tensile strength, and breakpoints are raised, whereas its ductile properties, especially ability to lengthen, are reduced.

Steel mills manufacture a wide range of wire rod of different types and quality that are suitable for the many uses of drawn-wire products. These include:

- plain carbon steel, classified as 'soft' or low-carbon (carbon content $\leq 0.25\%$) or 'hard' or high-carbon (carbon content $> 0.25\%$);
- alloy and carbon speciality steels;
- stainless steel.

Drawn-wire products are traditionally divided into two major categories, namely:

- drawn wire *per se*, for direct use;
- the commercial products manufactured from drawn wire by drawing mills or processing plants.

These products are commonly called steel-wire products.

Drawn-wire rods are classified by both the type of steel (low-carbon, high-carbon, alloy) and type of coating (uncoated rod, galvanized, plastic-coated, various metal coatings, etc.) used. There is a wide range of utilizations for direct-use highly extruded wire: binding, rolling mill banks, saddle joints, bolt and screw manufacture, springs, cables, welding, type casings, etc.

The main steel-wire products are:

- heavy welded mesh for reinforcing concrete
- grillwork and fencing
- metal cloth
- brads and nails
- barbed wire
- cables and strands
- chains.

These products are destined for a wide variety of users, the main ones being: the building sector, public works, the automotive industry, the mechanical engineering sector, the packing industry, bolt and screw manufacturers, and the furniture industry.

Production and consumption

The wire-drawing trade is currently represented in European circles by the European Wire-Drawing Committee (CET), the members are the wire-drawing mills of the Community's eight major steel-making countries, i.e.:

- Belgium
- the Federal Republic of Germany
- Spain
- France
- Italy
- Luxembourg
- the Netherlands
- the United Kingdom.

The figures given below refer to these countries only.

Production

- In the Federal Republic of Germany, some 120 companies, including 65 wire-drawing mills *per se*, produced the 2 million tonnes of drawn-wire products manufactured in 1988. Most of these companies are independent SMEs; very few are subsidiaries of steel-making groups.
- In France, about 90 companies, most of them SMEs in wire-drawing or steel processing, account for the drawn wire and wire products produced (935 000 tonnes in 1988). Subsidiaries of the State steel mills account for more than half of the national output.
- The British drawn-wire sector, which produced some 1 100 000 tonnes in 1988, consists mostly of non-government-owned mills. Some 30 companies turn out large amounts of these products. One large group is a subsidiary of British Steel.
- The 'steel wire and wire products' sector in the Belgo-Luxembourg Economic Union (BLEU) — 915 000 tonnes produced in 1988 — consists of six major firms. The 'big six', for which exports account for more than two-thirds of their total deliveries, manufacture more than 90% of the steel wire and wire products in Belgium and Luxembourg. This production consists primarily of wire for reinforced concrete, industrial wire, and goods for trade.
- 310 000 tonnes were produced in the Netherlands in 1988 by seven companies, four of which are subsidiaries of the national steel mills. These companies account for about half of the country's production volume, the other half being manufactured by independent mills.
- The more than 160 companies in the Italian wire-drawing sector produced 1 440 000 tonnes in 1988. However, most of the output is the work of some 40 large concerns. The bulk of the remaining 120 undertakings are family-run SMEs.

- Spain produced close to 500 000 tonnes of drawn-wire products in 1988. This was the work of 65 companies of various sizes, most of which are independent of the national steel company. However, the national steel company is buying up more and more shares in Spanish wire-drawing mills.

Consumption

Like the other branches of first-stage steel processing and steelworks themselves, the European drawn-wire industry was hit hard by the recession triggered in the main steel-consuming sectors in the 1970s.

World production of and demand for drawn-wire products fell steadily after 1974, which was an exceptionally good year, reaching rock bottom around 1985/86.

The surge in the demand for steel products that began in 1987 picked up considerable speed in 1988, reaching and sometimes even exceeding 1974 consumption levels in most of the Community's Member States.

The total consumption of drawn steel (drawn-wire and wire products) for the CET's eight member countries came close to 8 million tonnes in 1988.

1989 began where 1988 left off. The world demand for drawn steel held steady in the first quarter of 1989, making considerable progress compared with 1988.

The forecast for the end of 1989 remains reasonably optimistic, although European demand for drawn-steel products would seem to have peaked in 1989.

Some signs of a slowdown in global steel demand are already visible (DRI forecasts a 6% drop in the demand for steel in the US in 1989). After a record year in 1988 and continued strong demand in 1989 it is likely that the European and global demand for drawn steel will slump in 1990.

Table 1
Production of wire and wire products

(1 000 tonnes)	B-L	D	E	F	I	NL	UK	Total	USA (1)
1986	825	1 865	410	865	1 303	290	920	6 478	944
1987	840	1 817	435	860	1 351	290	980	6 573	959
1988	915	2 017	480	935	1 440	310	1 122	7 219	N/A

(1) Total deliveries.

Source: European Wire-Drawing Committee.

Table 2
External trade
European wire-drawing Industry (1)

(1 000 tonnes)	Benelux (2)		D		E		F		I		UK	
	X	M	X	M	X	M	X	M	X	M	X	M
1986	670	325	561	439	N/A	N/A	325	427	355	119	183	149
1987	686	335	613	448	87	35	299	497	426	146	208	184
1988	710	385	658	505	72	32	303	602	493	160	197	201

(1) Customs data. X = exports; M = imports.

(2) Estimate, which does not cover certain confidential headings.

Source: European Wire-Drawing Committee.

The magnitude of this slowdown will obviously depend on outside factors influencing activity in the steel-using sectors, such as the US dollar's exchange rate, oil prices, inflation rates, and budget decisions in the leading industrial countries.

External trade

The major phenomenon seen on the Community's main markets over the past few years has been the steady gains in the market shares of foreign companies, due to both the development of intra-Community trade and the emergence of the newly industrialized countries (the Republic of Korea, Taiwan, South Africa, and Brazil) and eastern bloc countries at the low end of the market.

It is unlikely that this increasing permeability of the European drawn-steel markets can be reversed, given the gaps created by the regrouping of European companies and above all the differences in production costs between Europe and its foreign competitors. Nevertheless, one can take comfort from the fact that the trade balances with Member States,

and with the rest of the world for all the Member States except France, are positive.

Outlook

Like all the world's wire-drawing mills, the European mills have had to adapt to the past few years of recession.

A certain number of mergers and restructurings have taken place recently, especially in and among the major steel-making groups' European subsidiaries.

Besides these efforts to increase productivity, a tendency to rationalize and specialize production has been spreading among the main European wire-drawing concerns.

This trend can only continue in the years to come, in particular because of the completion of the single market in 1993.

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Chapter 4: NON-FERROUS METALS

ZINC

(NACE 224)

Summary

The EC zinc industry is characterized by a strong degree of vertical integration, with the same firms carrying out operations from the mining of the ore to the production of semi-finished products. The industry is recovering after 15 years of difficulties aggravated by the oil price rises coupled with a surplus of installed zinc capacity. Little new capacity was added during this period, so that, given the fast recent growth of demand for zinc, there is no spare capacity available at present. However, restructuring is now under way in the European and Japanese industries. Major leader groups have been created at the world level. If current favourable world trends continue, supply and demand in the zinc industry can be expected to remain more or less balanced in the western world.

Zinc is commercialized in various shapes: ingots, rods, wire and plates, with differing degrees of purity. The highest quality (SHG — special high grade) has a purity of 99.995%, the lowest having a purity of about 98%, with an intermediate range of four to five qualities.

The following zinc semi-finished products (semis) are manufactured:

- rolled products
- pressure die-casting
- zinc dust
- zinc oxide
- various alloys, wire, sphere, anodes, zinc powder, etc.

Description of the sector

Primary zinc is found in nature in the form of blende (zinc sulphide — ZnS), smithsonite (zinc carbonate — ZnCO₃) and calamina (a mixture of smithsonite and zinc silicate — ZnSiO₄). Blende is generally associated with galena (lead sulphide PbS₂). As for secondary zinc, this mainly comes from the reprocessing of residues from galvanization (zinc matte), middlings from zinc ash and old zinc roofing, with very low recovery convenience. Its production is fairly low in comparison with that of primary zinc (8 to 10%).

Current situation

Zinc production is highly vertically integrated in the sense that extraction, smelting and refining are generally carried out by one and the same concern, either directly or via subsidiaries. Ireland and Greece are the only countries which carry out just the first production stage (mining production).

In the EC, 13 companies produce zinc ingots, five rolled products and 22 oxides. Table 2 indicates the extent of integration at most smelters in Europe. There are 13 companies, but 10 of them fall into six major groups which between them, account for more

Table 1
Main indicators, 1982-88
Zinc ingots

(1 000 tonnes)	1982	1983	1984	1985	1986	1987	1988
Consumption (1)	1 338	1 423	1 453	1 424	1 475	1 498	1 565
Net exports	-29	38	137	96	71	138	114
Production (2)	1 423	1 501	1 567	1 594	1 619	1 674	1 714

(1) Excluding Luxembourg.

(2) Re-melted zinc and zinc dust are excluded.

Source: Eurométaux.

Table 2
Zinc production capacities

Smelter	Total capacity (1 000 tonnes)	Marketable slab (1)		Products produced (1 000 tonnes)			
		Total	(Galv. alloys)	Rolled zinc	Die-cast alloys	Oxides/ Powder	Semis (2)
Auby (F)	205	90	(*)	40	15	X	X
Balen (B)	180	*	(*)	X	*	*	*
Noyelles Godault (F)	105	75	(40)	X	15	*	*
Dattein (D)	135	80	(*)	40	15	X	*
Berzelius (D)	90	80	(20)	X	X	X	X
Nordenham (D)	125	100	(33)	X	17	X	X
Overpelt (B)	120	*	(X)	X	*	*	*
Budel (NL)	210	170	(*)	15	*	*	*
Porto Vesme (I)	150	140	(X)	X	X	X	X
Crotone (I)	105	65	(X)	X	12	9	*
San Juan de Nieva (E)	215	140	(15)	X	18	13	X
Cartagena (E)	40	21	(*)	X	12	X	X
Avonmouth (UK)	100	85	(X)	X	X	X	X

(1) Total includes all grades — SHG, HG, GOB debase continuous galvanizing grade (GGA) and other galvanizing alloys.

(2) Semis include wrought products, battery callots and plating anodes.

(*) indicates production at the smelter.

X indicates no production.

Source: Eurometaux.

than 97% of Community zinc ingot production (about 1 670 000 tonnes in 1988).

The extent of downstream integration by US zinc producers varies considerably from company to company. US plants are smaller than in Europe and Canada.

In the case of Canada, at each of the four smelters, the product ranges only include alloys for the steel industry for galvanizing. A wide range of specialty alloys are produced that are tailored to customers' needs. None of the producers manufactures die-casting alloys, powder or dust at the smelter site.

The extent of integration in Japan is greater than in North America, but less than in Europe, a narrower range of products being produced there. All six electrolytic plants produce die-casting alloys, which account for between 20 and 50% of total zinc output. Not all plants produce the full range. Tailored zinc accounts for the majority of production at most of

the plants, and each plant manufactures a number of different products.

The EC accounts for 13% of the western world mining production, while the corresponding figure for ingot production is about 32%.

In November 1988 Penarroya, a French company, and Preussag, a German company, merged to form a new entity: Metaleurop. Preussag AG now owns 45% of Metaleurop's shares, Imetal 24% and the public the remainder. The main production sites are located in France, Italy, the Federal Republic of Germany and Spain. This new company has a leading position in lead, zinc and silver production in the western world. It has a strategic role in the production of rare metals like germanium and indium.

Consumption

The EC represents about 30% of the metal tonnage consumed in the western world. Roughly speaking, the remainder is spread over the other industrialized

Table 3
EC production of ores and unwrought metal (1)

(1 000 tonnes)	1982	1983	1984	1985	1986	1987	1988
Mining production (2)	636	656	727	719	612	634	613
Ingot production	1 423	1 501	1 567	1 594	1 619	1 674	1 714

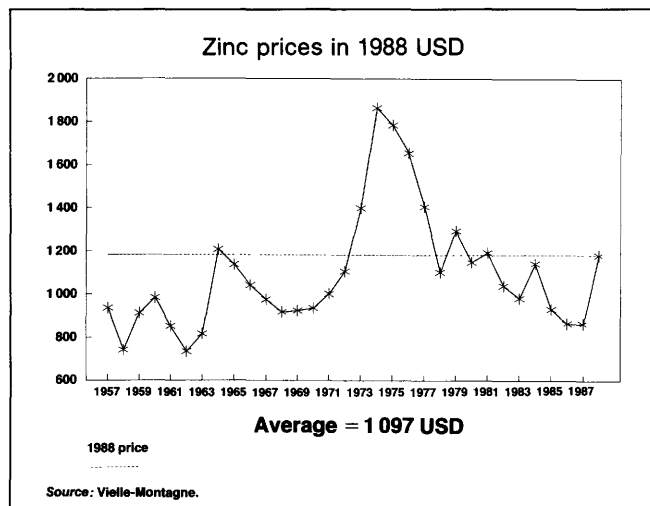
(1) Including Greenland up to 1985.

(2) Zinc content.

Source: Eurometaux.

countries (mainly Japan and the USA). It should not be forgotten that the processing and consumption of zinc, by the very nature of the uses to which the metal is put, are inseparably linked to the level of development of the regions in which they occur, and are thus spread over the most industrialized countries.

Figure 1



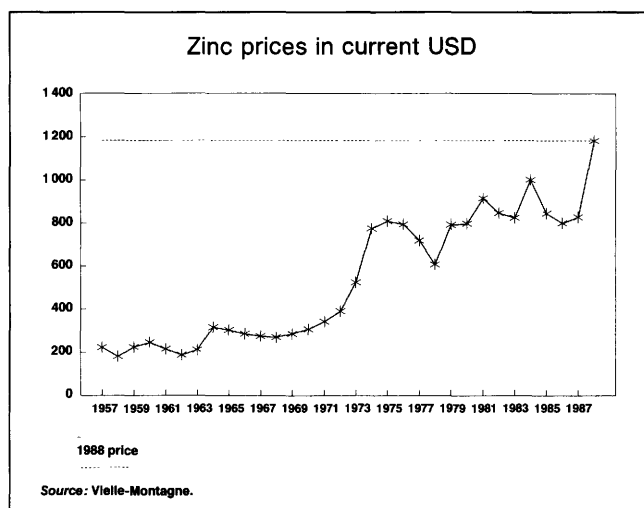
The main outlets of the zinc industry are galvanization, brasses, and alloys, which represent 45, 21 and 15% of world consumption respectively.

The solid position of demand can be explained in particular by:

- a sustained overall economic situation;
- the surge in galvanization development (motor vehicle and construction sectors);
- the revival of demand in the brasses and alloys sectors.

From 1982 to 1988, EC consumption increased by 2.6% per year on average.

Figure 2



Prices

The basic zinc price, known as the 'producer price' used to be the one on which all ore-purchasing contracts were generally based. It was fixed in US dollars. Calculated in constant 1988 dollars, this price was relatively stable in terms of quotations, apart from a short period of high prices between 1973 and 1977 (see Figure 1). The producer price was replaced by the SHG Zn LME quotation on 31 December 1988.

Calculated on the basis of the producer price, the actual selling price of the metal of the EC countries is influenced by the dollar exchange rate in relation to its various currencies and the quotations on the London (non-ferrous) Metals Exchange (LME).

Table 4
International comparisons
Production of zinc (1)

(1 000 tonnes)	1982	1983	1984	1985	1986	1987	1988
Belgium	228	263	271	271	269	284	298
FR of Germany	334	356	356	367	371	378	352
Spain	190	198	212	216	202	224	256
France	244	249	259	247	257	249	274
Italy	158	156	167	210	230	247	242
The Netherlands	186	187	210	203	198	205	210
Portugal	4	4	6	6	6	6	5
United Kingdom	79	88	86	74	86	81	77
EC	1 423	1 501	1 567	1 594	1 619	1 674	1 714
USA	303	305	331	334	316	344	346
Canada	512	617	683	692	571	610	703
Japan	662	701	754	740	708	666	678

(1) Re-melted zinc and zinc dust are excluded.

Source: Eurométaux.

Table 5
EC zinc ingot consumption

(1 000 tonnes)	1982	1983	1984	1985	1986	1987	1988
Ingot consumption	1 338	1 423	1 453	1 424	1 475	1 498	1 575
% of western world consumption	31.5	31.1	30.7	29.9	30	29.5	30

Source: Eurométaux.

Trade

The EC is a net exporter, particularly to traditional markets such as the USA. The situation regarding third countries can be summarized as follows. Japan, a major zinc consumer that was at first self-sufficient, must now import following a drop in its production. The South-East Asian and Latin American countries are becoming increasingly important in international zinc trade. The industrialization of these regions has given rise to stepped-up demand and production. For the time being, the African countries continue to play a minor role, zinc demand being very low. Trade between the industrialized and directed-economy countries is based on qualitative import needs or currency requirements of the latter.

Technological trends

It should be stressed that the major industrial efforts tend towards the economic optimization of the integrated production line; most plants have a double link, in fact, the first being zinc production and the second, generally considered as by-product metals

related to the recovery of various metals. Such metals are by no means negligible, either qualitatively or quantitatively (and therefore in economic value).

It should also be noted that technological choices are generally made on the basis of a number of factors, such as major ones being: required product quality, environmental aspects, recycling, energy-specific consumption, and availability of required sources of energy.

In regard to required product quality, only the electrolytical process allows the direct production of a 99.995% quality zinc. As far as energy consumption is concerned, it should be noted that zinc production is energy-intensive. Energy accounts for about 30 to 35% of the cost of production.

Outlook

The present situation is characterized world-wide by a delicate balance between production and consumption, with, however, a considerable degree of

Table 6
International comparisons
Consumption of zinc (1)

(1 000 tonnes)	1982	1983	1984	1985	1986	1987	1988
Belgium	126	166	156	169	172	163	175
Denmark	10	9	10	12	15	10	12
FR of Germany	368	405	425	410	434	452	446
Greece	13	11	12	15	15	14	18
Spain	97	107	101	103	100	110	110
France	264	271	282	247	260	253	290
Ireland	1	2	1	1	1	1	2
Italy	202	208	210	218	232	245	250
The Netherlands	59	54	60	51	54	50	59
Portugal	16	9	11	9	10	12	10
United Kingdom	182	181	185	189	182	188	193
EC	1 338	1 423	1 453	1 424	1 475	1 498	1 575
USA	801	933	980	962	998	1 052	1 089
Canada	120	144	146	156	154	158	159
Japan	703	771	774	780	753	729	774

(1) Re-melted zinc and zinc dust are excluded.

Source: Eurométaux.

production over consumption in Europe. The difference is easily absorbed by exports.

Short term

Zinc production is in its cruising phase. To keep up with demand, producers will have to increase capacity.

Medium term

In order to keep up with the increase in demand for zinc (about 2 to 2.5% per year in the western world, representing about 100 000 to 130 000 tonnes of metal), producers must install new capacity. These increases are already under way or planned in order to meet the increase in demand by 1994. The extremely high cost of installing new capacity is a factor that cannot be ignored.

Long term

After 15 years of crisis, during which zinc production suffered from surplus capacity resulting in a great deal of rationalization and during which demand increased unevenly — although with a generally stronger tendency than for the other non-ferrous metals — demand has finally caught up with supply, and the supply/demand balance has been restored over the past two years. The industry has, therefore, geared its structure away from surplus capacity towards a balanced situation world-wide. The low price levels seen in the recent past are no longer expected. In the galvanization sector, which represents a developing activity in which there is no substitute for zinc, there is every reason to believe that the trend will remain favourable. It is accordingly crucial to the future of the Community industry that supply adapt smoothly to demand.

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ALUMINIUM

(NACE 224)

Summary

The EC aluminium industry underwent major structural changes during the period 1980-86. It enjoys a strong technological lead in the production of both raw aluminium and semi-finished products (semis). The EC aluminium market is benefitting from good economic performance, and the aluminium consumption in the Community has registered a sustained growth in recent years; a large potential for further growth still exists in some sectors like packaging.

Description of the sector

The aluminium industry in the European Economic Community covers mining production (bauxite), the production of alumina and primary and secondary smelter aluminium, as well as the production of semi-finished products.

Aluminium is a 'young' metal, having celebrated in 1986 the centenary of the taking out of patents for its world-wide production.

After iron and its alloys, aluminium is the second most widely used metal, its total consumption exceeding that of all the other non-ferrous metals combined.

Aluminium owes the variety of its uses to its many characteristics. Indeed, the major properties of aluminium comprise all of the following: its lightness, its resistance to corrosion, its electrical conductivity, its aesthetic qualities, its alloy possibilities.

Finally, unwrought aluminium lends itself to processing in various forms — flat, long, cast or forged products, or wire.

Current situation

The aluminium market is a world market. The current situation of the aluminium industry in the Community must therefore be assessed in a wider context.

The importance of the aluminium industry in the EC in 1987 can be seen from the following production figures: 3 880 kt of bauxite (4% of production in the western world), 5 110 kt of alumina (18%), 2 325 kt of primary aluminium (18%), 1 320 kt of secondary aluminium (26%) and 3 630 kt of semis (30% of production in the western world of rolled and drawn products, wire and cable).

Modest in the mining industry, the European aluminium industry thus grows considerably in importance the closer one is to the stage of the manufacture of finished products.

Production and consumption

Consumption

Total aluminium consumption

Total aluminium consumption (primary and secondary) amounted to 18.8 million tonnes in the western world in 1987. With 5.6 million tonnes, Europe was in second position behind the USA (6.8 million tonnes), and the EC represents 88% of European consumption.

During the period 1972-88, total aluminium consumption grew at an average rate of 2.9% per year in the western world. This growth was much more moderate than that noted during the period 1960-72

Table 1
Main indicators, 1981-88
Aluminium — semis (1)

(1 000 tonnes)	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	2 633	2 743	2 990	2 887	2 938	3 182	3 507	N/A
Net exports	235	263	289	328	331	213	119	N/A
Production	2 868	3 006	3 279	3 215	3 269	3 395	3 626	3 893

(1) 1981: Excluding Greece.

Source: Eurométaux.

Table 2
Production, 1987-88

(1 000 tonnes)	Bauxite		Alumina		Primary aluminium		Secondary aluminium		Semis	
	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988
EC	3 877	3 335	5 106	5 011	2 323	2 312	1 323	N/A	3 626	3 853
Belgium/Luxembourg	0	0	0	0	0	0	0	0	308	347
Denmark	0	0	0	0	0	0	0	0	17	17
FR of Germany	0	0	1 313	1 163	738	744	501	530	1 213	1 305
Greece	2 472	2 440	529	532	126	149	4	N/A	87	105
Spain	0	0	801	881	341	294	70	N/A	235	261
France	1 388	878	866	737	322	328	195	204	612	656
Ireland	0	0	787	879	0	0	0	0	2	N/A
Italy	17	17	700	705	233	226	335	N/A	561	587
Netherlands	0	0	0	0	269	271	101	N/A	131	146
Portugal	0	0	0	0	0	0	0	0	35	N/A
United Kingdom	0	0	110	114	294	300	117	106	425	429

Source: Eurométaux.

(about 10% per year), but it kept pace with world economic activity; in terms of GNP, growth was about 2.7% between 1972 and 1988.

The growth of total consumption in the EC over the same period was practically equal to that in the rest of the western world (2.7%).

As a consequence, there is a development potential, opening up wide growth prospects for aluminium consumption in the EC.

Table 3
Per capita consumption

(kilograms)	1975	1987
Belgium	7.5	7.5
Denmark	8.2	14.0
FR of Germany	14.6	25.9
Greece	5.3	4.8
Spain	6.6	8.4
France	9.7	14.2
Ireland	1.9	9.8
Italy	7.5	17.7
Netherlands	8.4	15.4
Portugal	1.3	5.3
United Kingdom	8.9	11.5
EC	9.3	15.1
Europe	9.9	14.7
USA	20.4	28.0
Japan	12.2	23.4

Source: Eurométaux.

Per capita consumption varies greatly from one country to another. It was 20.5 kg in 1987 in the most industrialized countries and 1.3 kg in the other regions. Even amongst the industrialized countries themselves, there are enormous differences.

The average rate of per capita consumption in the EC was 15.1 kg in 1987, which constitutes a much lower value than in the USA or Japan.

Table 4
USA, Japan and Europe combined aluminium consumption per sector

	1987		1977-87
	1 000 tonnes	%	AAGR
Transportation	3 920.0	25.9	3.0
Building	3 370.0	22.3	2.2
Packaging	2 930.0	19.4	5.0
Electrical engineering	1 320.0	8.7	.7
Other sectors	3 600.0	23.8	1.4
Total	15 140.0	100.0	2.5

Source: Eurométaux.

Consumption per sector

More than three-quarters of aluminium consumption in the OECD countries was accounted for in 1987 by four outlet sectors: transport, building, packaging and electrical engineering.

Among these, the packaging sector experienced the fastest growth over the past 10 years in the industrialized countries and particularly in the USA.

In the EC the transportation sector is the major consumer of aluminium. Despite sustained growth over the past 10 years (5% per year), the packaging sector only represents just over 10% of consumption, but harbours an important growth potential for aluminium consumption.

The dispersion of per capita consumption in the industrialized countries mentioned above is due to the dispersion of consumption per sector and per capita. In the building and transport sectors, in fact, European consumption per capita (3 to 4 kg) is less than that of the USA and Japan (6 to 7 kg). In the packaging sector, consumption per capita in the USA (8 kg) is much higher than in Japan and Europe (less than 2 kg).

Table 5
EC aluminium consumption by sector, 1987

	%
Transportation	30.0
General engineering	7.4
Electrical engineering	8.3
Building and construction	20.7
Chemical, food and agricultural appliances	1.2
Packaging	11.2
Domestic and office equipment	6.3
Powder and paste	0.5
Iron, steel and metallurgical uses	4.6
Miscellaneous	9.9
Total	100.0

Source: Eurométaux.

Secondary aluminium consumption

Over the past 10 years, the development of secondary aluminium in the western world has been more rapid than that of primary aluminium. While the proportion of total consumption presented by aluminium has fluctuated between 16 and 19% since 1960, it increased to more than 20% in 1979, and has never stopped growing since, reaching 27% in 1987.

The development of secondary aluminium has been less rapid in the EC and, more generally, in Europe than in the USA and Japan. Over the past 15 years, aluminium production increased by 5.3% per year in Japan and by only 3% per year in Europe. During the same period, aluminium recovery in the USA rose by 4% per year. The refining industry has been developing for a long time now in Europe. However, this growth is due to the emphasis on the use of castings, particularly in the automobile sector.

Primary aluminium consumption

Primary aluminium consumption in the western world increased at the rate of 2% per year during the period 1972-88. In the EC, the growth of primary aluminium has been slightly more sustained, at 2.3%. Hence, consumption reached 3 760 kt in 1988, bringing the EC up to second place, behind the USA (4 610 kt).

Production

The tenfold increase in petrol prices during the 1970s created new conditions for primary aluminium production. The competitive possibilities of the various producer regions were fundamentally changed.

Table 6
EC aluminium consumption, 1987

	1 000 tonnes
EC	4 856
Belgium/Luxembourg	73
Denmark	61
FR of Germany	1 585
Greece	47
Spain	321
France	788
Ireland	35
Italy	1 014
Netherlands	226
Portugal	54
United Kingdom	652

Source: Eurométaux.

In the context of the world economic crisis that characterized the early 1980s, these changes called for structural adjustments on the part of the aluminium producers. All the production installations deemed non-viable in the long run were dismantled, primarily in Japan and the USA.

- In Japan, 14 out of the 15 electrolysis plants operating at the beginning of the decade were finally closed down.
- In the USA, 22% of the production capacity installed in 1981 was dismantled.

The fact that the aluminium producers in the western world only increased their production capacity by 1% between 1981 and 1988, whilst at the same time primary aluminium demand increased by 25% (about 3 million tonnes) reveals the importance of these rationalization efforts.

The European producers have also accepted the necessity of a general rationalization process of the world's electrolysis plants, shutting down their small, non-competitive units. In the EC, the number of production sites has been cut from 38 to 29 since the early 1980s.

Many plants still in operation owe their viability to the considerable progress that is subjected to be made in energy integration, without which the Community would be unable to take advantage of its undeniable edge in international competition.

Trade

The dislocation of primary aluminium production brought about by the abovementioned restructuring process in the western world has helped to intensify trade between the producer and consumer countries. Areas with a low local consumption have become important net exporters: Latin America and Oceania have achieved in a decade (1978-88) an export potential of around 1 million tonnes. On the other hand, areas with a high local consumption are now running large trade deficits.

In the EC, the recent growth in primary aluminium consumption (3.4% per year between 1984 and 1988), coupled with the stagnation of production, led to a drop in the rate of cover by local production (62% in 1988, compared with 73% in 1984).

Intra-Community trade in primary aluminium developed during the 1980s, exceeding 1 million tonnes in 1986 and 1987, i.e. about 45% of Community production. Two-thirds of extra Community imports in 1987 were from the EFTA countries (mainly Norway) and Africa (15%).

The European Community is a net exporter of semis: the trade surplus for semis reached 120 kt in 1987.

Intra-Community trade in semis represents a volume equivalent to that for the primary metal. In 1987, this also exceeded 1 million tonnes, i.e. 28% of Community production.

Trade in semis between Europe and the USA is very much dependent on the USD-ECU parity. After rising considerably up to 1985, net European exports

were down by half in 1988 in comparison with 1985. These shifts in European/US trade show just how sensitive the aluminium processing industry is when faced with a drop in the USD-ECU parity.

The primary aluminium industry is also susceptible to dollar fluctuations. In fact, the primary aluminium price is established in US dollars, and the European producers are particularly vulnerable to falls in the US currency.

Research and development

The aluminium industry has made a considerable effort to consolidate its competitive position and to improve continually the quality of the products and techniques offered to its customers.

Aluminium products incorporate an increasingly sophisticated know-how, developed in close collaboration with the users.

This applies both to finished and semi-finished products.

For finished products, progress has taken the form of developing new alloys (aluminium-lithium) and mastering complex smelting processes (continuous strip casting, electromagnetic casting of plates and billets).

All the aluminium-using sectors have been affected by the technological developments undertaken by the aluminium industry.

In the transportation sector, new ground is being broken, in particular in high-tech applications (especially in sectors such as aircraft and aviation,

Table 7
Semis in the EC, 1987

(1 000 tonnes)	Prod.	Consump.	Exports	Imports
EC	3 626	3 500	472	353
Intra-EC trade			1 018	1 011
Belgium, Luxembourg	308	120	284	96
Denmark	17	64	19	66
FR of Germany	1 213	1 133	442	362
Greece	87	58	37	9
Spain	235	215	56	36
France	612	517	298	203
Ireland	2	35	2	34
Italy	561	605	108	153
Netherlands	131	141	124	135
Portugal	35	45	6	16
United Kingdom	425	566	114	255

Source: Eurométaux.

and aerospace), and in association with other materials in the form of composites.

In the packaging sector, successful productivity efforts have been made (thin strip and cans), and original solutions involving other materials (plastics and paper) have been widely applied.

In the electronics sector, a market is being opened up for high value-added materials (high-purity aluminium).

Finally, aluminium recycling constitutes an essential advantage for the future, in so far as it satisfies an increasingly pressing requirement to protect the environment.

Outlook

Over the past six years, aluminium consumption in the EC has sustained a rate of growth that is much higher than that of the Community's overall economic activity (2.7% per year on average, in terms of GNP growth).

This holds for total consumption of aluminium semis (4.4% per year on average), as well as that of primary aluminium (3.4% per year on average).

A comparison of per capita consumption across sectors on the one hand, and an analysis of consumption by sector as mentioned earlier on the other, reveal an extensive potential for growth of consumption in the Community, particularly in the packaging sector.

These growth prospects for aluminium consumption in the EC and, more generally, in Europe, come in addition to the growth expected in Japan and the newly industrialized countries. Coupled with the fact that there has been a great deal of rationalization of production capacity at world level over the past few years, they give rise to expectations of a much improved supply/demand balance on the world aluminium market over the next few years relative to the one that has obtained since the beginning of the decade.

The sharp increase in aluminium price quotations in 1987, 1988 and 1989, although amplified by short term factors, is a manifestation of this market improvement. The situation is, however, still threatened by the appearance of a whole series of new projects, the simultaneous completion of which would definitely lead to a surplus capacity situation similar to the one experienced at the beginning of the 1980s.

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PRECIOUS METALS

(NACE 224)

Summary

The European Community is a world leader in the refining and processing of precious metals, even though its mineral resources of such metals are extremely limited. The consumption of gold and silver depends on jewellery fashion and investment demand for both bars and coins. Industrial demand for gold and silver is relatively stable. The consumption of platinum group metals in Europe will rise significantly as the new EC standards for automobile emission control come into effect.

Description of the sector

The precious metals are:

- gold
- silver
- the platinum-group metals: platinum, palladium, rhodium, iridium, ruthenium and osmium.

Precious metal activities can be grouped under five headings:

- mining;
- refining — the treatment of both primary and secondary precious metal materials;
- trading — dealing in the unwrought metal on a commodity basis;
- fabricating — processing, alloying and converting precious metals into wrought semi-manufactured goods, industrial components, chemical compounds and other such products;
- manufacturing — producing items for sale at retail level, e.g. jewellery, silverware.

Production and consumption

Production

Mining production

EC mineral resources of precious metals are extremely limited.

- EC mine production of gold is currently only 7 500 kg out of an annual world production of some 1.5 million kg, or 0.5%.
- Some 60 countries produce primary silver, mostly as a by-product of base metal mining. EC mines yield under 500 000 kg per annum, or about 3% of annual world production of 14 to 15 million kg.
- There are no mineral sources of any significance in western Europe for the six platinum-group metals, which are found mainly in South Africa, the USSR and Canada. Platinum availability is usually about 90 000 kg per annum, including the sales of the Soviet Union to the West, and that of palladium is also about 90 000 kg, on a similar basis. The four other platinum-group metals are found in much smaller quantities.

Refining

The total precious metals refining capacity of the EC countries approaches that of major primary producing countries such as South Africa and the USSR. Such refiners include both specialist precious metal firms and base metal refineries capable of both recovering precious metals as a by-product of their main activities in copper, lead and zinc, etc., and also of smelting and treating precious metal scrap and ores. All the major EC refiners are able to treat gold and silver as well as platinum and palladium, and most of them can process other platinum-group metals as well.

Trading

While the number of companies actually refining or fabricating precious metals is comparatively limited, many more are involved in dealing in such metals, either as commodities in unwrought forms such as ingots, or as investment products, e.g. special bars and coins. Banks, commodity traders and brokers may all deal in precious metals, particularly gold and silver, but they do not have any production facilities themselves and rely on the refiner-fabricators to convert the precious metals into whatever other form they may require, e.g. gold of higher purity, bars of a different weight, etc. Such dealers trade largely in paper, with non-physical transactions on the commodity markets in London, New York or Zurich, and only rarely do they have rea-

Table 1
Community gold fabrication by country

(tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC	284.0	341.1	373.0	312.3	355.2	399.0	386.1	400.7	457.3
Belgium, Luxembourg	3.5	2.6	2.6	2.3	2.2	2.3	2.0	16.4	2.2
Denmark	.4	.4	.8	.7	.8	.8	.9	.9	.9
FR of Germany	74.8	67.1	65.6	61.4	61.2	62.3	59.5	62.5	72.1
Greece	4.7	6.2	7.0	8.0	9.2	10.6	9.1	8.3	8.4
Spain	19.3	18.3	17.1	14.6	13.8	16.7	16.7	18.3	24.1
France	23.7	22.6	25.7	24.0	22.6	23.4	26.0	26.7	28.8
Ireland and United Kingdom	37.4	35.4	33.1	24.0	25.1	30.0	29.6	37.0	37.9
Italy	114.9	181.9	214.2	170.3	213.6	245.6	234.9	221.8	273.7
Netherlands	3.1	4.0	3.8	3.7	4.2	4.9	4.8	4.0	4.1
Portugal	2.2	2.6	3.1	3.3	2.5	2.4	2.6	4.8	5.1

Source: Gold 1988, Consolidated Gold Fields.

sons to be actually involved with the physical metals themselves.

Refiners and fabricators are also active in such markets, both buying and selling metals to meet their customers' needs and carrying out hedging transactions in order to fix prices and protect themselves from losses due to fluctuating precious metal prices.

Fabrication

The EC precious metal fabricators are among the leaders in the production of precious metal materials for advanced-technology fields. Another part of their business is the manufacture to close tolerances of wire, sheet and tube in carat golds and silver alloys for goldsmiths, silversmiths and manufacturing jewellers. In practice, the larger jewellery firms in the EC are tending to integrate upstream, making their own alloys and semis.

More complicated products, such as complex chemical salts and catalysts, woven catalyst gauzes and electrical contact parts, are also produced by the EC fabricators. Elsewhere, they often have to be imported from fabricators who have the production skills to produce what is required, and to a large extent it is EC firms which provide these services for

Third World countries, where there is no local or regional manufacture.

Closely linked with the fabrication business is scrap recovery or recycling of precious metals. Such reworking business, using the customer's scrap metal, is an important part of the precious metals fabrication industry, particularly in the case of platinum-group metals.

Consumption

Precious metals consumption within the EC countries varies from year to year, depending on industrial demand, jewellery fashion and government decisions regarding the minting of gold and silver coins. Such trends, particularly that of demand for precious metals for investment purposes, are both affected by, and have an impact on, precious metal prices.

Roughly just under a quarter of world precious metals consumption takes place in the EC countries. Only in the case of gold is jewellery the major use. About 75% of the EC's consumption of 450 tonnes of fine gold is converted into jewellery, mainly in Italy, much of which is then exported.

Table 2
Estimated consumption of precious metals, 1988

(tonnes)	Gold	Silver	Platinum	Palladium
EC	450	4 000	17	18
Western world	1 800	14 000	112	104
EC as % of western world	25	28	15	17

Source: Eurométaux.

Table 3
Platinum demand by application (1)

(kg)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Western world total	72 815	75 940	72 505	68 125	82 190	88 440	88 745	102 815	113 125
North America	30 625	21 875	22 190	22 500	28 440	31 565	37 190	28 125	26 565
Japan	29 375	35 940	32 815	29 690	35 625	39 065	31 565	51 565	59 845
EC and rest of western world	12 815	18 125	17 500	15 935	18 125	17 815	19 995	23 125	26 720
of which:									
Autocatalyst	940	625	625	780	1 095	2 190	4 375	7 970	9 530
Chemical	4 220	5 940	5 315	4 220	4 530	4 220	3 595	3 905	2 815
Electrical	1 565	3 125	2 500	2 030	2 030	2 500	2 190	2 190	2 345
Glass	1 565	940	940	940	1 095	1 250	1 095	1 565	1 875
Investment	0	0	155	1 405	3 905	2 970	3 595	2 190	4 065
Jewellery	3 280	3 595	4 065	4 375	4 220	3 750	2 965	2 345	3 280
Petroleum	-780	2 190	940	-315	-625	-315	315	1 250	1 095
Other	2 030	1 720	2 970	2 500	1 875	1 250	1 875	1 720	1 720

(1) Figures are net sales. This explains why there can be some negative values.

Source: Johnson Matthey.

Examples of the sectors in which precious metals are used are:

Gold:

- jewellery
- electrical and electronics industries
- dental alloys
- surface coatings — electroplating, spectacle frames, porcelain and glass decoration.

Silver:

- photographic
- electrical and electronics industries
- jewellery and silverware.

Platinum:

- catalysts for the chemicals, car and oil industries
- electrical and electronics industries
- jewellery.

Palladium:

- dental alloys
- electrical and electronics industries
- jewellery alloys.

Situation in the rest of the world

In the western world, the principal precious metal mines are situated in the Republic of South Africa, Canada, the USA, Mexico, South America and Australia.

In addition, the USSR and the People's Republic of China are major suppliers or potential sources, whose mineral reserves are less well documented.

However, in the past both the primary refining processes for precious metal ores and the secondary ones for all different sorts of scrap materials have largely been developed by companies based in Europe. For instance, many of the processes used in

Table 4
Palladium demand by application

(kg)	1984	1985	1986	1987	1988
Western world total	92 500	85 625	90 940	99 530	103 595
North America	30 940	29 375	30 155	32 345	31 875
Japan	39 065	33 750	38 440	44 690	47 970
EC and rest of western world	22 500	22 500	22 345	22 500	23 750
of which:					
Autocatalyst	0	0	470	625	315
Dental	8 750	8 125	8 440	8 595	9 220
Electrical	5 625	6 250	7 500	7 970	8 750
Jewellery	4 375	4 375	2 815	2 345	2 030
Other	3 750	3 750	3 125	2 970	3 440

Source: Johnson Matthey.

the South African platinum-group metal refining industry originate from the UK, where the entire production used to be refined before the increased cost of transporting mineral concentrates made this uneconomic. However, final separation of Canadian primary platinum-group metal production is still carried out in the UK. Gold from Papua New Guinea is refined in the Federal Republic of Germany in substantial quantities.

In the rest of the non-Communist world, there are major secondary refineries and fabricators in the USA and Japan, and smaller ones in Australia, Brazil, Canada, India, South Africa, Norway, Sweden and Switzerland. Many of these are subsidiaries or associates of the major EC refiners.

Precious metal fabrication activities employ over 10 000 people, both in Europe and in the USA, and several thousand in Japan. Such figures exclude base metal refineries also treating precious metals.

Industry structure

The larger EC precious metals firms are generally concerned with the refining, trading and fabricating activities. However there are a few exceptions where jewellery manufacture is also a major fully integrated part of such companies' business. The precious metals industry in the EC on the other hand, unlike the industries of certain base metals, has relatively little integration with the actual

precious metal mining companies, although there are some significant exceptions, mainly in the platinum sector. The most common ways of assuring supplies are by long-term contract or daily purchases on the commodity markets and from traders and banks.

Environmental protection

1989's major development in the European car catalyst scene has been the EC Environment Ministers' decision to adopt the tight American-style exhaust standards for cars with less than 1.4 litres engine capacity by the end of 1992.

The tendency in the EC is now strongly in favour of cleaner car exhausts and, consequently, of a greater use of platinum-group metal catalytic converters to remove pollutants from car exhaust fumes. In 1987, a package was agreed in Luxembourg under which virtually all new cars of 1.4 litres capacity and above will require car catalysts to be fitted, even to those equipped with engine systems embodying the so-called 'lean-burn' technology. The 1989 agreement means that from 1 July 1992 most new small cars, too, will need catalytic converters containing platinum-group metals.

In the Federal Republic of Germany more than 50% of all newly registered cars already have catalytic emission control systems, and in the Netherlands the proportion is about 33%.

Table 5
Geographical location of the main EC refiner/fabricator companies

Company: Head Office:	Johnson Matthey England	CLAL France	Degussa Germany	Doduco Germany	Heraeus Germany	Metalor Switzerland	Englehard USA
Belgium	F	-	S	-	-	-	-
Denmark	S	S	S	-	-	S	S
FR Germany	S	S	F	F	F	S	S
Greece	-	-	-	-	-	-	-
Spain	S	F	S	F	S	F	-
France	S	F	S	S	S	F	F
Ireland	S	-	-	-	-	-	-
Italy	F	S	S	-	S	-	F
Luxembourg	-	-	-	-	-	-	-
Netherlands	S	F	F	-	S	-	-
Portugal	-	-	-	-	-	-	-
UK	F	F	F	S	S	S	F
EC countries directly represented (1)	9	7	8	4	6	5	5
North America	Yes	No	Yes	No	Yes	Yes	Yes
Far East	Yes	No	Yes	No	Yes	Yes	Yes

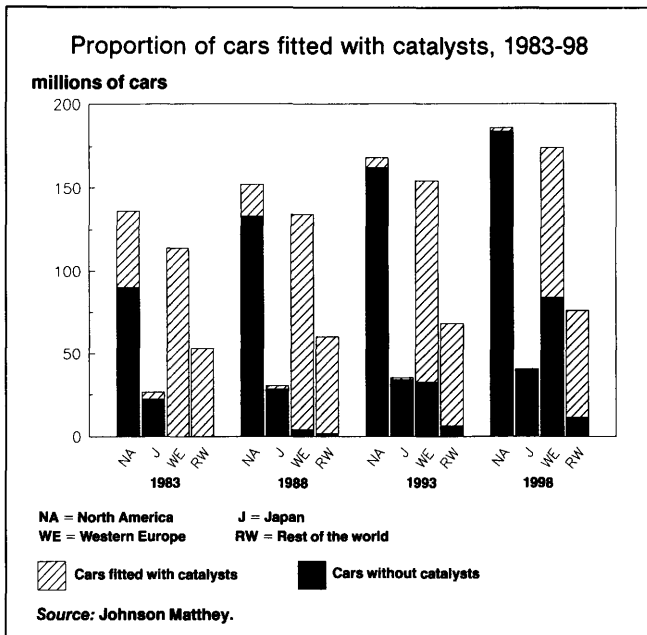
(1) This chart excludes base metal refiners who also refine precious metals but do not fabricate them, e.g. MHO (Belgium), NDA (Germany), Inco (UK).

F = Fabrication company.

S = Sales company.

Source: Eurométaux.

Figure 1



Demand for the platinum-group metals in Europe will therefore rise as a result of these anti-pollution measures.

Outlook

Although there have been fluctuations in supply and demand, there are no long-term risks of shortages. Ample reserves for the foreseeable future are well documented, and at present new mines are being developed in a number of countries — the USA, Canada, South America, Australia and South Africa. Even if there are risks of disruption of supplies, whether from South Africa, the USSR or other countries due to political events, mine catastrophes or strikes, there are substantial pipeline stocks of precious metals available in the short term. In any case, as already explained, precious metals have many uses in industry and are continually being recycled. Much of this recycling activity takes place in the refineries of the EC precious metals industry, so that free movement of precious metal materials both within and across the frontiers of the EC is of great importance to the industry.

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LEAD

(NACE 224)

Summary

The EC has a few lead-mining resources, but its metallurgical lead activities represent about one-third of such activities in the western world. Even if 1988 appears to be a good year, the EC experienced slow growth in lead consumption and production during the past few years. However, in comparison with its competitors, the European industry enjoys good know-how and competitive equipment. This might be an important asset in the medium term since world demand is not expected to rise much and environmental regulations might impose some extra costs on European producers.

Description of the sector

The lead industry covers the following activities:

- mining production
- primary smelting
- secondary smelting
- rolled and worked products manufacturing
- lead oxide production
- lead shot manufacturing.

This monograph will be essentially concerned with mining and metal production (primary and secondary smelting).

Annexes 1, 2 and 3 provide a detailed list of the companies involved in the different activities.

Current situation

In terms of both metallurgical production and metal consumption, the EC industry represents about one

third of lead activities in the western world. Mining production, however, only accounts for 10% of world production.

In 1988 the EC had a good year, with a 4.4% increase in production, partly fostered by a 3.1% increase in consumption. Both production and consumption increased faster than in the western world as a whole.

The lead industry is 'sensitive', in so far as the major product prices resulting from its activities are fixed on the London Metal Exchange (LME price). For this reason, prices are constantly fluctuating in line with supply and demand. This applies to about 70% of lead sales in the world.

The LME prices, which are used as a reference for both purchasing lead in ores and selling the metal, are thus an important determinant of the results of the lead industry.

Production and consumption

Production

Mining production

As shown in Table 2, EC mining resources are very limited.

Metallurgical production

Production is based, on the one hand, on ore processing (primary smelting) and, on the other, on scrap recycling (secondary smelting), most of which comprises used accumulators.

The production equipment of the Community industry is competitive in comparison with that of

Table 1
Main Indicators 1983-89
Metallurgical production

(1 000 tonnes)	1983	1984	1985	1986	1987	1988	1989
Consumption	1 319	1 392	1 357	1 373	1 399	1 443	1 415
Net exports	-183.5	-161.4	-173.7	-629.5	-216.4	-239.7	N/A
Production	1 322	1 392	1 383	1 340	1 376	1 437	1 486

Source: Eurométaux, Eurostat (Comext).

Table 2
Mining production

(1 000 tonnes)	1983	1984	1985	1986	1987	1988	1989
Western world	2 469	2 374	2 483	2 360	2 372	2 326	2 372
EC	218	227	209	195	199	170	166

Source: Eurométaux.

competitors outside the EC, and fits in perfectly with market requirements from both a quantitative and a qualitative viewpoint. Thanks to its know-how, research conducted and the ensuing development, it is in a position to produce complex, very specific alloys in response to technical requirements, thereby helping to improve constantly downstream products.

It should be noted that the share of secondary smelting has increased over the past few years.

Consumption

During the past five years, consumption growth has been rather small, especially in the EC, where the

annual average growth rate only reached 1.8% between 1983 and 1988.

The following breakdown of consumption into segments shows the predominance of batteries in the use of lead:

The trend towards rather weak demand mentioned above can be explained by substitutions like:

- the increasing use of plastic and aluminium instead of lead in cable production,
- the suppression of lead in petrol.

Table 3
Metallurgical production
International comparison

(million tonnes)	1984	1985	1986	1987	1988	1989
Belgium, Luxembourg	120	105	90	90	105	109
Denmark	10	1	0	0	0	0
FR of Germany	357	356	367	340	345	345
Greece	12	14	19	3	23	22
Spain	160	168	130	126	122	132
France	206	224	230	246	256	250
Ireland	9	10	10	10	12	12
Italy	140	135	126	168	168	195
The Netherlands	34	37	33	40	40	40
Portugal	6	7	6	6	6	6
United Kingdom	338	327	329	347	360	375
EC	1 392	1 384	1 340	1 376	1 437	1 486
USA	965	1 054	932	1 028	1 037	1 030
Japan	363	367	362	339	340	340

Source: Lead and Zinc Study Group — April 1989.

Table 4
Metallurgical production

(1 000 tonnes)	1983	1984	1985	1986	1987	1988	1989
Western world	3 926	4 059	4 239	4 062	4 240	4 314	4 411
EC	1 322	1 392	1 383	1 340	1 376	1 437	1 486
% of which:							
secondary smelting							
Western world	40	45	43	46	46	47	N/A
EC	46	50	49	51	52	50	N/A

Source: Eurométaux.

Table 5
Lead consumption

(1 000 tonnes)	1983	1984	1985	1986	1987	1988	1989
Western world	3 830	3 972	4 026	4 110	4 236	4 293	4 302
EC	1 319	1 392	1 357	1 373	1 399	1 443	1 415

Source: Eurométaux.

These negative effects are, however, partly offset by the healthy outlook of the accumulator market.

Table 6
Consumption by product in 1987

(%)	Western World	EC
Accumulators	60	46
Cables	5	7
Semis	10	19
Chemicals	16	21
Alloys	4	3
Miscellaneous	5	4
Total	100	100

Source: Eurométaux.

The main customer sectors of the lead industry are:

- Automobile: batteries
- Construction: rolled products
- Television: cathode tubes
- Paints: anti-corrosion
- Glass: crystal.

Trade

As mentioned before, the EC has very limited mining resources. This explains the high level of imports of lead-bearing ores.

In addition, in view of the increasing importance of secondary-smelter production, the EC is also a net importer of lead-bearing scrap (in the form of old weights and, above all, used batteries).

As far as metallurgical production as a whole is concerned, extra-EC trade is more or less balanced. Since 1986 the trade balance has been slightly negative but provisional figures show that this trend should be reversed in 1989.

It is interesting to note that both extra-EC imports and extra-EC exports of lead originate from and go to a limited number of countries. In 1986, for

example, deliveries from Canada, Mexico and, to a lesser degree, Peru, represented almost 70% of total extra-Community imports. On the other hand, Austria and the USSR absorb more than 50% of total extra-EC exports.

Environmental protection

Generally speaking, it should be noted that the Community lead producers are just as concerned, if not more so, about the good health of their workers and the general public and the protection of the environment as the authorities drawing up regulations. In this respect, they endeavour to use scrap themselves, while at the same time devoting all their energies to improving collection conditions.

Furthermore, it should also be emphasized that recycling itself plays an essential role in improving the quality and the protection of the environment, by saving non-renewable natural resources and reducing waste arisings, thereby diminishing the need for landfilling facilities.

Employment

The mine, metallurgy and first-stage processing work-force claims about 20 000 persons, in addition to whom there are the workers in the downstream sector, such as the accumulator industry.

Outlook

Over the next few years, the world market should experience a slight growth of about 0.5 to 1% per year.

One of the major concerns for the future of the industry is environmental regulation. The EC lead industry is fully aware of the need to develop standards to protect the environment. Investment will be required in order for the industry to adapt to these and, in certain cases, implement new treatment processes, whose technology is already being developed in the Community.

In this respect, it is interesting to recall, by way of example, that at a lead smelter half of the installed electric power goes for the operation of anti-pollution equipment, particularly filters for the treatment of gases. Furthermore, the proportion of anti-pollution investment in total investment by present smelters can be estimated at about 30%. The corresponding extra operational costs will easily reach ECU 1.5 million per year for each smelter.

At the same time, the investment required in order for the industry to construct a primary lead smelter with a capacity of about 150 000 tonnes on an existing site, using new processes, is almost ECU 100 million.

Although the Community producers are anxious to achieve a better degree of protection for people and

nature, this is not the case with producers in other countries, who are not subject to the same rules.

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Annex 1 List of lead mines

FR of Germany	Meggen
Greece	Cassandra
Spain	Silicatos — Rubiales — La Troya — La Cruz — Sotiel — Aznalcollar — Reocines
France	Les Malines
Ireland	Tara
Italy	Silius

Source: Eurométaux.

Annex 2 Major producers — primary smelter

Country	Name	Location	Process	Theoretical annual capacity mt
France	Société Minière et métallurgique de Peñarroya	Noyelles-Godault (P-de-C)	F-WJ	110 000
			F-ISR	40 000
			RTI	150 000
Federal Republic of Germany	Berzelius Metallhütten GmbH	Duisburg-Wanheim Binsfeldhammer	F-ISF	32 000
			F-WJ	90 000
			RTI et 2	115 000
	Norddeutsch Affinerie Aktiengesellschaft	Hamburg	F-WJ	30 000
		RTI et 2	45 000	
	Preussag-Boliden-Blei GmbH	Nordenham	F-WJ	90 000
			RTI et 2	100 000
Belgium	Métallurgie Hoboken-Overpelt	Hoboken	F-WJ	125 000
			RTI et 2	125 000
Spain	Sdad Minera y Metalurgica de Peñarroya Espana	Carthage (Marcie)	F-WJ	90 000
			RTI et 2	90 000
Greece	EMMEL	Lavrión (Attique)	F-WJ	20 000
			RTI et 2	20 000
Italy	Nuova Samim SpA	San Gavino (Sardaigne)	REI	30 000
			RTI	50 000
		Porto Vesne (Sardaigne)	F-ISF	30 000
			F-KV	84 000
UK	Britannia Refined Metals Ltd Commonwealth Smelting Ltd (filiale de AM & S Europe)	Northfleet Avonmouth	RTI	160 000
			F-ISF	40 000

Source: 1986 Minemet Yearbook.

Annex 3
Major producers

	Rolled and worked products	Lead oxide	Lead shot
Belgium	MHO		
FR of Germany	Bleiwerk Goslar Roehr	Heubach & Lindgens	Hendler & Natermann Dynamit Nobel
Spain	Figueroa	Arcoplosa	Perdigones Azor Ballesteros Figueroa Industrias Montoretas
France	Peñarroya	Peñarroya	Peñarroya Meridionale de Plomb de Chasse Colombi
Italy		Bitossi PBO Samim	Aquila Cervo Samim
The Netherlands	Uzimet		
United Kingdom	BLM Cookson		Cookson Elley

CONSTRUCTION MATERIALS INDUSTRY

(NACE 241 to 246)

The economic importance of the industry in the EC economy

In 1988, the EC construction materials industry employed 502 673 people, and its production reached ECU 47 440 million. The Federal Republic of Germany accounted for over 23.7% of total EC production, followed by the United Kingdom (20.6%), Italy (16.1%), France (15.1%) and Spain (11.8%).

The construction materials industry is a major input into residential and non-residential construction; as

a result, the performance of the building materials sector depends on the same factors as those which affect the building market. The building industry experienced declines in the early part of this decade, but growth was particularly strong over the past two years, and, in 1988, the sector reached its highest level of production in 10 years. The construction materials industry displayed a similar pattern of growth. In 1986, construction materials production, measured in constant 1985 ecus, stood 17% below the 1980 level. In 1987 and 1988, production rose by 4% and 6% respectively (in real terms) to reach ECU 45 702 million.

Table 1
Main indicators, 1980-89
Construction materials

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	34 381	35 485	36 492	38 500	39 801	39 304	39 977	41 726	45 595	N/A
Net exports	1 429	1 677	1 926	2 303	2 422	2 379	2 005	1 697	1 844	N/A
EC production (1)	35 810	37 162	38 418	40 804	42 223	41 684	41 982	43 422	47 440	51 557
Employment (1 000)	712	666	625	605	581	544	520	509	503	506

(1) Excluding Luxembourg.

Source: Eurostat (Inde, Bise, Comext).

Table 2
Production and external trade (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC (2)	35 810	37 162	38 418	40 804	42 223	41 684	41 982	43 422	47 440	51 557
Index	85.9	89.2	92.2	97.9	101.3	100.0	100.7	104.2	113.8	123.7
USA (3)	20 894	26 367	27 970	33 816	42 490	45 635	N/A	N/A	N/A	N/A
Index	45.8	57.8	61.3	74.1	93.1	100.0	N/A	N/A	N/A	N/A
Production in constant prices										
EC (2)	49 595	45 559	43 794	45 044	44 266	41 684	41 320	42 937	45 702	47 435
Index	119.0	109.3	105.1	108.1	106.2	100.0	99.1	103.0	109.6	113.8
EC trade in current prices										
Exports extra-EC	1 815	1 977	2 258	2 639	2 847	2 878	2 400	2 388	2 618	N/A
Imports extra-EC	414	429	459	508	603	672	510	535	712	N/A
X/M	4.4	4.6	4.9	5.2	4.7	4.3	4.7	4.5	3.7	N/A

(1) Estimated.

(2) Excluding Luxembourg.

(3) Census of manufactures.

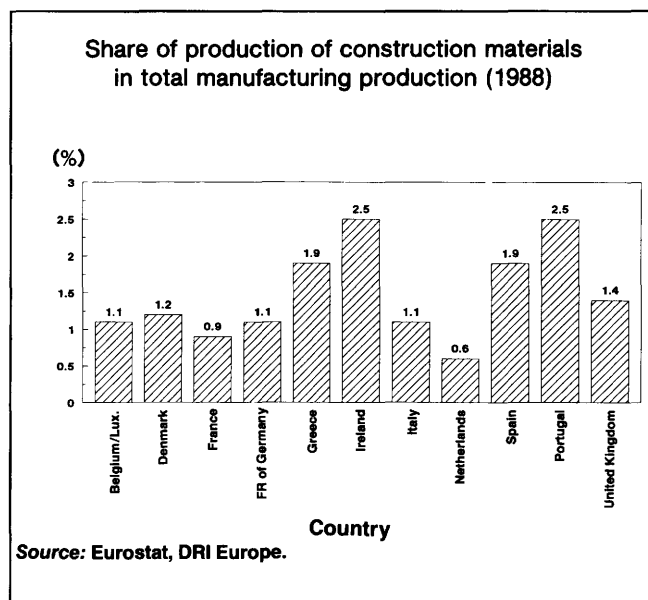
Source: Eurostat (Inde, Bise, Comext).

Over the last few years, favourable economic conditions and government policy both have encouraged investment in housing and non-residential construction across the EC. Tax reforms in several of the EC countries have increased personal disposable income and have, in turn, supported growth in the construction materials industry by encouraging investment in the housing market. For example, in Belgium, tax reforms have reduced the tax burden of home-owners and increased the demand for family homes.

Geographical features

Production of construction materials as a share of total manufacturing production averages 1.4% for the Community. As shown in Figure 1, the sector's share of manufacturing output is slightly more important in Ireland and Portugal than in the Netherlands and France.

Figure 1



The development of the construction materials sector has been similar in most EC countries over the last eight years and the share of each Member State in total production has changed very little over this time period (see Table 3). There are, however, exceptions. The share of the Federal Republic of Germany decreased significantly (from 26.8 to 23.7%), whereas that of the United Kingdom increased from 16.9 to 20.6%.

Table 3
The EC construction materials industry
Breakdown of production by country, 1980 and 1988

(%)	1980	1988
EC (1)	100.0	100.0
Belgium	3.6	3.0
Denmark	1.7	2.3
FR of Germany	26.8	23.7
Greece	1.8	1.8
Spain	11.6	11.8
France	16.4	15.1
Ireland	1.1	1.4
Italy	14.7	16.1
Netherlands	3.9	2.4
Portugal	1.4	1.8
United Kingdom	16.9	20.6

(1) Excluding Luxembourg.

Source: Eurostat (Inde).

Because of the decline in production in the most important sales area, the building industry, there was a considerable fall in employment in most EC countries until 1986. After 1987, the rate of decline moderated (see Table 4).

Table 4
The EC construction materials industry
Employment

(%)	1980	1988
EC (1)	100.0	100.0
Belgium	3.2	3.1
Denmark	1.7	2.2
FR of Germany	22.6	22.8
Greece	2.0	2.8
Spain	16.0	14.0
France	13.5	12.3
Ireland	.9	1.0
Italy	14.5	14.7
Netherlands	3.2	4.1
Portugal	4.9	5.2
United Kingdom	17.2	17.8

(1) Excluding Luxembourg.

Source: Eurostat (Inde).

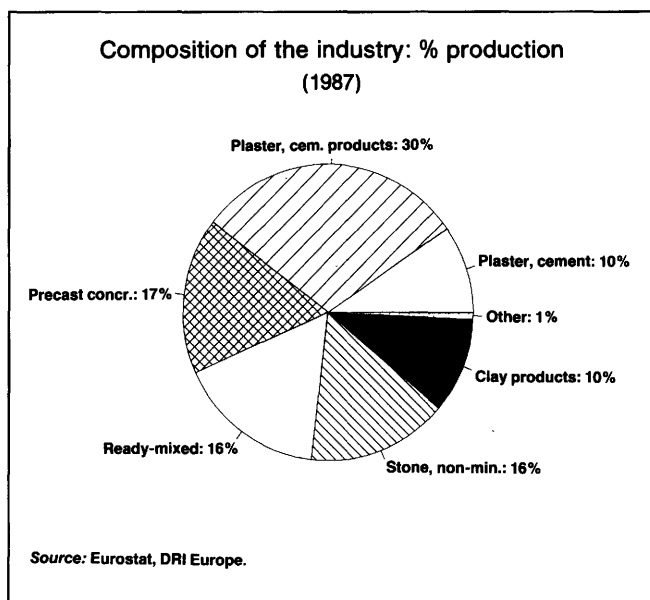
Description of the industry

The construction materials sector produces a wide range of non-metallic mineral products (excluding glass and ceramics) for use in construction. This overview will be based on summarized data from the NACE nomenclature 241 to 246 which includes brick-making, the manufacture of cement, chalk plaster, the manufacture of concrete and plaster construction materials, asbestos products and asbestos cement products and the processing of natural stone and manufacture of grinders and grinding products.

The extraction of raw materials for manufacture in this industry (e.g. gravel and sand) is not included in this chapter nor is glass and ceramics production. We have also added an analysis of heat insulation materials (mineral wool) in Section 5.6. Although it does not fit under NACE 241 to 246, the production and use of mineral wool is closely associated with the construction materials industry.

The manufacture of concrete (precast and ready-mixed concrete taken together) is the largest component of the construction building materials industry and accounts for 33% of the sector's production. Plaster and cement products are next in importance with 30% of production, followed by stone with an estimated 16%.

Figure 2



The production process for this sector can essentially be divided into three components: extraction of raw materials, processing, and manufacturing. The nature of this production process and its close relationship with the building sector has generated the following characteristics in the construction materials industry:

- A large part of industrial activity consists of extracting raw materials. This creates problems associated with the search for and the use of storage facilities, and the disposal of and recycling of waste materials;
- The manufacture of many of the construction materials involves combustion processes and consequently high energy consumption;

- If materials are changed and improved, binding standards and regulations on product quality must be respected;
- The building industry and also the construction materials industry depend largely on weather conditions. This results in pronounced seasonal fluctuations in both of these sectors;
- Most materials are homogeneous mass products. Most finished construction materials are heavy and the value of individual units is low. As a result, construction materials are highly sensitive to transport costs. Frequently, transport costs exceed the value of the products for an average distance as small as 30 km. Thus, together with labour and energy, transport is the most important cost factor;
- Given this sensitivity to transport costs, cross-frontier activities are insignificant in the construction materials industry (see Table 1). The volume of imports and exports combined is less than 10% of total production.

Outlook

For 1989, building experts forecast positive growth rates in the building industry in most EC countries. Consequently, it can be expected that construction materials production in these countries will also have positive growth rates in 1989, as in the two previous years.

In the structural adjustment processes of the last 10 years, the construction materials industry has shown so much flexibility in its adjustments and reactions to the changing and often extreme demands it has to face, that one can be confident that the industry will also be able to take up future challenges.

Companies within the industry are already preparing for the European single market, which is likely to lead to increased competition. In particular there is increasing cooperation in many areas between companies and associations within the EC.

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THE STONE INDUSTRY

(NACE 245; 231)

Summary

Stone, marble and granite have been the main basic building materials for a long time. The use of more modern materials, in particular concrete, did not extinguish this industry, which was able to diversify its activities in funerary monuments and in the decoration of buildings.

Description of the sector

The two major branches of this sector are the granite industry and the stone and marble industry.

The major outlet of the granite industry is the construction of funerary monuments. In France, three quarters of the turnover of this subsector are generated by funerary monuments. This segment of the market has grown especially these last 15 years, taking over from construction, where concrete replaced stone as the basic material.

Nevertheless, this situation is under risk of further complications. More specifically, the drop in the mortality rate and the growth of cremation in various European countries is going to cause a certain levelling off in this segment. These last few years, France has witnessed an annual drop in the sale of funerary monuments of about 2%.

On the other hand, granite can undergo a recovery in construction in the next few years. Building decoration in thin slabs represents a potentially impor-

tant market. The development of urban renewal and recreational space projects is another of the more promising markets for the entire building materials sector.

Despite higher construction costs, the durability and aesthetic qualities of granite constitute important assets. Moreover, maintenance costs for granite are considerably lower than those for concrete.

The stone and marble industry is also undergoing changes. Chiefly oriented towards the construction market, which accounts for more than 90% of the demand for its products, this branch has experienced extreme difficulties during the recession in the construction industry these last 10 years. Used increasingly less for shell construction (quarry stones, etc.), these materials are more and more in demand for interior works (ornamental works, slabs, decorative fireplaces, etc.) and the industry is looking for ways to diversify its products. The most important niche in this market is formed by buildings for the service industry (banks, offices, etc.)

Current situation

The European Community is the world leader in the stone industry. In 1987 about 12 million metric tonnes were produced in the Community which has the world's largest producers. First of all, Italy, which needs no introduction in this sector, but also Spain, which recently experienced considerable growth (a 57 % rise in production between 1985 and 1988) and Greece. It is estimated that half of the

Table 1
The stone industry, 1987

	Production		Employment
	1 000 tonnes	million ECU	
Belgium	N/A	N/A	10 000
FR of Germany	415	292	20 000
Greece	1 700	282	15 000
Spain	1 569	534	27 352
France	907	475	25 660
Italy	7 000	1 652	75 000
United Kingdom	N/A	N/A	6 250
Total	N/A	N/A	179 300

Source: FIMIGCEE.

4 000 or so stone-masonry workshops around the world are in Italy. This sector employs about 180 000 persons in the European Community.

Historically, the stone industry has of course developed near quarries which supplied the raw material. These were essentially small family-owned companies. In the last two decades, production processes have been mechanized in so far as possible (certain activities require manual labour by their very nature, e.g. slate cutting). Productivity in this very labour-intensive sector is however not growing as fast as the industrial average.

Small family-owned companies still do not have the financial means required for this mechanization which is often difficult and hence expensive by the very nature of the activity. This has in turn caused a restructuring of the sector. Companies which could not undertake this modernization process either closed or were taken over by bigger ones. This trend will continue in the coming years.

In addition to this factor, labour costs and at times the difficulty of extending certain quarries combined to intensify the stone trade between the Member States or even imports from non-European coun-

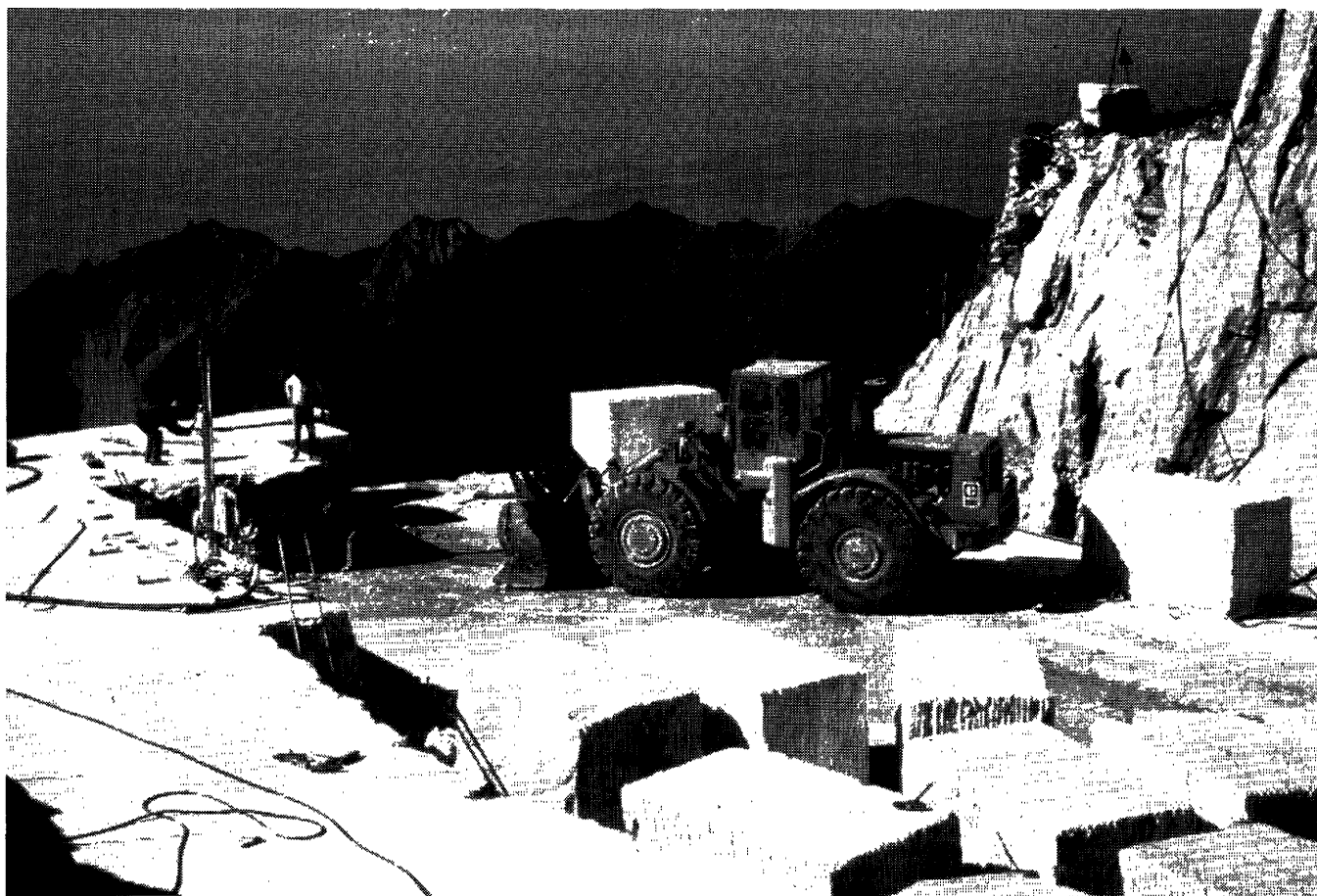
tries. Long-distance transport of stone is made possible by the fact that these materials are granted preferential ocean-freight rates because they serve as ballast.

This concerns essentially the transport of raw stones from producing countries (Italy, Spain, etc.) to the northern countries of the Community where highly mechanized stone-masonry workshops are operating.

International trade

International trade is relatively limited in this sector, given the weight of the materials to be transported. Moreover, the high demand from Middle Eastern countries (Saudi Arabia, etc.) which occurred after the rise in oil prices has now abated. The United States is another important market for European stone.

Italy is the number one exporter, with 25% of its production sold abroad. Spain exports about half of its production. Countries located farther to the north which are not as big producers of stone are less



active in trade. For example, France exports 5% of its production.

Prospects

Prospects are relatively good for the stone industry, thanks to the durability and aesthetic qualities of this material. The diversification of production, particularly towards interior and decorative works, and the

increasing use of these materials for urban construction and renovation should secure sustained demand. This will compensate greatly for the slowdown in funerary monuments anticipated in the sector.

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CLAY PRODUCTS

(NACE 241)

Summary

The age-old bricks and tiles industry is found in all the EC countries, with large local variations in size and production. The sector underwent a serious crisis, in which bricks were particularly affected by the decline in new construction. Tiles, which are frequently used in renovation operations, were less severely affected. The trends of the past three years have, however, been more positive.

The sector's future remains dependent on the prospects in the construction sector and especially on the number of individual houses that will be built. The moves towards mergers and concentration in the industry will also continue.

Description of the sector

Fired clay already existed in the New Stone Age, and was widely used as a building material in most ancient cultures. Bricks and tiles were introduced into Western Europe by the Romans. During the Dark Ages, these materials were used only sporadically, but were re-introduced during the twelfth century. Since that time, the brick and tile industry has become traditional.

Throughout their long history, bricks and roofing tiles have formed part of the historic and cultural heritage of virtually every country in the world. This fact has consequences for national building standards and regulations, which are based upon such local conventions as brick sizes and methods of construction. In the larger European countries such as France and the Federal Republic of Germany, there are even considerable inter-regional differences. Thus, a facing brick from northern France would have completely different dimensions to one from southern France. A second example is the fact that cavity walls and facing bricks are generally used in building in northern Germany, while in the south of Germany facing bricks are practically unknown.

In general, two major product categories can be distinguished:

Bricks

Brick is a masonry building component made from a preformed clay mass fired in a kiln. The classification

of different styles of bricks is effected on the basis of national standards, but the following classification is applicable to all European categories:

- solid brick without perforations, or for which the number of perforations does not exceed a certain fixed percentage (15% to 25% of the total volume of the brick, according to the country);
- perforated brick with a large number of small, generally vertical, perforations;
- hollow brick with large, generally horizontal, perforations (usually more than 50% of the gross volume).

The type of brick used varies from country to country. In the Netherlands, the United Kingdom and Ireland, solid brick is mainly used; in Belgium and Denmark, both solid and perforated bricks are commonly used, whereas in France, Italy, Spain, Portugal and Greece mainly hollow and solid bricks are used.

In northern Europe (the UK, Ireland, Denmark, the Netherlands, Belgium and northern Germany), facing bricks are used in cavity walls, which consist of an outer skin (facing bricks) and an inner skin that can be made of solid or perforated brick or of other materials. In southern Europe, most buildings have plain walls in perforated or hollow brick. These walls are rendered. In some regions of southern Europe, the tradition is to clad parts of the facade with facing brick instead (e.g. Toulouse, Barcelona, Venice).

Clay roofing tiles

Clay roofing tiles have a special shape that makes them suitable as roofing material. The production process is essentially the same as for brick: clay is kneaded to the desired shape and the tile is then fired in the kiln. Roofing tiles vary from manufacturer to manufacturer and consequently are not interchangeable. They can be roughly divided into the Mediterranean type (for roofs with a slight slope) and the northern European type (for roofs with a steep slope).

Current situation

The brick and roofing tile industry finds its main outlets in the construction of houses and buildings up to six storeys high. Less important, but still worth noting, are small civil engineering works (engineering bricks) and paving. The roofing tile industry, especially, still services amongst other activities, the maintenance, repair and transformation of existing buildings.

In most countries, there is a striking parallel between house construction and the sale of brick, although the correlation is not perfect. When there is a sudden upswing in building activities, the building techniques applied are rather special and involve less brick. When a sudden slump hits building activities, brick sales fall off less sharply because, by and large, these special building techniques are the first to suffer.

In most European countries, house construction after the Second World War experienced a prolonged period of intense activity, followed by a rather deep trough. This crisis did not affect all countries at the same time, but took place between about 1980 and 1985. There has been a recovery over the past few years, especially in the single-family housing sector, but the brick sector is still a long way from returning to pre-crisis levels. Things were different in the roofing tiles sector. Sales of roofing tiles depend upon the popularity of the roof and that of concrete roofing tiles. After the Second World War, the clay roofing tile lost ground everywhere, but there has been a steady revival in the past 15 years.

The statistical material available for this sector is difficult to interpret. With respect to brick, many national statistics express production of bricks in terms of one or another standard-size brick, and production figures are given per thousand. This unit is

useful only insofar as one is familiar with the standard size on which the figures have been based, because of this being different in each country. Some countries use the cubic metre and still others quote production in tonnes. Considering that the weight of one cubic metre of brick can vary between 600 kg and 2 200 kg, statistics given in tonnes are not comparable to statistics expressed in cubic metres.

Analogous statistics exist for roofing tiles, which are recorded either in thousands of units, in square metres or in tonnes.

Similarly, the value of one cubic metre of brick varies from ECU 50 to ECU 300, according to the type considered.

Production

Table 2 shows the evolution of brick and tile production in the units mentioned above. In the early 1980s production went through a crisis. This crisis struck all countries after 1980, the trough point being situated somewhere between 1982 and 1985. In not a single country have 1980 levels been re-attained. Sluggish demand was caused by the slack period of house-building activity. This, in turn, was due to the high interest rate on mortgage loans, the national budget deficit, which led to cutbacks in the construction of public housing, rising unemployment in Europe and job insecurity. The upshot of the crisis was that the total capacity for brick production fell and investment in the early 1980s was quite low.

In the same period, 1980-85, there was a reasonable and even growing activity in the roofing tiles sector, but also — and chiefly — in the renovation of existing buildings. Whereas in the 1960s and 1970s the emphasis was on new construction, since 1980 more emphasis has been given to renovation of the existing heritage. In the case of traditionally built

Table 1
Main indicators, 1980-89
Clay products

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	4 298	4 171	4 102	4 019	4 364	4 200	3 970	4 204	4 715	N/A
Net exports (1)	247	227	209	250	279	285	299	322	224	N/A
EC production (2) (3)	4 545	4 398	4 311	4 269	4 644	4 485	4 269	4 526	4 939	5 277
Employment (1 000) (2)	137	127	118	105	104	95	88	88	86	86

(1) 1980-85 and 1988 estimated.

(2) 1981 and 1984-89 estimated.

(3) Excluding Ireland.

Source: TBE, Eurostat (Inde, Bise).

houses, the masonry is still usable for the most part but the roofs have to be renewed.

Export

International brick trading between the Member States of the EC is not very highly developed because the material is rather heavy, making long-distance haulage unprofitable; furthermore, national standards and regulations give rise to great difficulties where export is concerned. In view of the fact that these national regulations originate from local building traditions, the prospects for removing these barriers to trade by means of international harmonization are rather bleak.

Only certain small countries (especially the Netherlands and Belgium) have brick exports worth mentioning. In the Netherlands, exports represent up to 20% of the national production and in Belgium, up to 10%. Because of the size of the country, producers do not have to sell very far away to reach foreign customers. However, markets remain regional and exports rarely cross more than one border.

Exports outside the EC are virtually non-existent. The small contingency exports to remote countries that appear now and again in customs statistics almost invariably concern a single building; for example, the embassy of the exporting country, the church of a religious community or the premises of a foreign subsidiary of a big-business concern.

For roofing tiles, the cost price/weight ratio is much more favourable and there is an important intra-

Community trade in roofing tiles, and even some small-scale export to countries outside the EC. However, this export trade is very small in relation to the whole European market.

Imports from outside the EC are rare. International trade in roofing tiles is greatly hindered by the difficulties surrounding the organization of the legal framework for product liability.

Employment

The number of persons employed in the ceramic bricks and tiles industry has been decreasing over the years due to the closing of numerous old-fashioned factories which employed a large number of manual workers and modernization of the remaining factories, so that relatively few workers are now necessary for production.

Following the progressive mechanization that took place, productivity continues to expand. This is illustrated by the trend in average production per worker in the Belgian brick industry, expressed in cubic metres per person year:

1950: 150
1960: 196
1970: 390
1980: 685
1987: 814
1988: 858.

Table 2
Brick and tile production

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987
Bricks:								
Cubic metres (1)	35 936	33 737	30 220	29 529	30 038	27 719	28 487	29 289
Index	129.6	121.7	109.0	106.5	108.4	100.0	102.8	105.7
Tonnes (2)	22 340	21 396	20 306	18 732	17 654	16 031	16 525	17 115
Index	139.4	133.5	126.7	116.8	110.1	100.0	103.1	106.8
Tiles:								
Pieces (3)	429 497	427 946	451 520	468 686	483 988	452 056	445 693	474 595
Index	95.0	94.7	99.9	103.7	107.1	100.0	98.6	105.0
Tonnes (2)	3 158	2 757	2 734	2 739	2 720	2 671	2 734	2 903
Index	118.2	103.2	102.4	102.5	101.8	100.0	102.4	108.7
Square metres (4)	27 998	28 035	27 632	29 706	35 051	28 444	28 363	29 319
Index	98.4	98.6	97.1	104.4	123.2	100.0	99.7	103.1

(1) Belgium, Denmark, FR of Germany, Ireland, Italy, the Netherlands and the United Kingdom.

(2) Spain, France and Portugal.

(3) Denmark, FR of Germany and the Netherlands.

(4) Italy and the United Kingdom.

Source: TBE, Eurostat (Inde).

Geographic features

The situation varies greatly between the countries in the south and in the north of Europe. In southern Europe especially, factories tend to be rather old and, technologically, not very sophisticated. In northern Europe, businesses are mostly modern and staffing levels are rather low. In the older factories the main cost factor is wages; in modern businesses it is energy and depreciation of capital. The energy content of brick is relatively low (approximately 25% of the total production cost), yet since energy is the only input that the brick manufacturer has to buy (he digs the clay himself, and clay is cheap), the brick industry has always been very sensitive to fluctuations in energy costs. Many brickyards regularly change their fuel (coal, fuel oil, natural gas, LPG) according to the price at a particular moment. On the other hand, the customer is very conservative, and it is quite difficult to get the customer to accept slight changes (for example, the tint of the brick) caused by modifications in the production process.

Production

Brick producers face a very high cost of transport. Hence, most brickyards sell their products within a maximum radius of 70 km from the factory. Since earliest times, a good site from the point of view of transport has always made for good sales. For historical and geological reasons, brickyards tend to be situated along navigable rivers and canals. However, the transportation of brick by boat has now become rare.

Industry structure

The typical European brickyard is a family business with 10 to 50 employees, according to the level of technology. In most countries, there are businesses owning a number of brickyards more or less concentrated in a certain area. In some countries, the brick industry is in the hands of public companies. In Europe, however, this situation is now more the exception than the rule, although the proportion of public companies is increasing irreversibly.

Modernization of businesses has given rise to continuous concentration and, in all countries, the number of brickyards has dropped sharply (in Belgium, there were about 800 in 1950, against some 50 in 1988). Older factories are mostly seasonal businesses, and during the winter the workers are unemployed. Even in countries where the brick industry is highly automated (mainly northern Europe), one still comes across certain older, more traditional brickyards that have survived by specializing in hand-crafted products, sometimes with considerable financial success.

Table 4 shows the evolution in the number of enterprises by country; this number diminished by 33% between 1980 and 1986.

Outlook

The European brick and tile industry proceeds on the assumptions that housing construction activity for the coming decade will remain fairly slack, and that the building sector will not reach the high levels

Table 3
Clay products
Employment

(No of employees)	1980	1981	1982	1983	1984	1985	1986	1987	1988 (1)	1989
EC	137 271	126 856	117 548	104 540	103 620	95 359	88 213	87 488	85 860	86 304
Belgium	3 942	2 682	2 290	2 206	2 120	1 970	1 884	1 866	2 044	2 052
Denmark	1 976	1 485	1 279	1 242	1 335	1 376	1 137	1 124	1 068	1 072
FR of Germany	20 745	10 610	19 221	17 662	17 721	16 290	15 901	15 628	15 526	15 672
Greece	2 474	2 261	2 084	2 731	2 773	2 904	2 897	2 807	2 807	2 818
Spain	25 364	22 407	19 247	16 490	15 372	13 680	12 857	13 310	13 310	13 363
France	12 140	10 595	10 186	9 154	8 514	7 928	7 077	6 894	6 804	6 782
Ireland	169	162	155	149	142	137	132	124	120	117
Italy	28 566	27 480	26 151	20 011	20 714	18 619	15 519	14 918	14 468	14 106
Netherlands	5 224	4 854	3 782	2 944	2 871	2 679	2 567	2 594	2 620	2 630
Portugal	14 702	15 041	15 379	14 462	13 036	11 815	11 230	10 939	11 128	11 172
United Kingdom	21 969	19 279	17 774	17 489	19 022	17 961	17 012	17 284	15 965	16 520

(1) Estimated.

Source: TBE, Eurostat (Inde).

Table 4
Clay products
Number of enterprises

	1980	1981	1982	1983	1984	1985	1986	1987
EC	3 196	2 912	2 832	2 692	2 481	2 259	2 165	2 155
Belgium	99	82	72	64	58	57	56	55
Denmark	68	58	51	45	45	46	40	36
FR of Germany	395	390	370	350	325	300	290	287
Greece (1)	70	68	64	66	61	55	53	53
Spain	1 000	800	750	700	650	600	650	700
France	234	208	270	252	244	213	197	190
Ireland	3	3	3	3	3	3	3	3
Italy	680	650	615	590	513	440	390	370
Netherlands	106	105	97	94	86	62	63	67
Portugal (2)	321	333	330	328	296	283	233	232
United Kingdom	220	215	210	200	200	200	190	162

(1) 1984-87 estimated.

(2) 1987 estimated.

Source: TBE.

of the 1960s and the 1970s over the next 10 years. Expectations are thus for a lower volume. The possibility of exporting outside the EC is not seriously being considered and it is equally unlikely that cheap imports will flood the EC.

The sector is thus attempting to keep its turnover at present levels by offering high-quality products, such as hand-made facing bricks, insulating bricks and glazed bricks. Furthermore, everything possible is being done to increase productivity, with an eye to improving the chances of survival in a leaner market.

The organization of the internal market in the EC could bring about far-reaching changes in the situation of businesses located close to national frontiers. It may be assumed that the tendency towards concentration and increased scale that began 30 years ago will continue.

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THE CEMENT INDUSTRY

(NACE 242.1)

Description of the sector

The activity of the cement industry is closely linked to the general economic situation. Cement is an important basic material for infrastructure and transport works launched by the public authorities, as well as for the construction industry.

Cement production consists of two essential phases:

- The manufacture of a semi-finished product, the so-called clinker, which is obtained from calcination in a high-temperature furnace (1 450°C) of raw materials (clay, limestone, etc.) previously prepared in paste or powder form depending on the production process used (wet or dry);
- The manufacture of cement as a finished product, obtained by the homogeneous mixture and fine grain of the clinker plus calcium sulphate with or without — depending on the type of cement — one or more of the following components: slag, light ashes, pozzuolana, fillers, etc.

Current situation

World cement production reached 1 051 million tonnes in 1987, i.e. 24% more than in 1980.

In 1987, the top 10 cement producers (in order of importance) were: China (180 million tonnes), the USSR (136.5 million tons), Japan (72.6 million tonnes), the USA (70.9 million tonnes), Italy (37.0 million tonnes), India (37 million tonnes), South Korea (27.6 million tonnes), Brazil (25.5 million tonnes), Spain (24.6 million tonnes) and France (24.1 million tonnes).

Production in EC countries in 1987 amounted to 152 million tonnes, i.e. 15% of the world production compared with 21% in 1980. Affected by the recession in construction that has hit Europe since the 1970s, production in the EC countries declined steadily up to 1985, at an average rate of 1.4% a year. A certain improvement has been registered since then, linked to the recovery in the construction industry.

Consumption

Cement consumption is directly linked to investments in the construction sector: residential and non-residential buildings as well as civil engineering works.

The economic recession that plagued most European countries at the end of the 1970s and early 1980s was particularly severe for the construction sector.

High interest rates, tight credit policies, a decline in real purchasing power, and extremely low profitability levels in trade and industry had a negative influence on investment in housing and in non-residential construction.

Similarly, deficits in public finance meant at times drastic reductions in public investments in civil engineering projects.

It was not until 1986, when most European countries started to invest more in construction again, that cement consumption resumed a positive trend.

The per capita consumption of cement is therefore expected to gradually climb back up to its 1980 level.

Table 1
Main indicators, 1980-87
The cement industry

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Apparent consumption	163	160	150	148	139	135	139	142
Net exports	19	17	22	22	20	14	11	10
Production	182	177	172	170	159	149	150	152
Employment (1000)	80	79	77	75	72	69	65	63

Source: ICCE, Cembureau.

Table 2
Production of cement, 1987

(million tonnes)	Production	Share (%)
Asia	430.3	40.8
Europe (incl. USSR)	399.0	37.9
(of which EC) ⁽¹⁾	151.8	14.4
America	166.8	15.8
Africa	51.1	4.8
Oceania	6.9	.7
World ⁽²⁾	1051.0	100.0

(1) Cement + clinker exported outside EC countries.

(2) Adjusted for clinker exported outside of Western countries.

Source: Cembureau, *World Statistical Review* No 10, January 1989.

Foreign trade

The geographic distribution of trade in cement corresponds closely to the weighty nature of the product: its modest price per weight unit makes it

very vulnerable to the effects of transport expenses, especially road transport. That is why, most often, cement is delivered in the markets that are closest to the place of production.

This explains why world trade in cement currently accounts for less than 10% of production. Moreover, it is marked by a very pronounced geographic polarization. In 1986, more than a third of the world's exports came from four countries (Greece, Spain, Japan, and South Korea), while 50% of imports were recorded in only five countries (the USA, Egypt, Saudi Arabia, Hong Kong and China).

The demands of distant markets, occasioned by provisional or accidental shortages in local production, are monitored with interest because they enable certain countries to make better use of their industrial equipment and their manpower.

Table 3
Average cement consumption per head

(kg/capita)	1980	1985	1986	1987	1988 ⁽¹⁾
EC	516	425	428	438	469
Japan	704	561	566	582	605
USA	300	332	341	342	339
Asia	105	139	143	150	N/A
Africa	87	101	97	96	N/A
World	192	199	204	210	N/A

(1) Estimated.

Source: ICCE.

Table 4
The cement industry
External trade

	1980	1981	1982	1983	1984	1985	1986	1987
Exports extra-EC								
Value (million ECU) ⁽¹⁾	398.7	806.4	1 013.5	877.1	810.3	584.0	411.1	236.6
Quantity (million tonnes)	20.1	19.3	22.9	23.9	21.0	16.0	13.0	12.6
Imports extra-EC								
Value (million ECU) ⁽²⁾	27.7	44.9	73.3	59.8	46.7	52.4	60.2	75.5
Quantity (million tonnes) ⁽³⁾	.8	1.5	1.6	1.4	1.2	1.3	1.5	1.8
X/M								
Value	14.4	17.9	13.8	14.7	17.3	11.2	6.8	3.1
Quantity	26.5	16.8	14.1	17.5	17.8	12.0	8.9	7.2
Imports intra-EC								
Value (million ECU)	166.3	176.4	185.8	219.0	228.2	236.3	259.5	284.3
Quantity (million tonnes)	4.7	4.3	3.8	4.3	4.4	4.3	4.6	5.2

(1) 1980 excluding Spain; 1987 excluding Greece.

(2) 1987 excluding Greece and Portugal.

(3) 1987 excluding Portugal.

Source: ICCE.

Foreign trade of EC countries is characterized by the same features as world trade.

From 1980 to 1987, the fluidity of intra-Community trade increased substantially, while exports outside the EC, as well as their share in the world trade of cement, continued their downward trend.

This trend shows to what extent international trade conditions have changed.

As a matter of fact, the progressive equipment of distant markets has meant outright losses of or severe cuts in the traditional outlets of the European cement industry, especially in the Middle East countries.

The loss of major export outlets, coupled with a drop in internal demand on most of the European markets, has at times led to important production overcapacity levels, while the technical improvements in dispatching and transport equipment — such as floating storage, for example — and logistical transformations have facilitated the trade of cement, thus increasing competition on the market.

The main customers of European countries in 1987 were: the USA (5.4 million tonnes), Egypt (1.5 million tonnes), Saudi Arabia (1 million tonnes), Algeria (0.9 million tonnes), Turkey (0.6 million tonnes) and the Ivory Coast (0.6 million tonnes).

The production of EC countries is currently more than enough to cover their internal demand. Nevertheless, there has been a renewed outbreak of cement imports from Eastern European and developing countries, at artificially low prices (dumping conditions, where only variable expenses are taken into consideration), or at prices imposed by the authorities in the countries in question. This is explained by the pressing needs of these countries for hard currencies, and often also by the requirements of barter-trade.

The legal resources for defence against concentrated dumping at the borders proved inadequate (see the decision of the Commission of the European Communities of 17 July 1986, OJ L 202/43 of 25 July 1986), as regional occurrences of such practices were not taken into consideration. In fact, whereas the economic harm to the EC may appear limited at the overall level, the same does not hold for the regional level where the damage is sorely felt and where these practices threaten the existence of local companies. Furthermore, one cannot expect a reciprocal response from cement producers in State-run economies, as the import of cement is purely and simply

prohibited there. It is therefore imperative to introduce the necessary means in these cases, so as to re-establish fair competition.

Employment

During the period under review, overall employment fell from 80 000 in 1980 to 63 000 in 1987, i.e. a drop of 21%; this global trend corresponds closely to the drop in demand, but covers national situations which vary considerably.

On the other hand, the productivity of the cement industry went up from 2 281 tonnes/person in 1980 to 2 406 tonnes/person in 1987, thanks to the introduction of more efficient and more sophisticated production tools, with very advanced automation of operations, which require extra training and higher qualifications from the staff.

Investment

The cement industry is a very capital-intensive sector: it processes large quantities of low-value raw materials in very expensive facilities, to manufacture a product with a low unit price.

The structure of cement production costs has changed substantially over the last few years, especially due to the impact of fluctuations in energy costs. It is estimated that, on the whole, half the production costs in the cement industry consists of fixed costs.

Table 5
Investments by the European cement industry,
1980-86

(million ECU)	Investment
1980	813.5
1981	1 035.3
1982	1 043.1
1983	879.1
1984	830.7
1985	893.5
1986	741.1

Source: ICCE.

Table 5 shows the size of the investments made by the European cement industry during the 1980-86 period. They should be compared with the turnover of the sector.

Three of these areas of investment deserve closer consideration, because of their particular importance in the cement industry for some years now.

The modernization of production facilities

In connection with a rather dormant market, the period from 1980 to 1986 was marked by a very fast drop in investment in new capacities, in favour of investment for modernization and maintenance.

The creation of new capacities will be put back on the agenda if the prospects of a sustained recovery are confirmed in the coming years.

Energy saving efforts

Cement production requires large quantities of energy. The average energy consumption per tonne of cement produced in the EC today amounts to 3.8 GJ. This value may vary widely from country to country (from 3 to 6 GJ), depending on the policy pursued by the different national industries as regards investment and the development of composite cements.

The second oil crisis confirmed the usefulness of the conversion of energy supplies undertaken since 1973. The industry has therefore continued its efforts in a double direction: i.e. seeking cheaper fuels (diversification of fuels thanks to the versatility of equipment) and a rational use of energy (new manufacturing processes, development of composite cements, heat recovery, etc.).

Environmental protection

The cement industry is devoting more and more investments to reducing the inherent drawbacks of its industrial activity, especially with regard to air pollution. Investments in dust separators can represent as much as 15% of the total investment.

Main structural characteristics and geographic establishment of the sector

The cement industry is characterized by a high capital density. The structural concentration process that began in the last few years, is expected to continue, for reasons which include the depressed state of the market and the increasing size of new investment needed. Today, there are fewer than 150 companies in the cement industry, compared with 175 in 1980 and 195 in 1975.

The geographic establishment of the plants, on the other hand, is always determined by the nature and availability of raw materials as well as the proximity of large consumption areas. However, the drop in demand in national markets has also necessitated a restructuring of the means of production by each company concerned.

Prospects

The recovery of the construction sector and the optimistic economic prospects indicate a favourable trend for the cement sector. The restructuring operations carried out should enable this sector to benefit from a sustained demand in the years to come, provided that low-priced imports do not destabilize the market.

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PRECAST CONCRETE

(NACE 243.2)

Summary

In 1988, the turnover of the precast-concrete industry approached ECU 15 billion.

The development of the precast-concrete activity within the construction sector varies however from one Member State to another. Generally, its proportion is greater in the northern than in the southern regions of the Community.

Description of the sector

The precast-concrete industry is defined as follows: 'The sub-group includes units exclusively or primarily engaged in the manufacture of concrete goods for construction purposes — including road-building materials — such as pipes and similar products from light concrete (...) or from heavy concrete, even if reinforced or prestressed'.

In practical terms, the precast-concrete industry is the collective noun given to all enterprises that, independently of weather conditions, manufacture precast-concrete products at specially-equipped plants, with a permanent location (as opposed to concrete production on the building site). The products are delivered to the construction sector ready to be put in place.

Since non-reinforced concrete began replacing natural stone, timber and cast iron in many applications, the precast-concrete industry became highly mechanized.

The rapid technological development of reinforced and prestressed concrete led to the breakthrough of various plant-manufactured structural elements for building construction and civil engineering works.

Lightweight concrete was first applied in the precast-concrete industry for the manufacture of masonry units, wall and floor elements. The specific and scientific approach of the concrete technology helped guarantee a high and consistent quality of precast-concrete products.

The construction boom in the 1960s and early 1970s as well as the increase in building cost over that same period led to a further industrialization of the precast-concrete industry. Profits were reinvested in modern equipment and plant such as semi- and fully-automated batching and manufacturing equipment. Handling, packaging and transporting techniques were equally revolutionized.

Over the years, the precast-concrete industry has learned to adapt to the rapidly growing and changing demand of the construction sector, and has thus acquired a place of its own as a supplier to the construction sector.

Current situation

Generally, precast-concrete products are heavy and bulky in relation to value. The average value of one metric tonne of precast-concrete products is approximately ECU 90 (but for some standardized unreinforced products manufactured on a large scale, this value can be as low as ECU 35). Consequently, long-distance transportation of precast-con-

Table 1
Precast concrete, 1988

	B-L (1)	DK	D (2)	F (3)	NL	UK (4)
Turnover (million ECU)	560	N/A	7 717	1 584	745	2 575
Production (1 000 tonnes)	6 400	3 400	36 697	31 285	N/A	N/A
Employment	5 250	5 000	43 967	23 520	7 580	13 500
No of precast concrete plants (total)	365	N/A	1 351	N/A	148	250
With 50 or more employees	16	N/A	236	N/A	44	N/A

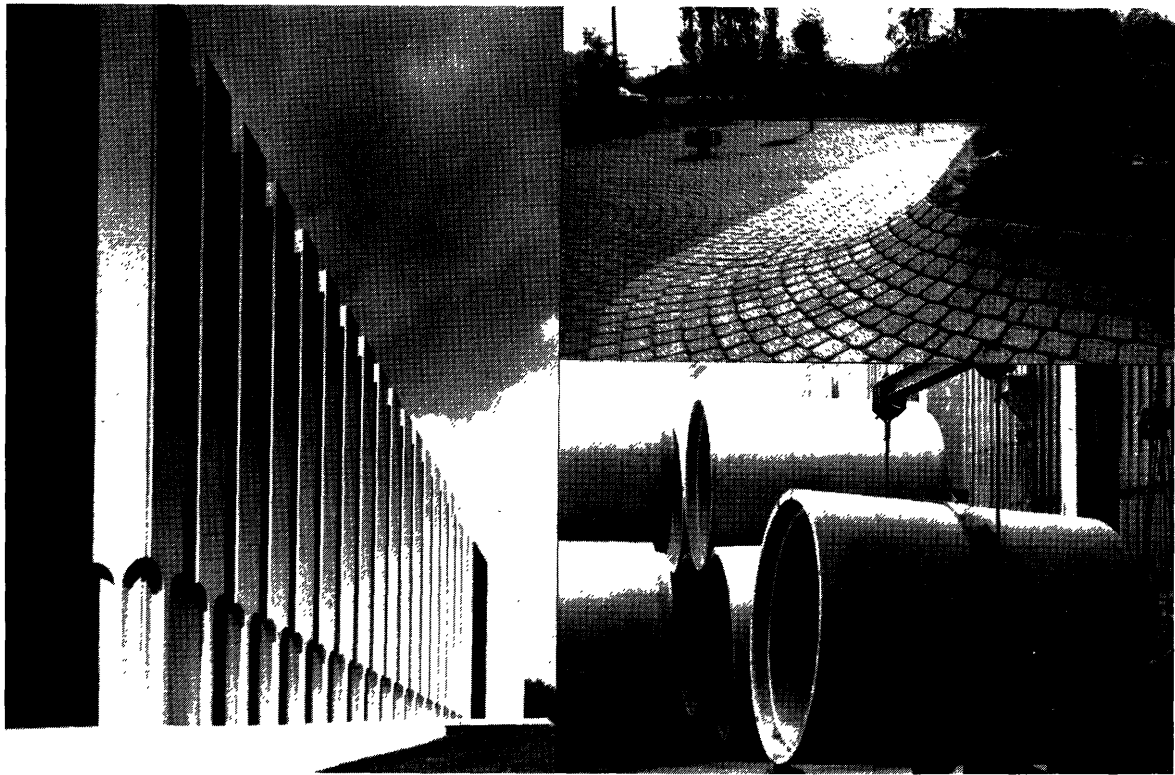
(1) Turnover and production estimated.

(2) Estimated.

(3) Turnover and employment estimated.

(4) Employment estimated.

Source: BIBM.



crete products is unusual. A typical exception is, however, the technologically highly-advanced precast-concrete products such as the sophisticated cladding frame elements in architectural concrete, that have been shipped from Western Europe to MiddleEast countries. Hence, trade is mostly limited to one border crossing.

For the industrialized countries, the activity of the precast-concrete industry largely depends on the overall economic climate in general and on activity in the construction sector in particular (99% of the precast concrete production goes to the construction sector).

There can be trend differences within construction subsectors. For instance, high activity in residential building and a slump in non-residential building. In the road construction sector (roughly 30% of the precast-concrete production) activity always depends on the policy of the concerned public authorities.

Employment

Even though there is no complete information on employment in the precast concrete industry at the moment, a reasonable estimate is nearly 160 000 persons in the European Community; 99 000 employees (or about 62%) are accounted for in the partial figures for Belgium, Denmark, France, the Federal Republic of Germany, the Netherlands and the United Kingdom (see Tables 1 and 3).

This number of workers is spread over nearly 3 500 precast-concrete works of which approximately 500 (14%) employ more than 50 people. The typical precast-concrete firm is in fact a small family-owned business.

The economic crisis caused a 30% to 40% drop in precast-concrete production in the Community with an almost equal fall in employment from the mid-1970s to 1984.

With the economic revival, production has increased considerably over the last five years, with figures varying depending upon the country considered.

Although, at first, growth in employment did not quite follow (for the reason that the industry used at first other means than hiring additional labour to increase production) this situation could not continue indefinitely. Hence, an increase of about 1% in 1987 vs. 1986 and of some further 2% in 1988.

Major structural and geographical features

Over the years, the building sector had to adapt to changing structure of demand, which led to the emergence of a precast-concrete industry. The latter has become particularly important in the Federal Republic of Germany, where the precast-concrete industry now holds about half of the European market for building precast-concrete plants.

Table 2
Precast concrete
Production by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Belgium (1)	313	265	248	231	232	249	297	347	425	510	500
Denmark	215	180	169	215	265	320	387	392	384	365	373
FR of Germany (2)	1 879	1 768	2 031	2 311	2 411	2 082	2 280	2 402	2 628	2 133	2 815
France (2)	1 155	1 208	1 195	1 148	1 144	1 216	1 322	1 405	1 486	1 511	1 553
Netherlands	470	470	465	466	470	475	523	550	633	680	680
United Kingdom	N/A	1 300	1 535	1 696	1 300	1 852	1 821	2 094	2 575	N/A	N/A
Total	N/A	5 191	5 643	6 067	5 821	6 193	6 630	7 190	8 131	N/A	N/A

(1) 1987-88 estimated.

(2) 1988 estimated.

Source: BIBM.

The precast-concrete industry is also relatively important and advanced in the Netherlands and Belgium, and to some extent, in France. In some countries, one notes a higher concentration of the precast-concrete industry in certain regions (e.g. the south west of the UK).

Industrialization stimulates demand for precast-concrete products as it creates needs for construction materials.

Geographical factors have also played an influential role in the precast-concrete industry. The more densely populated a region, the more important and developed the precast concrete industry tends to be. Indeed, these regions have a higher demand for building, water and road construction and since precast-concrete products are heavy, and costly to transport, production takes place near the centre of demand. An example of this is the triangle made up of Belgium, the Netherlands and the Federal Republic of Germany compared with regions such as central France and Spain.

Climatic conditions also play an important role. In general, the further north a country is situated, the

more developed its precast-concrete industry. Traditional building activity in northern countries often has to be suspended during the winter due to bad weather conditions, while with precast-concrete products, building activity can go on uninterrupted. In some cases, cold weather is even preferable when using precast-concrete products (no mud on building sites).

The different development of the precast-concrete industry in individual EC countries is illustrated in table 5, which shows the share of the precast-concrete industry in total national cement consumption for each Member State.

The technical realization of new types of beams or girders with, for instance, larger spans, would automatically create a (higher) demand for these structural elements.

Tradition in the use of material has influenced the degree of development and strength of the precast-concrete industry in the various countries. In the Netherlands for example, a boom began for precast-concrete pavers when traditional clay pavers started to become too expensive. This secured the Dutch

Table 3
Precast concrete
Employees by country

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Belgium	7.7	6.1	6.2	5.5	5.4	5.3	5.0	5.1	5.3	5.5	5.5
Denmark	5.2	4.0	3.2	3.4	3.6	4.0	4.3	4.8	5.0	4.9	4.5
FR of Germany (1)	51.9	47.5	43.1	42.2	40.9	43.6	42.3	43.2	44.0	44.1	43.7
France (1)	30.7	29.3	28.0	26.2	26.2	24.6	23.6	23.3	23.5	N/A	N/A
Netherlands	10.0	9.4	8.5	8.2	8.1	7.9	7.7	7.6	7.6	8.0	8.0
United Kingdom (2)	N/A	N/A	N/A	N/A	N/A	13.0	13.0	13.0	13.5	N/A	N/A

(1) 1988 estimated.

(2) Estimated.

Source: BIBM.

Table 4
Precast concrete
Intra-EC imports

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Belgium											
Value (million ECU)	45.9	40.3	39.7	38.7	33.8	34.2	42.7	46.3	54.7	N/A	N/A
Quantity (1 000 tonnes)	781	686	672	633	627	673	731	789	857	N/A	N/A
FR of Germany											
Value (million ECU) (1)	53.2	49.1	47.3	65.7	63.0	50.7	47.8	51.0	55.0	57.0	56.0
Quantity (1 000 tonnes) (1)	576	514	473	614	560	496	447	433	467	488	479
France											
Value (million ECU)	21.6	24.4	29.5	32.1	44.0	51.6	62.4	69.7	84.9	N/A	N/A
Quantity (1 000 tonnes) (1)	302	333	362	362	455	551	646	679	822	N/A	N/A
United Kingdom											
Value (million ECU)	N/A	N/A	N/A	N/A	N/A	N/A	130.0	160.0	240.0	N/A	N/A
Quantity (1 000 tonnes)	N/A	N/A	N/A	N/A	N/A	N/A	483	613	934	N/A	N/A

(1) 1988 estimated.

Source: BIBM.

concrete-paving industry a strong position which allowed large-scale production at a favourable cost; as a result, the transportation beyond national borders became possible. In contrast, the British precast-concrete flooring industry has great difficulty in breaking into the traditional timber floor market for low-rise housing, in spite of the obvious advantage of precast-concrete floor elements over timber.

The following general characteristics of the precast-concrete industry can be highlighted:

- relatively low value-added content of the products;
- strong dependence upon the efficiency of the business, that is, the degree of mechanization of the production unit on the one hand, and the managerial skills of business managers on the other.

This is particularly true for this sector which is mainly composed of small and often old family-owned businesses.

In the last two or three years, there has been some degree of concentration in the industry. This is due either to the fact that one or more small businesses were bought up by a major industrial group, often a large building company or a cement factory, or because various smaller precast-concrete businesses have merged; despite these trends, small production units still dominate the industry. The trend towards increased concentration varies in nature and intensity from country to country, and is probably largely due to anticipated market changes in view of 1992. These moves would either allow large building companies to control supplies in the foreign market they will enter, or create precast-concrete companies

Table 5
Percentage of cement consumption by country (1)

(%)	1982	1983	1984	1985	1986	1987 (2)	1988 (3)	1989
Belgium	18.0	17.4	18.7	17.4	18.0	18.6	21.0	22.0
Denmark	33.0	37.0	39.0	44.0	45.0	45.0	N/A	N/A
FR of Germany	27.0	28.0	27.0	26.0	26.0	26.0	26.0	26.0
Greece	N/A	N/A	N/A	3.4	N/A	1.0	N/A	N/A
Spain	N/A	N/A	N/A	N/A	11.0	16.0	N/A	N/A
France	19.0	19.0	18.5	18.0	17.0	17.0	17.0	N/A
Ireland	N/A	N/A	N/A	29.0	27.0	27.0	N/A	N/A
Italy	13.8	13.8	13.5	13.3	13.0	13.0	N/A	N/A
Luxembourg	N/A	N/A	N/A	12.0	14.0	16.0	N/A	N/A
Netherlands	30.2	30.2	36.0	34.0	35.0	37.0	38.0	38.0
Portugal	5.0	5.0	N/A	11.1	10.5	10.8	N/A	N/A
United Kingdom	22.0	N/A	N/A	24.4	27.3	25.0	25.0	N/A

(1) Percentage of cement consumption by the precast concrete industry in the total national cement consumption.

(2) Italy estimated.

(3) Germany and France estimated.

Source: BIBM.

big enough to deal with the large building companies on a recently internationalized market.

Another consequence of the increase in demand and production and of anticipations with regard to the single market is the rise in gross fixed investment that took place over the past five years (an increase of about 20% from 1983 to 1988) which is expected to be sustained in the near future.

Environmental protection

Except for noise and to some extent water, ecology and its many aspects pose no serious problems for the precast-concrete industry. A noise problem may occur when, due to increasing urbanization, residential buildings start crowding in on the plant that had been built in an originally non residential zone. But the industry is working on reducing the noise and has already recorded some success. The same holds for those specific and exceptional production processes that may cause some degree of water pollution.

On the other hand, raw material shortages might arise in some countries. Indeed, the quarries supplying the precast-concrete industry with sand and aggregates are either forbidden to extend further, or threatened with closure down. Since about 80% of concrete is made up of sand and aggregates (or 1 m³ concrete requires 2 tonnes of these raw materials), this may cause serious short-term problems, not only for the precast-concrete industry but also for the construction industry as a whole.

However, various precast-concrete products can help solve, in a very rational and economic way, some environmental problems, using sound barriers (to protect residents living near highways or railways from noise hindrance) and other aesthetic products for urban landscaping, pipes and ancillary products for cost-effective drainage and sewage installations, etc.

The impact of 1992

The advent of 1992 has emphasized the urgency of the work on harmonization, certification and standardization; so far, this has mainly resulted in intensified activities of the trade associations in these respects.

Furthermore, there is a growing trend toward cross-border concentration (hitherto limited to a national level) in that 'foreign', both intra- and extra-Com-

munity based groups, buy up plants in view of the internal market by 1992.

Technological development

Some technological developments are expected to take place in the medium term, as the industry aims at increasing production capacity without attracting additional labour. Investments are rising and these involve not only replacement of older (and sometimes outdated) equipment and installations but also aim at higher capacity and output. Thus, plants can enhance their competitiveness in their region.

Outlook

After several difficult years, most countries have seen a relative growth in the last three or four years and this upward trend is currently even expanding.

Apart from cross-country differences, there will also be differences between the various branches of the sector. In road construction, street products and accessories, where the activity depends almost exclusively on public authority policies, great efforts are nowadays being made with regard to highway maintenance, an aspect that had been neglected in many countries for budgetary reasons. For the same reason, and probably as a result of growing environmental consciousness, prospects are good for the improvement or renovation of drainage, sewage and water purification installations.

As expected, the boom in the sub-sector of landscaping products continues. Again, this is probably due to growing environmental consciousness. Precast-concrete solutions (concrete block paving, urban equipment) are widely used in urban landscaping projects.

The non-residential building sector (for which the precast-concrete industry offers interesting solutions) is currently experiencing a boom, now that industry and businesses finally go ahead with investments in equipment and building. These investments have been put off during the years of the economic crisis. The expansion is expected to continue for at least two or three years. The further evolution will largely depend on the way the industry reacts to possible future economic changes.

Notwithstanding slight differences from country to country (e.g. due to the tradition in some regions of building one's own dwelling, a trend that may vary between 30% and 60%) residential building has been

experiencing a relative boom in most countries in the last year or two.

On the labour market, wage costs are on the rise as a result of reduced working hours, as well as of a shortage of skilled labour. The average hourly labour cost in 1988 varied between ECU 9.3 and ECU 16.7, with an overall average of ECU 13.

Skilled workers are especially needed in the production, which nowadays is highly mechanized. Many countries are thinking of or are setting up specific training schemes.

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READY-MIXED CONCRETE

(NACE 243.6)

Summary

The production of the ready-mixed concrete industry in the EC picked up slightly after a difficult period in the early 1980s. The encouraging outlook for the industry's markets (construction and housing) presages slight growth over the medium term.

Description of the sector

The ready-mixed concrete industry covers the off-site manufacture of concrete and its transport to the place where it is poured.

Current situation

The ready-mixed concrete industry is a relatively new industry which has contributed substantially to the modernization and efficiency of the building construction industry.

Today, few countries in the world do not have a ready-mixed concrete industry. The main competing materials are wood, bricks and steel.

In 1987 EC members of Ermco produced some 220 million m³ of ready-mixed concrete, an increase of about 9% over the previous year. This is equivalent to over 0.5 m³ per head of population.

Ready-mixed concrete cannot be transported more than a few dozen kilometres. Its manufacture is

therefore by definition a local industry, with no intra or extra-EC trade.

Environment

Environmental protection questions continue to play an important role in the European Community. Rulings on air pollution controls can influence the ready-mixed concrete industry. In the Federal Republic of Germany, the law against emission has been extended to cover stationary concrete plants. Following a submission by the German Association, installations producing concrete and having the same location for more than six months, and with a capacity greater than 10m³/hour, may be considered as ready-mixed concrete plants for the purposes of the anti-emission law regulations.

In Germany, the federal government is planning to revise the water resources law with the effect that all discharge water must be treated in accordance with the latest technology. This would require the ready-mixed concrete industry to provide more thorough cleaning of its waste water. A working party is examining exactly what the latest technology is in respect of sewage discharge for the ready-mixed concrete industry.

In some regions, regulations already exist, or are being drafted, which require that waste discharge from certain installations, including ready-mixed

Table 1
Ready-mixed concrete
Production

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC (1)	N/A	N/A	N/A	N/A	N/A	N/A	6 719	5 941	7 805
Belgium	N/A	N/A	N/A	N/A	N/A	N/A	199	230	259
FR of Germany	2 094	1 898	1 906	2 206	2 307	2 072	2 072	1 988	2 248
Greece	330	324	319	336	N/A	N/A	405	339	456
Spain	488	459	462	467	430	N/A	517	434	580
France	977	937	982	1 019	1 069	1 132	1 155	1 041	1 422
Ireland	N/A	N/A	N/A	78	71	85	86	87	97
Italy	885	964	1 050	1 168	1 125	1 350	1 256	1 064	1 437
The Netherlands	288	254	277	308	N/A	N/A	N/A	N/A	N/A
United Kingdom	877	783	865	1 005	1 064	1 122	1 029	958	1 309

(1) 1986-88 excluding the Netherlands.

Source: Ermco.

Table 2
Ready-mixed concrete
Start up, production and consumption per head

	Start of production	Number of plants		Production (1)		Consumption (2)	
		1986	1987	1986	1987	1986	1987
EC (3)		8 297	8 284	182.7	197.6	N/A	N/A
Belgium	1956	221	186	4.8	6.0	.48	.60
Denmark	1926	150	150	1.7	1.7	.32	.32
FR of Germany	1903	1 940	1 920	42.9	40.5	.70	.66
Greece	1968	210	218	8.4	9.8	.85	.95
Spain	1942	490	515	10.8	17.5	.28	.44
France	1933	1 300	1 310	23.9	26.4	.43	.48
Ireland	1961	136	135	1.7	1.7	.49	.49
Italy	1962	2 500	2 500	58.0	61.0	1.00	1.07
The Netherlands	1948	193	188	7.1	6.7	.50	.40
Portugal	1966	57	62	2.1	2.0	.21	.20
United Kingdom	1930	1 100	1 100	21.3	24.4	.37	.40
Japan	1950	4 900	4 900	185.0	185.0	1.58	1.58
USA	1913	10 000	10 000	140.0	140.0	.62	.62

(1) Million m³.

(2) m³ per head.

(3) Excluding Luxembourg.

Source: Ermco.

concrete plants, require a licence if certain limiting values are exceeded.

Forecast and outlook

Growth of the ready-mixed concrete sector is necessarily linked to construction activity and the production and consumption of cement. Both these activities show signs of optimism for the future and this optimism is shared by the members of Ermco, although to varying degrees.

The following annual rates of growth are anticipated:

- 1% — FR of Germany, Ireland and the Netherlands
- 3% — Greece and Spain
- 5% — France, UK, Italy and Belgium.

These estimates have been made by Ermco and are based on recent trends in economic activity in each country, and preliminary estimates for the years to 1990.

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THE MINERAL WOOL INDUSTRY

Description of the sector

Man-made mineral fibres are manufactured from glass, rock, slag or other minerals which are melted and turned into products which can be divided into three broad types of mineral wool: glass wool, rock wool and slag wool.

Mineral wool fibres are vitreous (amorphous) silicates made by centrifuging a stream of molten vitreous material into fibres. Rock fibres are traditionally made from various kinds of rocks: basalt or diabase or furnace slag. Glass wool fibres are made from silicate and borosilicate compositions of aluminium, boron calcium, sodium and other metal oxides.

Mineral wool products are used for commercial, industrial and residential insulation, commonly in the form of rolls, sections, blankets and slabs. Mineral wool is also used to produce acoustic ceiling tiles and panels, air-conditioning ducts and a variety of thermal and acoustic materials. In its granular form, the product is also used for the insulation of cavity walls and as a soil-conditioning agent.

One of the major characteristics of this sector's production is the volume of the final product. Thus, the costs of holding inventories are considerable and the transportation cost of the product constitutes an important part of the sales price.

Current situation

The total turnover for the member companies, members of the professional association Eurima was, in the EC:

1984	ECU	951.2 million
1985	ECU	966.2 million
1986	ECU	1 074.2 million
1987	ECU	1 152.5 million

Data for 1988 are not yet available, but the growth should slow down slightly. From 11% in 1986 and 7% in 1987, a growth of the order of 5% is expected in 1988. Two factors played an important role in explaining the good results recorded in recent years, namely the recovery of the construction sector and the increasing concern for energy savings. Orders for insulating materials thus came both from the new house sector and from the renovation sector.

There are also mineral wool producers, members of Eurima, in Austria, Finland, Norway, Sweden, Switzerland and Turkey. Their combined turnover is roughly 25% of the combined turnover of the Eurima member companies in the European Community.

At world level, the leaders remain Saint-Gobain (F), Owens-Corning (USA), Pilkington (UK), Rockwool (DK), Manville (USA) and Partek (SF).

Europe is still in the forefront of this sector. The end of the 1980s, however, saw the arrival of Japan on the European scene. Hungary, for instance, is building a glass wool plant with the help of Japanese technology and reportedly to be managed by the Japanese.

Investment

The mineral wool industry is making heavy investments in air pollution control. Eurima's estimates evaluate that 20% of all investments currently being made in the sector concern equipment meant to reduce air pollution.

This pollution originates from the furnaces melting the raw materials. Of course, the situation differs from plant to plant, but it is hoped that the anti-pollution equipment will be on line in the early 1990s.

Table 1
Production of heat insulation products

	1985		1986		1987	
	1 000 tonnes	1 000 m ³	1 000 tonnes	1 000 m ³	1 000 tonnes	1 000 m ³
EC	1 013.2	37 211	1 079.3	38 805	1 093.5	40 253
EFTA	502.7	14 622	493.9	14 328	513.8	14 718

Source: Eurima.

On average, 6.7% of the turnover is dedicated to research and development in the mineral wool sector. In 1987 ECU 77 million were spent on R&D.

Environment

The need for better insulation in view of the rational use of energy and the need to reduce energy consumption has been stressed on many occasions. Yet, although the insulation has progressed over the last 10 to 20 years (in fact since the oil crisis of the 1970s), a lot still needs to be done, especially in existing houses.

In its document 'New Community energy objectives' (May 1985), the European Commission underlined the need to increase energy efficiency by 25%. Since heating accounts for about 60% of national energy consumption, a better insulation ought to be the first target to tackle. National authorities do not always act in this respect. In this period of economic growth, there is every reason for investing in energy saving in order to be prepared for possible new periods of high energy prices.

A rational energy policy is not the sole reason for the existence of an insulation industry. The comfort of housing is vastly improved by adequate insulation, e.g. the acoustics.

Stricter insulation requirements in Denmark between 1972 and 1986 have led to a reduction of oil consumption for heating from 1 670 litres in 1972 to 1 390 litres in 1986 (for a 120 m² house), that is a 20% improvement.

There is a strong relationship between thermal insulation and less air pollution due to a reduced discharge of pollutants from heating power stations and individual heating systems.

Saving a unit of energy is cheaper than generating one, both in economic and ecological terms. A recent study by Eurisol Ltd ('Pollution reduction through energy conservation', J.R. Bowdidge, pub-

lished by Eurisol Ltd, GD-Redbourn, 1989) concluded that the pollution caused by producing mineral wool is more than a thousand times less than the pollution saved. This calculation is based on a lifetime of the house of 50 years.

Table 2
Heat insulation products
Employment (1) (2)

	1988	1989
EC	10 406	10 873
Belgium	570	570
Denmark	1 479	1 466
FR of Germany	2 400	2 410
Greece	100	100
Spain	485	485
France	1 600	1 970
Ireland	80	80
Italy	316	370
Netherlands	1 576	1 615
United Kingdom	1 800	1 807

(1) Number of people employed in Eurima member companies.

(2) Direct employment only.

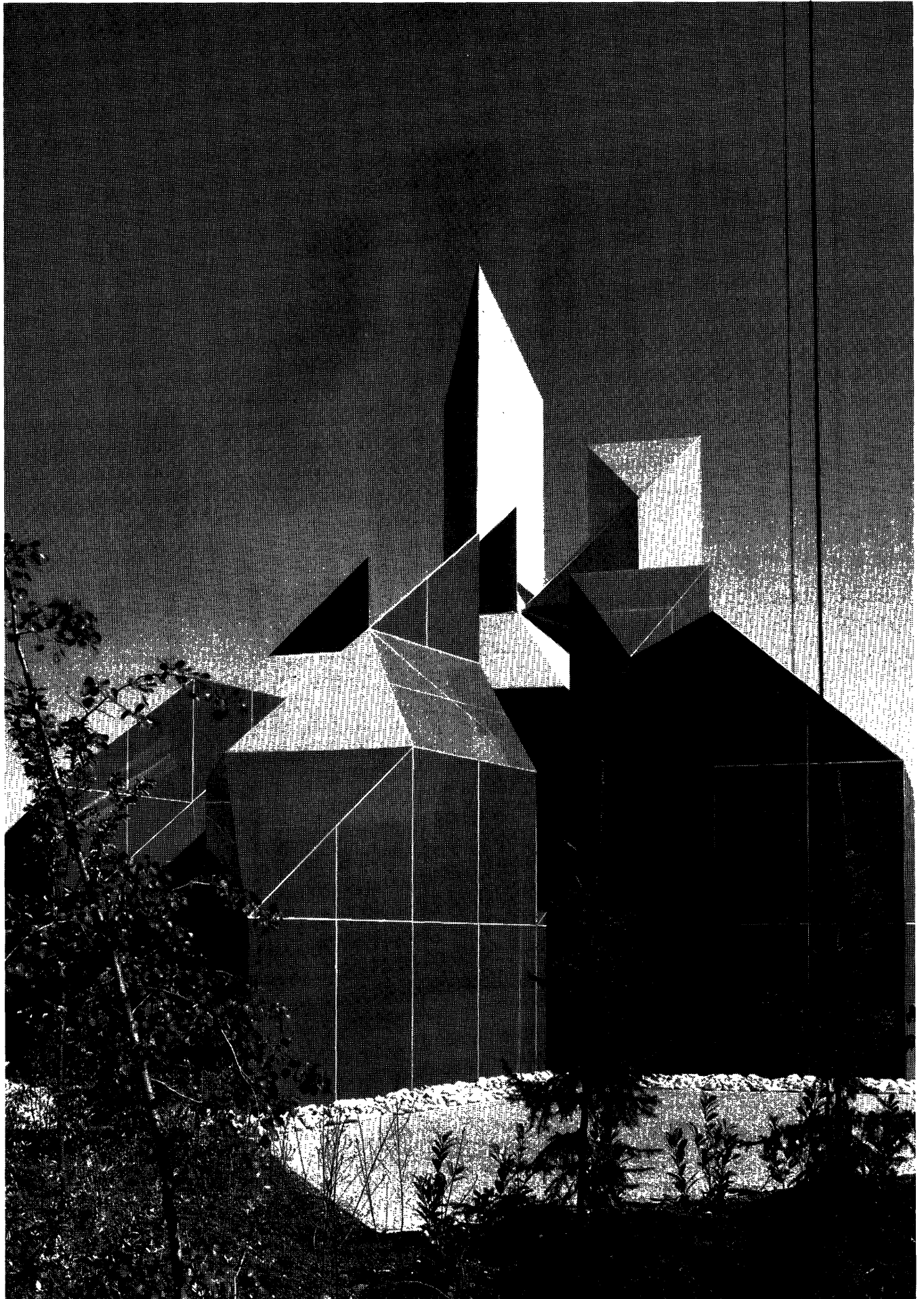
Source: Eurima.

Outlook

1989 should prove to be another good year for the mineral wool industry. Employment is expected to be up by 4.5% over 1988 as a result of increasing demand from the construction sector.

The mineral wool industry will continue to be favourably influenced by the growth of the construction sector in the coming years. The increasing concerns for energy saving and better comfort should ensure a growing demand for insulating products, mainly mineral wool. Although the industry may not record growth rates as fast as those recorded in the mid-1980s, the outlook for this sector remains bright.

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THE GLASS INDUSTRY

(NACE 247)

The glass sector in the European Community

The EC glass industry produced about 20 million tonnes in 1988 worth ECU 18 billion. This industry employs more than 200 000 people, i.e. a little less than 1% of the manufacturing sector in the Community, and is present in all the member countries. Production is proportionally small only in Greece and Denmark, whereas it is distinctly above the European average in Ireland and the Belgium-Luxembourg Economic Union. In these small countries,

the presence or absence of a single big glass company means a radical change in the industrial landscape.

In the 1980s, this sector was marked by a sharp drop in demand, beginning with 1981 when both demand and production plunged by 8%. Only the flat glass sector remained unaffected by this recession. The overall economic conditions are improving however, and after severe restructuring (employment dropped by more than 20% between 1980 and 1987), production gradually recovered its 1980 level to reach the current high point.

Table 1
Main indicators, 1980-87
The glassware industry (1)

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	18.36	16.89	17.08	17.27	17.87	17.66	18.09	19.05		
Net exports	.39	.44	.55	.64	.55	.75	.61	.41		
Production	18.75	17.33	17.63	17.91	18.42	18.41	18.70	19.46		
Employment (1 000)	285	266	253	240	235	230	225	223		

(1) Includes production of cast glass.

Source: CPIV.

Table 2
Production and external trade

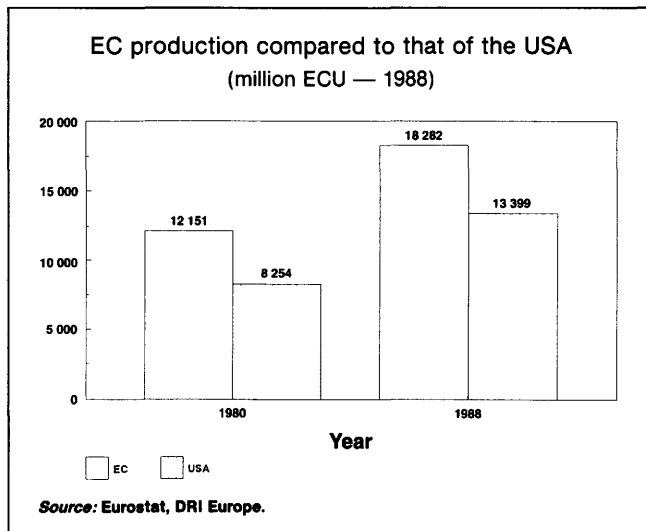
(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC	12 151	12 419	13 092	13 855	14 870	15 845	16 053	16 899	18 282	19 460
Index	76.7	78.4	82.6	87.4	93.8	100.0	101.3	106.7	115.4	122.8
USA (1)	8 254	11 333	12 844	14 717	17 226	18 252	15 033	13 115	13 399	14 663
Index	45.2	62.1	70.4	80.6	94.4	100.0	82.4	71.9	73.4	80.3
Production in constant prices										
EC	15 096	14 132	14 129	14 834	15 366	15 845	15 784	16 523	17 543	18 092
X/M	1.4	1.6	1.6	1.7	1.6	1.9	1.8	1.5	N/A	N/A
Import penetration (%)	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.5	N/A	N/A
Intra-EC Imports/Production (%)	15	16	17	18	18	18	20	18	N/A	N/A
Tonnes per employee	66	65	70	75	78	80	83	86	N/A	N/A
Index	82.5	81.3	87.5	93.8	97.5	100.0	103.8	107.5	N/A	N/A

(1) Census of Manufactures and Eurostat estimates.

Source: Eurostat (Comext).

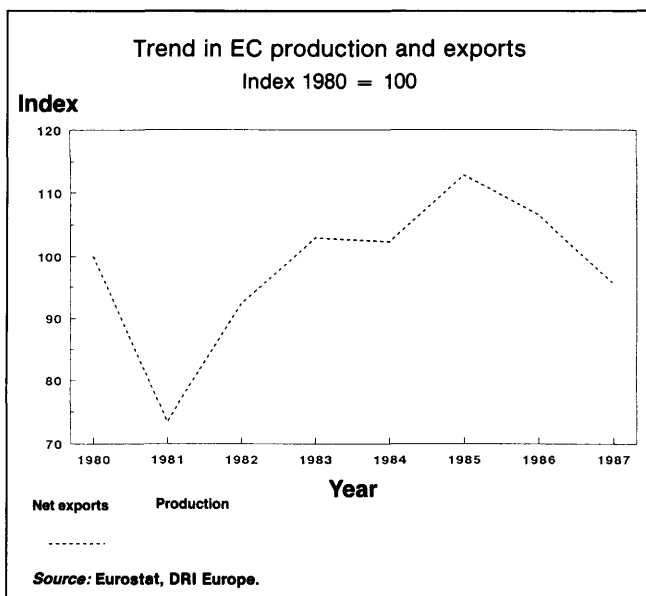
The bulky nature of glass and its low unit value make for limited international trade. Intra-Community trade accounts for 20% of the production, while import penetration is only 5%.

Figure 1



There continues to be a big surplus in the balance of trade in this sector, as the value of exports exceed that of imports by 50%. Nevertheless, whereas this balance was on the rise in the beginning of the 1980s, there has been a deterioration in this trend in more recent years. The Community market is confronted with a rise in imports from Comecon countries, essentially for cheap, down-market glass. The European Commission is currently looking into possible dumping practices by these manufacturers.

Figure 2



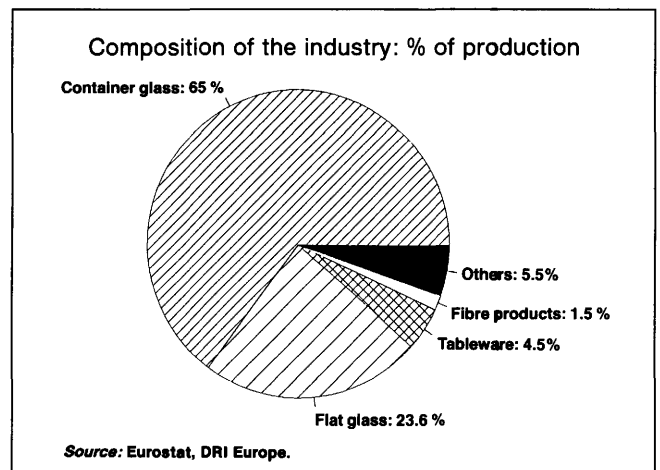
Glass production in the United States is about 25% less than that of the EC, corresponding more or less

to the size of the population in these two markets. In terms of dollars, production in this sector has grown by 4% a year during the 1980s thanks to a relatively stable home market.

Description of the industry

The main outlet for the glass industry is packaging, chiefly for beverages and food products. Glass for packaging is also referred to as 'hollow glass.' It accounts for about two thirds of the (glass) production in the European Community. Flat glass, used chiefly in the construction and transport equipment sectors, constitutes about a fourth of glass production. The remaining 10% are divided among tableware, glass fibres, special glass (high-tech products classified under 'other') and miscellaneous productions not included in the categories listed above.

Figure 3



Structure of the industry

Be it for hollow or flat glass, production using modern processes requires heavy investments and sizeable financial resources. As a result there is high concentration in this sector. This trend was bolstered even further in the 1980s. New investments were required, and important restructuring work was done, both of which lead to clearly greater tendency for concentration.

Several other factors contributed to this development. Glass making requires a lot of energy. The high price of energy reduced the competitiveness of glass *vis-à-vis* competing materials such as paper and plastics, especially in the packaging sector. The drop in demand which occurred in 1981 led to production overcapacity. This in turn led to serious restructuring in the sector, primarily through a series of mergers and acquisitions.

Furthermore, the technologies used in the sector are advancing at full speed. As regards flat glass, for example, heavy investments were required to adjust to the new technique of 'float glass'.

The major groups that dominate this sector (e.g. St-Gobain in France and Pilkington in the United Kingdom) tend to internationalize their operations. As a matter of fact, users are increasingly asking for homogeneous quality, regardless of their country of residence. This compels glass manufacturers to globalize their operations. Furthermore, such heavy investments can yield profits in a world market, though not in a smaller market restricted to only one continent. Windows and windscreens for cars are a good example of this trend. In this connection, Pilkington has recently invested in the United States to establish itself in the North American market.

Risks and opportunities

Environment

Because glass production consumes a lot of energy, glass manufacturers are constantly looking for possible ways to cut their energy consumption. Indeed, this is one of the aspects of the constant technological advancement in this sector.

More than any other material, glass used in packaging can be easily recycled. About 30% of hollow glass used has been recycled. This means considerable savings in both raw materials and energy, as the processing of recycled glass requires less energy than the production of new glass.

The impact of '1992'

Given the fact that concentration in this sector is already high, the single market should have no major effect on this development; all the more so because international trade, even between Member States, is relatively small. On the other hand, the abolition of customs barriers and the harmonization of technical standards can only have a favourable effect on the level of competitiveness of this sector.

Competition from third countries

Imports from non-EC countries remain small, due to the low unit value and the weight of the product. About 5% of the internal market is served by these imports, half of which from Comecon countries. They are usually low-quality, low-priced products.

Prospects

The prospects of the glass industry in Europe are relatively favourable. Good economic conditions should maintain demand at a high level. In the packaging sector, glass should, if not increase, at least stabilize its market shares against substitute products such as paper and plastics. Flat glass, on the other hand, could feel the negative effects of keener competition from Comecon and production overcapacity. Glass fibres for textiles will also face severe competition from imports. Overall, an annual 2 to 3% growth rate can be expected for the glass industry in the Community.

DRI Europe

CONTAINER GLASS SECTOR

(NACE 247.2, 247.4 and 247.7)

Current situation

Production and apparent consumption fell significantly in 1981, due to the economic crisis at the beginning of the decade. This drop was followed by a slow and progressive recovery. In 1987 the industry had completely recovered, and production and consumption levels were back to their 1980 levels.

Excess capacity and insufficient profitability characterized the sector in the 1980s. Container glass faced sharp competition from substitute products, especially plastic and cardboard, increasingly used in the packaging of high consumption goods such as soft drinks.

Exports to non-EC countries only represent 2.5% of production, and are more or less balanced with imports. About 49% of imports from non-EC countries originate from Comecon Member States.

Industry structure

As a reaction to the problems encountered, glass industrialists have started to restructure their companies and restore profitability by better adapting their production capacities to the demand for container glass, raising productivity, and reducing costs (especially for employment and energy). Takeovers and mergers of companies took place, some plants were closed, production lines were stopped, staffing levels were reduced and the production process was improved through application of the latest techno-

logical developments. Thanks to these efforts, the improvement in the general economic climate and the fall in energy prices, the glass industry's container situation improved significantly. By 1987 the utilization rate of the container glass industry's capacity was approximately 91.5%.

Factors behind the situation

The positive evolution of this sector during recent years was not only a result of the reorganization of the production process, but also of the adaptation of the manufactured product to new economic circumstances.

Four factors have contributed to the renewal of this sector:

The intrinsic qualities of glass

Glass is an impermeable, inert, attractive, recyclable and quality product. Glass has also been able to remain a competitive packaging with a good quality price ratio. Finally, glass is one of the few packaging materials that offers the choice between returnable or non-returnable goods, thus allowing it to respond appropriately to the characteristics of the distribution networks for which the product is designed. In the USA, for instance, there is a recycling industry for tins; such an industry does not exist in Europe yet, however.

Table 1
Main indicators, 1980-87
Container glass

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Production	12 173	11 247	11 478	11 623	11 972	11 820	12 160	12 631
Index	103.0	95.2	97.1	98.3	101.3	100.0	102.9	106.9
Apparent consumption	12 190	11 291	11 452	11 619	12 004	11 781	12 030	12 572
Index	103.5	95.8	97.2	98.6	101.9	100.0	102.1	106.7
Exports extra-EC	335	246	309	345	343	378	357	320
Imports extra-EC	352	290	284	341	375	339	227	261
X/M	1.0	.9	1.1	1.0	.9	1.1	1.6	1.2
Import penetration (%)	3	3	2	3	3	3	2	2
Intra-EC Imports/Production(%)	8	8	8	9	10	9	10	11

Source: FEVE, Eurostat (Comext).

Glass recycling

In terms of environmental impact, glass recycling has been performed for many years. Between 1980 and 1987 some 19 million tonnes of glass waste (cullet) were recycled in the EC Member States. In 1987 3 350 766 tonnes of glass were collected, about 30% of the total consumption. As well as diverting huge quantities of glass away from the domestic refuse channel, recycling creates large savings in raw materials (1 tonne of recycled glass replaces 1.2 tonnes of raw material) and energy (100 kg fuel oil per tonne of recycled glass), thus almost 2 million tonnes of oil equivalent.

Technological developments

Technology in the glass industry has considerably improved in the past few years, and there is still a lot of potential to obtain better performances in production processes and improve efficiency.

The energy performance of the furnaces has already been improved, enabling appreciable energy savings. Furnaces currently use a vitrifiable mixture with more than 50% cullet. Some glass furnaces for green glass even produce glass of very high quality with 100% cullet.

It has also become possible to manufacture glass at a lower cost and with a more flexible production rate through the automation and computerization of the production lines. A glass forming machine that produced 70 000 bottles per day in 1976 can now generate 270 000 bottles per day. Technology and productivity has improved, enabling glass containers to be sold at very competitive prices.

The container glass industry has constantly increased its quality controls in order to deliver reliable products better able to cope with shocks and friction from the packing lines and during handling and transport. At present a glass bottle undergoes several internal and external examinations. It receives some surface treatment as well.

The lightweighting of glass has been the constant preoccupation of glass makers. Technical regulation by microprocessors and the technique of press-and-blow enables the creation of a lightweight glass container with an equal resistance at all points. For example, the weight of a beer bottle was reduced by 33% in a few years.

Several glass companies from Europe (Rockware Glass and Wiegand Glas), the United States (Consumer Glass and Brockway Inc.), Australia (ACI

International) and Japan (Yamamura) and a large glass-forming machine manufacturer (Emhart Corp.) have formed a consortium whose aim is to develop a glass container 10 times stronger and half the weight of present glass containers.

Concerning hygiene in the process of container production, the container industry has 'clean pack' lines, the aseptic filling process and the complete handling, wrapping and palletizing of products.

As a result of its technological progress, the glass industry can now trade in new types of containers, for example bottles with plastic sleeves, wide mouth bottles, pre-labelled bottles, jars sealed by a metallic sheet, etc.

Media and advertising

The glass industry has reacted to the policies of some competitive materials in several European countries by taking a more vigorous stance on marketing policies. Important media and advertising campaigns for container glass and recycling have been launched in recent years in Spain, France, the United Kingdom and Italy. In some cases, clients and retailers were involved.

Outlook

The container glass industry, which has been completely restructured and modernized, markets competitive products coming up to the expectations of a society which is showing increasing concern about the quality of life and environmental protection.

Prospects for the container glass sector are rather optimistic. The industry expects stable moderate growth over the coming years, with a rate of capacity utilization above 90%. Container glass will successfully compete against substitute products and its market share in the packaging sector should increase.

It therefore looks to the future with confidence, a feeling reinforced by the favourable economic prospects that the creation of the single European market is expected by 1993 to bring in its wake.

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FLAT GLASS SECTOR

(NACE 247.1 and 247.6)

Current situation

In the early 1980s, the flat glass industry in the EC was strongly affected by external economic factors such as the oil crisis and low demand. During this period, the flat-glass industry in the Community went through serious structural reorganization: production capacities were reduced, and the industry gradually moved from the old technology of sheet plants to the new float furnaces, a more automatized process. As a consequence, considerable reduction took place in staffing levels (in some cases, employment was reduced by as much as 50%). The efforts of the flat glass industry are gradually being rewarded and production in the Community has been rising by an average of 1.7% per year between 1980 and 1987.

If we consider the trend in float and sheet glass sales, which represent the greater part of flatglass sales, we find that, since 1980, worldwide sales have been rising steadily, by about 2 to 3% a year on average. It is interesting to note that this growth rate is faster than that of the real gross national product. This confirms that flat glass is still widely used in the world. This high growth is the result of intense activity of the two major users of flat glass, namely the automotive industry and the construction sector.

In 1987 sales were high as a result of increased renovation and refurbishing work carried out on existing dwellings, of a slowly recovering building sector in some countries, and of good healthy car sales. Flat glass sales are indeed very sensitive to the development of the car industry.

The utilization rate of capacities installed in the EC was high in 1988, which led many producers to invest in new production facilities.

Foreign trade

Flat-glass manufacturers are however concerned by the increasing competition from State-trading countries which undercut the EC market with very low-priced glass. Procedures have been initiated within the EC in reaction to this unfair policy, but without success. Furthermore, the low US dollar rate makes it difficult to export to the USA and other dollar markets.

The fact that more and more plants are being built overseas itself tends to reduce export opportunities. Trade with the rest of the world is relatively low in this sector, and mostly limited to non-EC European countries because of transport problems. Import penetration is less than 10%. Intra-community trade is however, more important, and its share of production has grown from 23% in 1980 to 31% in 1987, as European integration slowly becomes reality.

However, the industry is very sensitive to import competition. An important share of imports come from Comecon countries. They are very low priced and often of lower quality. This puts a lot of pressure on Community producers, especially in some specialized market, for example glasses for horticulture. Enquiries on possible dumping have been launched by the Commission.

Table 1
Main indicators, 1980-87
Flat glass

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Production	4 090	4 160	4 176	4 281	4 256	4 477	4 441	4 586
Index	91.4	92.9	93.3	95.6	95.1	100.0	99.2	102.4
Apparent consumption	3 946	4 007	3 948	3 951	3 956	4 046	4 184	4 455
Index	97.5	99.0	97.6	97.7	97.8	100.0	103.4	110.1
Exports extra-EC	490	424	554	660	609	696	516	520
Imports extra-EC	346	271	326	330	309	265	260	389
X/M	1.4	1.6	1.7	2.0	2.0	2.6	2.0	1.3
Import penetration (%)	9	7	8	8	8	7	6	9
Intra-EC Imports/Production (%)	23	25	28	30	28	28	32	31

Source: Float and sheet glass from GEPVP, Eurostat (Comext).

Forecast and outlook

Demand for flat glass in Europe is likely to experience a mild setback in the next couple of years before improving again, as the single European market becomes reality. Imports of glass from non-European countries are expected to rise rapidly, in particular eastern European countries as their float process making capability increases.

Moreover, new capacities are being built in Europe. As a result, an overcapacity is likely to develop, which will depress prices and adversely affect the

return on assets of the major European flat glass producers.

Whilst every effort will be made to develop new products, the prospects for the flat-glass industry in the early 1990s are not as bright as was anticipated last year.

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GLASS TABLEWARE SECTOR

(part of NACE 247.2 and 247.3)

Summary

The general and often confusing term of tableware comprises a group of holloware products which are encountered in daily life and which have high demand placed upon them, especially from the design point of view. This glass is often referred to as household glassware.

Drinking glasses, in terms of value, represent about 60% of the tableware produced. The remaining 40% is accounted for by other glass accessories for the table and by articles which are used in the kitchen, the home and the office.

Breakdown of tableware by glass type

Compositionally, there are basically three main groups of tableware. By far the largest group is soda-lime glass. The main producers all have slight variations of this glass.

The second group includes the crystal and lead crystal glasses, in which most of the calcium is replaced by barium, zinc or lead, while sodium is in part replaced by potassium.

The third group includes machine pressed or blown tableware made of special glass immediately after the melting process. The composition varies greatly from those previously mentioned. There are currently three popular types on the market:

- transparent Borosilicate glass,
- white opaque glass (translucent, opal glass),
- glass ceramics.

Current situation

Production of glass tableware amounted to 870 000 tonnes in the EC in 1987. Most of this production was destined toward the domestic market, which grew by more than 5% in 1987 after having fluctuated around 642 000 tonnes between 1984 and 1986. Both production and consumption have suffered from the weak growth in personal disposable incomes in the early 1980s; as a result, glass tableware production is still some 15% below the 1980 level.

More than 30% of the EC production of glass tableware was exported outside of the EC in 1987, compared with 27.9% in 1980. Imports from non-EC countries are much lower, and only account for just over 10% of the domestic market, so that this sector provides a positive contribution to the EC's overall trade balance, both in volume and in value terms.

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Table 1
Main indicators, 1980-87
Glass tableware (1)

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Production	1 025	801	822	861	893	895	881	870
Index	114.5	89.5	91.8	96.2	99.8	100.0	96.0	97.2
Apparent consumption	805	553	588	601	644	639	665	676
Index	126.0	86.5	92.0	94.1	100.8	100.0	100.6	105.8
Exports extra-EC	286	304	302	330	320	329	282	271
Imports extra-EC	67	56	68	70	71	73	66	77
X/M	4.3	5.4	4.5	4.7	4.5	4.5	4.3	3.5
Import penetration (%)	8	10	11	12	11	11	10	11
Intra-EC Imports/Production(%)	20	27	26	26	29	30	37	32

(1) Excluding Spain.

Source: CPIV, Eurostat (Comext).

GLASS FIBRE SECTOR

(NACE 247.5)

Description of the industry

Fibre glass is produced from molten glass, heated in a modern furnace and pulled through tiny holes transforming the liquid mass into small glasswool fibres for insulation purposes, or into textile yarns or reinforcement products.

A clear distinction should however be made between glasswool and continuous glass fibre. Although both are produced in glass furnaces, their industrial manufacture calls on different forms of technology and their products are aimed at separate end-users. Glasswool as a final product is part of the insulation industry and as such is dealt with in the monograph on heat insulation products.

The present comments therefore only refer to the continuous glass fibres industry. The continuous glass fibres industry, since its creation after the Second World War, has constantly evolved due to the many applications of its new products by industry.

Current situation

Over the past five years, the increase in production in the 11 plants operating throughout the Community, has been more apparent for reinforcement than for textile fibres. This can be explained by the rapid development of the automobile, sport and leisure and construction sectors, which are important users of reinforcement fibres.

The amount of fibres for textile use declined in 1986, but has since been overcome by a recovery in

demand. The Community producers' profit margin was very unsatisfactory in the early 1980s due to overcapacity and competition at dumped prices by East European and Japanese producers. Price commitments by the latter and protective duties applied by the European Commission to imports originating from Czechoslovakia and the German Democratic Republic improved the competitive position of Community industry from 1985. However, strong price competition from non-Community producers remains a constant threat, which is exacerbated by international exchange-rate fluctuations. Continuous adaptation to change and new end-uses indeed requires huge investment in both R&D and equipment.

Forecast and outlook

The short-term forecast indicates a favourable trend in demand for reinforcement fibres. This results from the use of new products, for example, in the construction and the transport sectors and in the booming electronics industry. On the contrary, the outlook for textile fibres is more gloomy, in line with the poor expectation of the Europe-based textile industry as a whole.

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Table 1
Main indicators, 1980-87
Glass-fibre products

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987 (1)
Production	223.0	203.7	204.2	225.3	249.3	276.3	285.8	296.2
Index	80.7	73.7	73.9	81.5	90.2	100.0	103.4	107.2
Apparent consumption	215.0	181.9	203.3	222.5	251.6	279.4	287.8	303.3
Index	77.0	65.1	72.8	79.6	90.0	100.0	103.0	108.6
Exports extra-EC	44.2	53.4	42.8	47.8	52.0	56.7	54.0	59.0
Imports extra-EC	36.2	31.6	42.0	45.0	54.3	59.8	56.0	66.0
X/M	1.2	1.7	1.0	1.1	1.0	1.0	.9	.9
Import penetration (%)	17	17	21	20	22	21	20	22
Intra-EC Imports/Production(%)	50	54	60	60	63	62	73	78

(1) Estimated.

Source: APFE, Eurostat (Comext).

OTHER GLASS

'Other glass' includes the category 'special glass', which accounts for around half of this sub-sector, the other half being spread between many smaller industries, about which data are difficult to gather.

Special glass is identified by its use and applications. The term is used to describe a wide range of special glasses with high chemical and thermal durability and with a variety of optical, electrochemical or special technological properties. These glasses are used in such fields as chemistry, pharmacy, electrotechnology, electronics apparatus and instrument construction, optics, illumination engineering, household appliances, certain sectors of the construction industry and in other technical applications.

Current situation

In 1987 the market for special glass was characterized by a growing demand for special glass in domestic appliances, and a slowdown in the market for optical, chemical and pharmaceutical components.

In 1987 the gross Community production of special glass reached ECU 1.4 billion, of which television glass represented ECU 423 million.

The intra-EC market was ECU 1.13 billion, thus lower than production, implying exports of ECU 0.28 billion.

The world market for special glass was estimated at ECU 5.79 billion in 1987, distributed as follows across the major regions:

Western Europe	24%
USA	32%
Japan	22%
Other countries	22%

About 93% of Community production comes from France, Italy, the United Kingdom and the Federal Republic of Germany, which together account for 88% of special glass consumption. In the other EC countries there are practically no processing plants, while production only reaches some ECU 97 million.

Outlook

The EC special glass market will continue to expand in the 1990s. However, special glass faces growing competition in stagnant or declining markets such as biotechnology and opto-electronics, especially from plastics. Therefore it will probably undergo some restructuring, which should nevertheless not hamper expansion of this industry.

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Table 1
Main indicators, 1980-87
Other glass products

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Production	680.1	448.2	488.2	474.0	610.8	513.5	543.8	706.0
Index	132.4	87.3	95.1	92.3	118.9	100.0	105.9	137.5
Apparent consumption	620.3	388.8	436.9	437.7	579.7	486.9	538.3	674.0
Index	127.4	79.9	89.7	89.9	119.1	100.0	110.6	138.4
Exports extra-EC	151.0	148.9	158.9	155.2	138.5	141.2	126.7	121.0
Imports extra-EC	91.2	89.5	107.5	118.8	107.4	114.7	121.2	89.0
X/M	1.7	1.7	1.5	1.3	1.3	1.2	1.1	1.4
Import penetration (%)	15	23	25	27	19	24	23	13
Intra-EC Imports/Production(%)	58	91	90	86	71	92	93	91

Source: CPIV, Eurostat (Comext).

CERAMIC GOODS

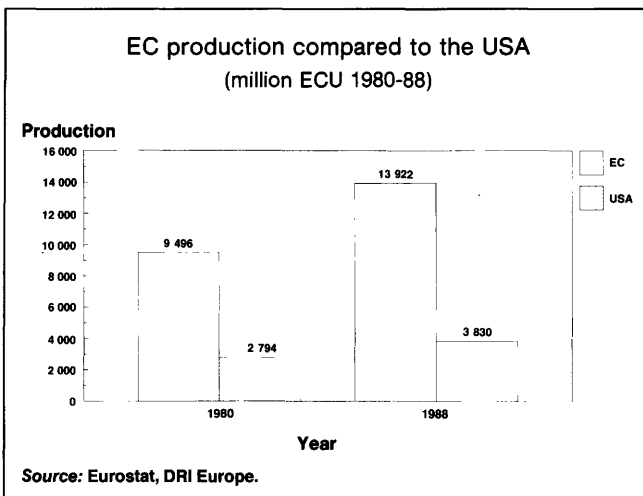
(NACE 248)

The economic importance of the industry in the EC economy

In terms of production, the ceramic industry ranks 52nd among the 107 leading European sectors and as far as employment is concerned, it is the 31st sector out of 97.

Production amounted to almost ECU 14 billion in 1988. It was stagnant in the early 1980s, but there has been moderate growth since 1984. US production was only ECU 3.8 billion and has been stabilizing around that level since its peak of ECU 5.4 billion in 1985.

Figure 1



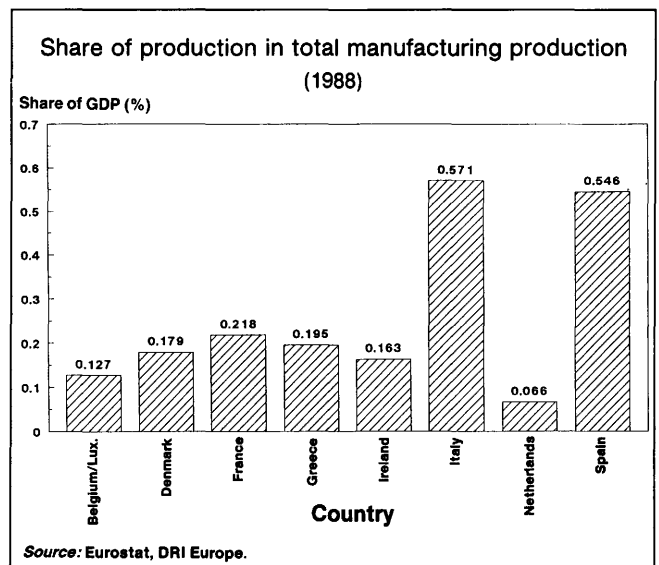
The share of production in individual EC countries is shown in Figure 2: it is the highest in Italy and Spain (more than 0.5%) and the lowest in the Netherlands, Belgium and Luxembourg.

Total turnover for the ceramic industry reached about ECU 13 billion in 1988, i.e. about ECU 60 000 per person employed; about 40% of this figure was achieved by tiles, 20% by tableware and ornamental ware; advanced ceramics are not included in these figures, no statistics being available.

Following a reduction of sales in 1980, the period 1981-83 was marked by stagnation which, above all,

affected those sectors dependent on the construction industry. Production capacity in these sectors remained largely under-utilized. Sales picked up from the beginning of 1984 and continued to do so in the majority of the subsectors until 1988 and 1989. The rate of growth nevertheless slowed in 1989 and is expected to continue to do so in 1990.

Figure 2



In current value, production almost follows the same pattern as turnover, but in constant terms production is more or less stagnant since 1983.

The external balance of trade of the EC has been positive throughout the 1980s and after a slight slowdown in 1986 and 1987, reached a record level of ECU 1 937 million in 1988. Total exports amounted to ECU 2 792 million in 1988, while imports, though increasing compared to 1987, were only ECU 831 million. Since 1985, import growth has been a little higher than that of exports (respectively 7.8% and 23.7%).

Trade between Member States has developed in recent years, thanks to the opening up of Community markets. At the same time, the export penetration of EC products on world markets increased. The share of EC production that is exported also



increased, from 19% in 1980 to 22% in 1988. Again, there are large differences depending on the products considered. Even so, the improvement of EC exports was slower than that of trade between Member States.

The existence of many tariff and non-tariff barriers on world markets seriously hampers the expansion of Community exports.

In many countries, in particular in the newly industrialized ones (South Korea, Taiwan, Brazil) as well as in centrally planned economies (Eastern Europe, China) and other countries like Japan, the ceramic industry has been expanding rapidly in recent years; however, it is difficult to quantify this potential.

To get over their loss of competitiveness, Community enterprises have, during the last few years, shifted towards an increased specialization in the high value-added product range and in highly technical products, which require an increased effort in research and development. On the whole, imports from third countries stabilized over the period 1980-1988, with an average penetration rate of 10%. However, in certain subsectors, such as tableware, there were bigger increases. The rate of coverage of EC imports by corresponding exports grew from 2.8 in 1980 to 3.4 in 1988.

Table 3 shows the position of the ceramic industry in all the EC Member States in terms of production, external trade and employment. Italy and the

Table 1
Main indicators, 1980-89
Ceramic goods

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption (1)	8 363.4	8 679.3	8 604.0	8 274.2	9 719.1	9 816.7	10 349.5	11 138.2	11 985.2	N/A
Net exports (1)	1 132.2	1 311.5	1 360.3	1 645.6	1 739.8	1 851.6	1 649.3	1 595.7	1 937.0	N/A
Production	9 495.6	9 990.8	9 964.3	9 919.8	11 458.9	11 668.3	11 998.8	12 733.9	13 922.2	14 853.2
Employment (1 000)	319.1	299.3	280.2	261.8	263.5	255.2	252.9	248.1	242.9	244.0

(1) 1980-85 and 1988 estimated.

Source: Eurostat (Inde, Bise, Comext).

Table 2
Production and external trade
Ceramic goods

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC	9 496	9 991	9 964	9 920	11 459	11 668	11 999	12 734	13 922	14 853
Index	81.4	85.6	85.4	85.0	98.2	100.0	102.8	109.1	119.3	127.3
USA (1)	2 794	3 697	3 603	4 146	5 314	5 375	4 234	3 711	3 830	4 320
Index	52.0	68.8	67.0	77.1	98.9	100.0	78.8	69.0	71.3	80.4
Production in constant prices										
EC	12 572	11 941	11 220	10 885	11 913	11 668	11 725	12 295	13 038	13 555
Index	107.7	102.3	96.2	93.3	102.1	100.0	100.5	105.4	111.7	116.2
EC trade in current prices										
Exports extra-EC (2)	1 791	2 003	1 982	2 276	2 536	2 672	2 434	2 471	2 792	N/A
Index (3)	65.2	75.0	74.2	85.2	94.9	100.0	94.0	95.4	107.8	N/A
Imports extra-EC (2)	640	725	666	695	842	868	699	746	831	N/A
Index (3)	72.0	83.5	76.8	80.1	97.0	100.0	104.0	111.0	123.7	N/A
X/M	2.8	2.8	3.0	3.3	3.0	3.1	3.5	3.3	3.4	N/A

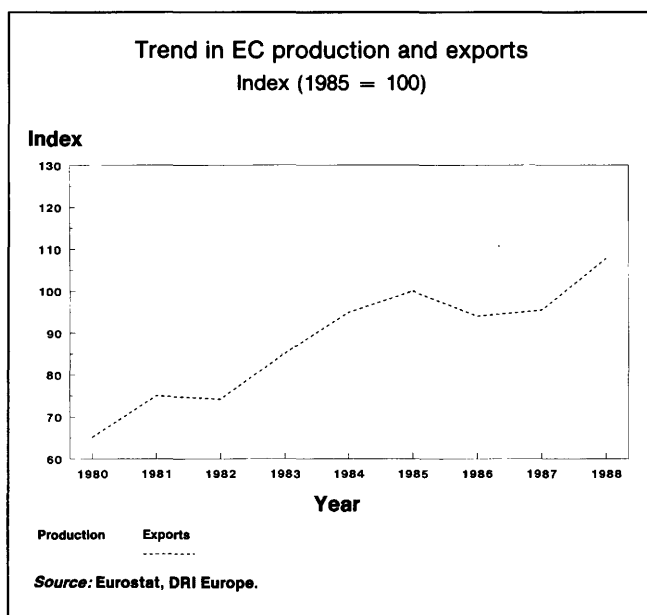
(1) Census of Manufactures and Eurostat estimates.

(2) 1980-85 Spain and Portugal estimated; 1980 and 1988 Greece estimated.

(3) Taking into account changes in EC membership.

Source: Eurostat (Inde, Bise, Comext, Trend).

Figure 3



Federal Republic of Germany are by far the largest producers of ceramic goods with respectively 28.7% and 26.7% of the total. The other large producers are the United Kingdom (14.6%), France (12.5%) and Spain (11.3%). Only Denmark, the Netherlands, Belgium and Luxembourg have a negative balance of trade.

The European ceramic industry provides employment to some 243 000 persons. The table and ornamental ware sector accounts for 45.3% of the total and tiles for 25.5%. The countries contributing the most to employment are the Federal Republic of Germany (64 000 employees), Italy (48 600), the United Kingdom (46 700) and to a lesser extent, Spain (12 900).

Productivity levels vary considerably across subsectors. The industry consists of a wide range of activities which are carried out by firms of all sizes.

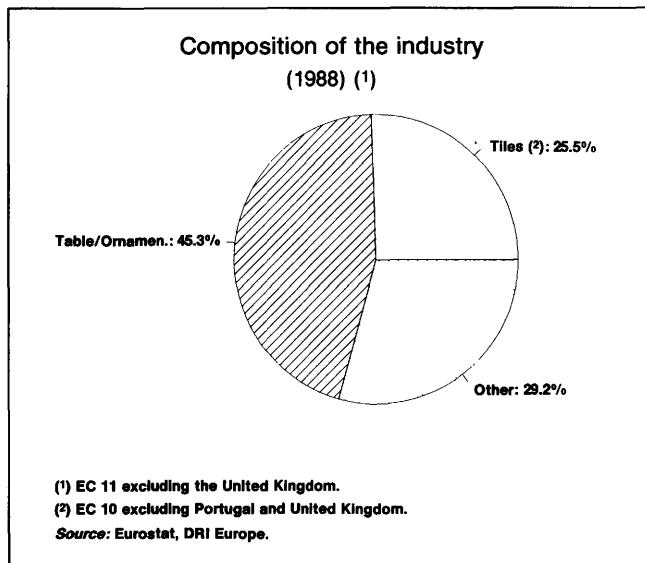
Table 3
National indicators, 1988
Ceramic goods

(million ECU)	B-L	DK	D	GR	E	F	IRL	I	NL	P	UK
Production	163	170	3 718	86	1 582	1 742	44	4 002	129	249	2 038
Exports extra-EC	43.8	39.2	769.6	24.7	245.8	248.5	8.1	917.8	29.8	49.9	414.9
Imports extra-EC	61.7	52.9	223.3	11.7	23.7	105.2	3.8	126.2	70.3	7.0	145.0
X/M	.7	.7	3.4	2.1	10.4	2.4	2.1	7.3	.4	7.1	2.9
Employment (1 000)	3.0	3.6	64.2	3.1	28.4	27.4	.6	48.6	4.3	12.9	46.7

Source: Eurostat (Inde, Comext).

High-technology firms coexist with traditional labour-intensive firms. The more recent years have seen some meaningful innovation, leading to structural changes in the industry.

Figure 4



Description of the industry

In its broad sense, the ceramic industry embraces any industry which manufactures products based primarily on clay minerals which, after forming and drying, are subjected to high-temperature firing. The raw materials used are largely found within the Community and the manufacturing process confers on them a high value-added content. However, highly technical ceramic products also use some special raw materials which are found outside the Community (e.g. zirconium, high-purity magnesium, etc.).

Classified according to use, the main products are:

- materials for construction: tiles, sanitaryware, bricks and roofing tiles;
- tableware and household goods: tableware, household articles and ornamental ware;
- products for electrical, electronic, mechanical and other uses: insulators and electrical insulating parts, products for chemical use, specialized and advanced technical ceramics;
- refractories and heat-resistant products;
- products for drainage and channelling: stoneware pipes.

With the exception of bricks and roofing tiles (see NACE 241), ceramic products are all classified under NACE 248.

Given the heterogeneous nature of the industries grouped under NACE 248 and the inadequacy of the aggregate data available, this study concentrates on the following main subsectors:

- tiles for floors and walls,
- tableware and ornamental ware,
- technical ceramics: insulators and insulating pieces and advanced ceramics.

Each of these subsectors is described in greater detail in the remaining sections of this chapter.

Industry structure

The structure of the ceramic industry shows a large number of small and medium-sized companies, particularly in the tableware and ornamental ware sub-sector.

Technological change and the depressed economic situation during the last decade brought about a reduction in the number of enterprises and in employment. In 1980, the EC industry still comprised some 2 800 companies with about 330 000 employees. In total, it is estimated that the Community at present includes approximately 2 300 companies employing about 243 000 people.

Ceramic enterprises are scattered throughout the Community with strong regional concentrations for some products, particularly tableware, ornamental ware and tiles.

Thanks to intense research and development activity and considerable investment during the last two decades, the ceramic industry has achieved a high degree of modernization and uses advanced techniques. New user requirements have led to new higher performance compositions being produced with new technologies.

Risks and opportunities

The ceramic industry continues to be highly labour-intensive, with labour costs accounting for 35 to 60% of production costs, depending on the sub-sectors.

Some idea of the change in labour costs within the Community ceramic industry can be gained by comparing the change in average gross hourly earnings paid in the EC countries since 1980, to which one should add social charges, which vary considerably from country to country (see Table 4).

Table 4
Gross hourly earnings by country
Ceramic goods

(ECU)	1980	1986	1987
Belgium	5.10	6.72	7.04
Denmark	6.27	9.56	10.83
FR of Germany	4.71	6.81	7.25
Greece	N/A	3.06	N/A
Spain	N/A	N/A	N/A
France	3.60	5.65	5.88
Ireland	N/A	N/A	N/A
Italy	3.24	N/A	N/A
Netherlands	4.43	N/A	N/A
Portugal	N/A	N/A	N/A
United Kingdom	N/A	5.32	5.45

Source: Cérame-Unie.

Since ceramic industries use firing processes at high and very high temperatures, research and the introduction of more effective firing processes have been accelerated to improve energy efficiency. This innovative reconversion process requires, among other things, a shift towards techniques of rapid firing and single firing, and very high investment.

The investment effort of the ceramic industry in the fields of rationalization and development of new products reached an average of ECU 570 million per year between 1980 and 1985 (about 5% of turnover) compared to about 350 million per year during the years 1975-80.

Outlook

The prospects for the sector as a whole for 1989 are moderately satisfactory, with some subsectors doing

better than others depending on the projected activity of basic industrial sectors or private demand.

In the medium term, the rate of growth is not expected to increase much; developments will be affected by numerous changes which will be caused by the achievement of the single European market in the economic and social environment in which enterprises will operate. The increase in competition which will result will have an accelerating effect on structural changes in progress in the different subsectors of the ceramic industry.

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and
DRI Europe

TILES

(NACE 248.3)

Summary

The EC is world leader in the ceramic tile industry by virtue of the quality of its products as well as the volume of its production (more than 50% of total world output). The industry provides jobs for some 62 000 persons in the EC. After the crisis in the construction industry in the early 1980s, the outlook is now brighter. Nineteen eighty-six saw a recovery of this industry, coupled with major investment efforts. In addition, new export markets are opening up.

The ceramic tile industry makes a wide range of products for covering floors and walls for private, public and industrial structures/buildings. They are produced in various shapes, sizes and decorations and can be glazed or unglazed; depending on the composition of the raw materials; their body may be vitrified or not.

Production and consumption

In the aftermath of the major decline in construction activity that was experienced in particular by the housing sector in 1981-85, ceramic tile consumption went through a period of stagnation and reduction. A fundamental improvement began in 1986 and continued in 1987 when the construction industry increased by 2.5% and the total turnover and consumption of ceramic tiles for the first time exceeded the levels reached in 1980. However, overall consumption rose further in 1988 at a slower rate (11%) and still slower rates are forecast for 1989.

Total turnover for the tile industry grew by 12% in 1988, with deliveries on the domestic market increasing by only 7% due to a very strong progression of imports. In the unglazed tiles sub-sector,

which constitutes about 10% of total turnover, demand had shown a fundamental downward trend for many years, but the improvement in 1987 was appreciably stronger for this type of tile. The figures for 1988, however, indicate a new downward move for unglazed tiles, with total sales increasing by only 6% in volume and 11% in value, while glazed tile production progressed by 12% in volume and 14% in value. Appreciable differences between countries can be seen if one looks at consumption per capita. It is highest in Italy, with 2 square metres per capita and lowest in the United Kingdom with about 0.5 square metre per capita.

With an annual production of about 720 million square metres, the Community tile industry ranks the first among world producers, whose total production is estimated at 1 billion square metres.

The tile industry, which comprises about 635 enterprises employing about 62 000 workers, is dispersed throughout the Community, with two strong regional concentrations: the Italian region of Sassuolo (province of Modena and Reggio Emilia), where about 55% of EC production is located and the Spanish region of Onda (Castellon), which accounts for 20% of total EC production.

Thanks to large investment in research and development and to their intrinsic quality and design, Community products have achieved a world-wide reputation. Dimensional and qualitative standardization (CEN standards) and the development of rational methods for the fixing of tiles have greatly facilitated their distribution.

The introduction of new technologies in the past few years, notably single firing and the installation of

Table 1
Main indicators, 1980-88
Ceramic tiles (1)

(million m ²)	1980	1981	1982	1983	1984	1985	1986	1987	1988 (2)
Apparent consumption	493	455	445	462	448	448	472	534	610
Net exports	104	103	104	120	146	126	112	113	112
Production	597	558	549	582	594	574	584	647	722
Employment (1 000)	83	82	74	68	64	60	63	65	62

(1) Excluding Denmark and Ireland.

(2) Estimated.

Source: Cérame-Unie, Eurostat (Comext).

Table 2
Production and external trade (1)
Ceramic tiles

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production (million m ²)	597	558	549	582	594	574	584	647	722
Index	104.0	97.2	95.6	101.4	103.5	100.0	101.7	112.7	125.8
Exports extra-EC (million ECU)	638	721	712	843	1 039	954	855	904	1 025
Index	66.9	75.6	74.6	88.4	108.9	100.0	89.6	94.8	107.4
Imports extra-EC (million ECU)	64	78	64	75	71	62	62	61	85
Index	103.2	125.8	103.2	121.0	114.5	100.0	100.0	98.4	137.1
X/M	10.0	9.2	11.1	11.2	14.6	15.4	13.8	14.8	12.1

(1) Excluding Denmark and Ireland.

Source: Cérame-Unie, Eurostat (Comext).

automated lines, has led to a profound transformation in the process and organization of enterprises which have reached a very high degree of modernization and competitiveness. Rationalization and restructuring measures increased in particular the productivity of the industry. Recently some new factories have been put into operation, whereas older ones have been closed.

Imports from third countries, particularly from Brazil, Asia and Eastern Europe increased considerably in 1988 (30% in volume, 38% in value). They represented about 3% of the overall EC consumption in 1988. For certain segments of the markets, the rate was much higher.

The ratio of extra-EC exports to corresponding imports decreased in 1988, but still remained very high at 12.1.

Trade

Thanks to its marketing efforts and the quality of its products, the EC industry is exporting about 20% of its production outside the Community, of which a large proportion (23%) is sold on the American market, where tiles imported from the Community represent 68% of total imports. Asian markets account for 21% of extra-EC exports. In total, extra-EC exports increased strongly (13%) in 1988. The prospects for 1989 are that export activity will slow down together with world economic growth.

Situation in the non-EC countries

The tile industry has developed rapidly in a number of countries during the past years, particularly in South-East Asia. Exports from the Republic of Korea and Thailand have increased at a rapid rate since the beginning of 1980.

The same development occurred in Brazil, whose ceramic tiles industry claims to be second in importance among world producers, with an estimated

Table 3
National indicators, 1988
Ceramic tiles

	B-L	D	GR	E	F	I	NL	P	UK
Production (million m ²)	2	66	5	181	34	380	14	16	16
Exports extra-EC (million ECU)	3	104	2	177	30	679	7	15	9
Imports extra-EC (million ECU)	3	35	1	1	11	6	10	2	17
X/M	1.0	3.0	2.0	177.0	2.7	113.2	.7	7.5	.5
Employment (1 000)	.5	8.5	.7	N/A	4.0	29.5	1.5	4.9	N/A

Source: Cérame-Unie, Eurostat (Comext).

output of 220 million square metres and about 52 000 employees. Brazilian exports to the EC and to the traditional export markets of the EC industry have developed strongly in recent years, particularly in 1988 when Brazil doubled its sales to the EC and became its first external supplier.

Mainland China, a country with a long ceramic tradition, is devoting large resources to the modernization and development of its ceramic industry, and has set its sights on export markets in particular. Ceramic products for the construction industry are manufactured in about 360 factories manned by an estimated 100 000 persons. The figures for tiles and sanitaryware are similar.

Production capacity has also expanded rapidly in the Eastern European countries, particularly in Yugoslavia and the German Democratic Republic.

Outlook

Partial figures for 1989 indicate that global demand for tiles will continue to benefit from the fresh increase in 1988 in the volume of construction underwork and the number of building permits issued, particularly residential.

However, overall activity will increase at a slower rate due to the reduction in state-subsidized houses and non-residential public buildings, although private non-residential construction and renovation of older properties will continue to grow. Globally,

construction in the EC has not yet regained pre-1980 levels and activity is still far below those levels in several countries.

When the internal market becomes a fact, the conditions under which companies will henceforth have to operate will change; notably in the area of standards and technical regulations, industries involved with construction materials will be able to operate within a harmonized framework at the Community level in respect of the production and distribution of their products.

Developments in the long run will be influenced by structural changes in the Community like the quality and way of life, distribution systems and changes in internal demand and purchasing power, as well as of multinational trade agreements. The creativeness of the Community industry and the development of new technologies are major assets in the penetration of markets where demand is growing for improved clothing, security, comfort and product design. Owners and designers attach more importance to the idea of life cycle costs of the materials, in which, among other things, maintenance is taken into account. In addition, better equipped and larger dwellings are increasingly in demand.

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TABLEWARE AND ORNAMENTAL WARE

(NACE 248.6 and 248.7)

Summary

The ceramic tableware and ornamental ware industry enjoyed relative stability between 1980 and 1986, and a strong resurgence of activity in 1988. In 1988 the industry provided about 110 000 jobs, and the value of production reached approximately ECU 2.8 billion. On its markets, the European industry faces increasing competition from third countries; some of these, such as China, the Republic of South Korea and Japan, have increased their market share in the Community. The future of the industry depends on its ability to integrate new technology, and its capacity to gain ground in export markets.

The sector includes a wide range of consumer products, equipment and decorative ware for households, the hotel industry and public institutions. Depending on the raw materials mix, the final products are in porcelain, earthenware, stoneware or terracotta.

Current situation

Consumption

The domestic ceramic sector, which produces mainly consumer goods, and is therefore not dependent on stagnating major industrial user sectors, resisted the economic depression much better than most of the other subsectors in the ceramic industry. However, in recent years it suffered from an appreciable contraction, as the purchasing power of households stagnated or even decreased. Furthermore, it has been subject to very keen competition from foreign producers.

Apparent consumption figures for 1988 show a major increase which might result partly from erratic statistics in the ornamental sector. Evolution differs by country, according to the types of products and regional habits.

In the ornamental ware sector, a constant upward trend in volume of consumption has been observed since 1980, with an acceleration in 1988. In the same period, consumption of ceramic tableware was virtually static, except in 1988 when it grew in the Community. That exceptional growth has continued in the first months of 1989.

During recent years, the earthenware sector has suffered losses of important markets to the benefit of vitrified products (porcelain-stoneware) and reconversion took place.

Competition from substitute products like glass and plastic has remained limited to specific outlets. However, thanks to their intrinsic qualities, especially strength and hygiene as well as decorative and aesthetic appeal, ceramic products have generally been able to resist this competition.

Production

The industry is spread over the whole Community, with some regional concentrations. At present, it comprises some 665 enterprises, mostly small and medium-sized, employing 110 000 people. Alongside large-scale industrial production, there is a large number of small regional producers of ornamental ware and pottery. Due mainly to the high degree of dispersion of the producers in the southern areas of the Community, statistical information remains very

Table 1
Main indicators, 1980-88
Tableware and ornamental ware (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	2 086	2 164	1 999	2 059	1 993	1 947	2 029	2 188	2 527
Net exports	173	157	222	278	299	443	375	292	270
Production	2 259	2 321	2 221	2 337	2 292	2 390	2 404	2 480	2 797
Employment (1 000) (2)	183	179	175	134	127	127	115	113	110

(1) Excluding Ireland.

(2) 1988 estimated.

Source: Cérame-Unie, Eurostat (Comext).

Table 2
Tableware and ornamental ware
Production and external trade (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production in current prices	2 259	2 321	2 221	2 337	2 292	2 390	2 404	2 480	2 797
Index	94.5	97.1	92.9	97.8	95.9	100.0	100.6	103.8	117.0
Exports extra-EC	463	489	508	580	623	728	689	675	733
Index	63.6	67.2	69.8	79.7	85.6	100.0	94.6	92.7	100.7
Imports extra-EC	290	332	286	302	324	285	314	383	463
Index	101.8	116.5	100.4	106.0	113.7	100.0	110.2	134.4	162.5
X/M	1.6	1.5	1.8	1.9	1.9	2.6	2.2	1.8	1.6

(1) Excluding Ireland.

Source: Cérame-Unie, Eurostat (Comext).

fragmentary. As a result, the analyses are often based on estimates.

Thanks to considerable investment in research and technological innovation, the domestic ceramic industry has made considerable progress in mechanizing different stages of the manufacturing process and in improving the quality of its products. In particular, the introduction of rapid firing at high temperature and the improvement in colouring substances has led to products with even better resis-

tance to wear. These rationalizations resulted in a restructuring process of the industry, leading to more concentration of production.

Trade

A large part of the Community industry's revenue is achieved through exports. In spite of very strong competition as well as tariff and non-tariff barriers, it has been possible to improve exports of tableware



and ornamental ware considerably between 1980 and 1988: 58% in value and 24% in volume. Export intensity was 20% in 1980 and reached 25% in 1988. The increasing penetration of extra-EC exports between 1980 and 1988 in third countries' markets centres mainly on the high end of the product range where quality and design are determining factors.

North American markets, above all the USA, are the main outlets for the Community industry. Exports of tableware remained rather stagnant in volume during the last five years, with a tendency to increased values. In the ornamental subsector, export volumes increased substantially.

Third countries have, however, appreciably improved their position on the European market since 1986, following a period of stable imports in the first half of the decade. The rate of penetration of extra-Community imports in the tableware sector, computed with volumes, grew from 15% in 1980 to 21% in 1988, while, computed with values, it increased from 11% to 16% over the same period.

In the porcelain tableware subsector, the change was particularly significant in 1988 with a 27% increase of import volumes from third countries and a 15% increase in value, while intra-Community trade only increased by 13% in volume and 11% in value.

As far as volumes are concerned, China is by far the largest external supplier of the Community in porcelain tableware. However, Japan and East Germany, which concentrate on high-value products, have the largest share of extra-EC imports in value.

In the subsector of earthenware/stoneware, tableware imports progressed by 27% in volume and 36% in value. Imports from Japan increased by more than 70% in 1988, whilst the position of Korea and Taiwan was maintained.

In the ornamental sector, imports from China increased by nearly 40%, while imports from Taiwan, the main EC supplier, were decreasing in 1988.

Situation in the non-EC countries

Among the main producer countries, Japan takes first place with a production of 600 000 tonnes in 1985, of which porcelain tableware represented about 70%. Approximately 60% was exported, mainly to the USA. It is estimated that there are about 600 factories. Several large groups of companies have manufacturing units abroad.

The Chinese ceramic industry has been strongly developed and modernized with the help of public support. However, its production capacity is difficult

Table 3
Tableware and ornamental ware
Breakdown by product and country, 1988

(million ECU)	B-L	DK	D	E	F	I	NL	P	UK
Production									
Tableware	52	N/A	669	N/A	187	263	N/A	50	N/A
Ornamental ware	3	N/A	145	N/A	18	558	N/A	44	N/A
Total	55	N/A	814	N/A	205	821	23	94	529
Exports extra-EC									
Tableware	17.0	18.4	123.2	8.1	40.9	44.2	2.1	11.4	194.5
Ornamental ware	2.3	11.4	55.6	54.1	13.3	64.8	8.6	23.4	28.8
Total	19.3	29.8	178.8	62.2	54.2	109.0	10.7	34.8	223.3
Imports extra-EC									
Tableware	17.8	20.7	51.6	7.5	27.7	33.6	21.8	2.0	46.2
Ornamental ware	7.5	4.7	42.7	6.2	24.5	26.0	25.4	1.7	52.8
Total	25.3	25.4	94.3	13.7	52.2	59.6	47.2	3.7	99.0
X/M									
Tableware	1.0	.9	2.4	1.1	1.5	1.3	.1	5.7	4.2
Ornamental ware	.3	2.4	1.3	8.7	.5	2.5	.3	13.8	.5
Total	.8	1.2	1.9	4.5	1.0	1.8	.2	9.4	2.3
Employment									
Tableware	1 353	N/A	N/A	N/A	5 751	9 000	N/A	N/A	N/A
Ornamental ware	143	N/A	N/A	N/A	573	12 000	N/A	N/A	N/A
Total	1 496	N/A	26 641	N/A	6 324	21 000	910	7 637	11 366

Source: Cérame-Unie, Eurostat (Comext).

to estimate. In one of the five principal regions about 350 million pieces of porcelain, apart from other ceramic products, were produced in 1985. In the last years, not only production and exports of porcelain, but also of stoneware products, have considerably expanded.

Korea developed its ceramic industry at a very fast rate, backed mostly with Japanese know-how and investment. It succeeded in becoming the chief supplier of the EC in stoneware articles in the years 1981-83. Its aggressive sales policy, based notably on copying European design, created major difficulties in this segment of the market. Similar developments took place in Taiwan.

Outlook

On the whole, shipments are likely to decelerate in 1989, and grow even slower in 1990. This mainly depends on the projected trends in household purchasing power. The evolution of inflation rates and

government incomes policies will be major factors influencing the situation.

Imports from Asia and eastern Europe already reach about 22% of EC global consumption, and the market share of the Community's industry is expected to shrink further.

However, the present multinational trade negotiations should result in a wider opening of world markets. This is expected to improve further the competitive position of the EC industry on export markets.

In the long run, the EC industry's strength in technological advances and creativity should enable it to maintain and strengthen its market position. The fundamental demand will be influenced by demographic factors, especially changes in the number of households.

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TECHNICAL CERAMICS

(NACE 248.8)

Summary

The vast range of products embraced under the title of technical ceramics includes, besides a number of electroceramic products like insulators and insulating pieces, a wide range of materials and ceramic products for electronic, mechanical and various other applications. The latter group includes, together with the more traditional products for laboratories and chemical industries, the whole field of materials and new ceramic products, called collectively 'advanced ceramics' or 'new ceramics'.

After a period of growth in the 1970s, the European ceramic insulator industry has declined and undergone sweeping restructuring since the early 1980s. In the sector of advanced ceramics, covering a large and constantly growing number of highly technical applications, the operational basis of the EC industry is undergoing considerable restructuring and development.

Current situation

Ceramic insulators

The production capacity of the sector for high-tension ceramics has been considerably increased in order to meet the large increase in demand after the first oil crisis, when important extensions to electrical distribution networks were carried out or

planned throughout the world. Later, with the slowdown in industrial activity, these programmes suffered big cutbacks, especially in the nuclear energy field, and this led to a considerable reduction in the EC insulator industry's activity.

The situation has deteriorated still further due to the effects of widespread new capacity investments in countries with planned economies, particularly Yugoslavia, which have become exporters of electro-technical ceramics, whilst the main competitor for the EC industry, Japan, has consolidated its leading position on world markets. Japanese insulators' production capacity (about 140 000 tonnes) considerably exceeds the Community's capacity (in 1988, Community production was about 25 000 tonnes).

Increases in production capacity for electrotechnical ceramics have also taken place in a series of other developing countries like in India, China and Brazil.

Together with growing competition from substitute materials (toughened glass, synthetic materials) all these factors have contributed to place the Community industry in a difficult position and have led to an in-depth restructuring process. Thus, of 16 companies existing in 1977 there remained no more than 10 in 1988; during the same period the labour force, which had been about 6 000 people, was reduced by half.

Table 1
Production trends in the FR of Germany, France and the United Kingdom
Industrial/technical ceramics

(million ECU)	1980	1981	1982	1983	1984	1987
FR of Germany						
Insulators	36	38	44	45	42	N/A
Insulating pieces	69	61	66	70	89	N/A
Total	105	99	110	115	131	145
France						
Insulators	25	22	24	N/A	N/A	N/A
Insulating pieces	13	12	13	N/A	N/A	N/A
Total	38	34	37	N/A	N/A	N/A
United Kingdom						
Insulators	27	27	27	26	26	N/A
Insulating pieces	18	21	18	24	24	N/A
Total	45	48	45	50	50	N/A

Source: C rame-Unie.

Production, which reached about 48 000 tonnes (ECU 98 million) in 1977, dropped to 39 000 tonnes (ECU 107 million) in 1980, to 35 000 tonnes in 1981 and should not exceed 25 000 tonnes in 1988.

Advanced ceramics

Advanced ceramics are made from pure microscopic powders consolidated at high temperatures. They are based on materials like nitrides, oxides, silicon carbides, aluminium zirconium, etc., and have performance characteristics enabling them to be used in very tough conditions of corrosion and temperatures.

The market for advanced ceramics covers a large number of applications which are constantly growing. Roughly speaking it is possible to differentiate between advanced ceramics used in electronic applications which form the largest part of the market and those used in mechanical/engineering construction. Other fields of application are optical, chemical, biological and nuclear.

Statistical data relating to the structure, activity and markets of the main subsectors in this rapidly changing industry are not available. In 1989 the world market was estimated at USD 5 billion.

The tendency to horizontal and vertical concentration continues at Community level, particularly by the inclusion in large industrial groups of both producers and users of ceramic materials and products. This is especially true in the chemical sector which produces powders for advanced ceramics.

In most Member States as well as in third countries, a growing number of new enterprises are emerging in the field of new ceramics; at the same time existing companies are enlarging their production programmes. This process is requiring very high investment.

Foreign trade

Thanks to the very high quality of the EC's insulators, a large proportion of production was traditionally exported outside the Community. However, with reference to 1983, exports in 1987/88 were stagnant. The main outlets for the EC industry were in Asia which absorbed one-third of total exports whilst EFTA (European Free Trade Association) countries accounted for about 20% of the total. In many developing third countries there is considerable potential demand for EC products with a high technical content which, however, suffer from a number of tariff and non-tariff obstacles.

Overall, Community imports increased by 5% in volume and 60% in value between 1980 and 1988.

As far as advanced ceramics are concerned, the EC industry is faced with very keen competition from the American and Japanese industries which, at present, dominate this market of which they probably hold a share of some 80%. Unfortunately there are no proper statistical figures available to analyse the main trade flows.

Table 2
Trends in external trade

(million ECU)	1983	1984	1985	1986	1987	1988 (1)
Exports extra-EC						
Insulators	36	34	45	48	34	31
Insulating pieces	13	14	18	17	17	18
Products for technical and chemical uses	46	56	63	63	73	95
Total	95	104	126	128	124	144
Imports extra-EC						
Insulators	18	13	21	17	17	17
Insulating pieces	18	19	22	18	15	13
Products for technical and chemical uses	17	14	35	31	35	33
Total	53	46	78	68	67	63
X/M						
Insulators	2.00	2.62	2.14	2.82	2.00	1.82
Insulating pieces	.72	.74	.82	.94	1.13	1.38
Products for technical and chemical uses	2.71	4.00	1.80	2.03	2.09	2.88
Total	1.79	2.26	1.62	1.88	1.85	2.29

(1) Excluding Greece.

Source: C rame-Unie, Eurostat (Comext).

In the sector of ceramics for electronic components, the Japanese largely predominate, as they do for the supply of powders for advanced ceramics, whilst the USA holds a very strong position in ceramics for mechanics/engineering construction. The US market in this field reached an estimated level of USD 117 million in 1987 and is expected to increase to USD 5 billion by the year 2000.

The strong position held by Japan is due less to its superiority in fundamental research than to the close cooperation which exists between industries, universities and government agencies.

The American industry has been able to develop techniques in special ceramics through benefiting from great support of the military and space programmes. It is thought that the federal government spends at least USD 50 million a year for research and development in this sector.

In some newly industrialized countries, large investments are also devoted to the development of new ceramics. In the Republic of Korea, the market is expected to increase from USD 200 million in 1980 to several billion in 1990.

Thanks to the research and development efforts of European industry, it has been possible to improve its position *vis-à-vis* the USA and Japan. Also, the development of advanced ceramic techniques resulted in a renewal of technology in the traditional ceramic industry.

Table 3
Import/export market shares
Industrial/technical ceramics (1)

(%)	1983	1984	1985	1986
Exports				
Non-EC Europe	36	38	34	33
North America	10	14	13	11
Latin America	6	3	4	3
Asia	27	14	27	16
Africa	10	8	7	3
Other	11	23	15	34
Total extra-EC	100	100	100	100
Imports				
Non-EC Europe	22	23	20	19
Eastern bloc	10	6	5	5
North America	43	41	50	44
Japan	24	27	22	22
Other	1	3	3	10
Total extra-EC	100	100	100	100

(1) Insulators, insulating pieces and products for technical and chemical uses.

Source: Cérame-Unie.

In spite of considerable technological progress in the production of advanced ceramics, the latter still requires a large amount of labour — a situation which bears heavily on costs and profitability needed for larger investments.

Outlook

As concerns the electro-ceramic sector, the uncertainty concerning development and modernization of electricity distribution systems make it difficult to evaluate future needs for high-tension insulators. This industry is confronted by a stagnant situation due to the almost stationary consumption of electrical energy. However, the opening up of public markets in Europe will have a positive effect. On the other hand, user industries are forced to devote a larger part of their investment to environmental protection, notably in the field of nuclear energy production. Technical evolution also lowers the specific consumption of insulators. Development of underground cables and, in the long term, of cryogenics, as well as technical evolution, will have a bearing on future demand. Thanks to its potential in research and development, the EC insulator industry is in a good position to answer the new requirements these changes will bring.

Changes in the user sectors create a constant challenge to the new industry of advanced ceramics, many of them being still in developmental stages. The world market growth is expected to accelerate, to a size of USD 50 billion by the year 2000. Some subsectors, such as electronic products, may perhaps expect lower rates of growth than in the past whilst a higher rate may be expected for micro-electronic products such as substrates and cases for integrated circuits; strong growth is expected for other applications such as piezo-electric ceramics, supports for anti-pollution catalysts and optical fibres, end-use applications such as cutting tools and bioceramics.

At present, the position of the European industry in the world market is still modest compared to the USA and Japan. However, thanks to its considerable potential in research and development as well as the rapid expansion of the market, it should move towards substantial growth in the last decade of the century.

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REFRACTORY PRODUCTS

(NACE 248.1)

Summary

Consumption is declining sharply in Europe as well as in the United States and Japan. This trend is likely to continue until the mid-1990s and to give rise to structural reorganization of this industry in Europe.

Description of the sector

Refractory products are materials resistant to high temperatures and to hot or cold chemical or physical action. They come in the form of shaped materials (bricks and various pieces) or unshaped materials (concrete and various masses). Demand for refractory products has been declining steadily since the 1960s. From 1980 to 1986, total sales of shaped refractory products from the EC decreased by 26% in tonnage.

The main client sector for these products is the iron and steel industry, which takes up two-thirds of production. Sectors using 2 to 10% of production include the following industries: ceramics, lime and cement, glass, chemicals/petrochemicals, non-ferrous metals, energy and heating.

In 1983, 290 firms in the Community employed 29 300 people.

Foreign trade

During the period 1980 to 1986, as world consumption of refractory products decreased, both exports and imports fell in real terms. However, the export/import ratio improved from 2.3 to 2.9, which attests the competitiveness of the European refractory products industry.

Currency fluctuations create serious difficulties for exports, since delays in production and delivery are often important in this sector, which primarily works to order.

Technology

Rapid technological progress by user industries has led to parallel development in the production capacity and processes of the refractory products industry. The performances of modern furnaces and other plants were considerably enhanced. Originally based solely on the use of fireclay available in the EC countries, this development has led to the introduction of other raw materials such as quartzite, magnesia, chromite, silicon carbide, extra-aluminous materials, zircon, etc., many of which come from outside Europe.

The development of products of increasing technicality has necessitated ever-greater investment in research and installations. These changes have hastened the disappearance of small firms and have accelerated concentration in the industry.

Situation in third countries

Among third countries, the USA has a highly developed refractory products industry, characterized by large plants which tend to be specialized. The refractory products industry is well developed in Japan. They often compete with European producers on export markets, in the high-performance products range. The Comecon economies compete essentially in the very low price ranges. China is making strong efforts to modernize and to develop a refractory products industry within the framework

Table 1
Main indicators, 1980-86 (1)
Shaped refractory products

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986
Apparent consumption	2 995	2 710	2 330	2 250	2 315	2 390	2 135
Net exports	395	360	360	350	395	405	375
Production	3 390	3 070	2 690	2 600	2 710	2 795	2 510

(1) EC 9.

Source: PRE — Fédération Européenne des Fabricants de Produits Réfractaires and national export statistics.

Table 2
Production and external trade
Shaped refractory products

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Production (1)	3 390	3 070	2 690	2 600	2 710	2 795	2 510	N/A
Index	121	110	96	93	97	100	90	N/A
US production	2 217	2 180	1 320	1 350	1 375	1 214	1 016	1 068
Index	183	180	109	111	113	100	84	88
Japanese production	1 710	1 565	1 368	1 217	1 199	1 160	1 044	918
Index	147	135	118	105	103	100	90	79
Exports extra-EC (1)	700	640	550	510	570	620	575	N/A
Index	113	103	89	82	92	100	93	N/A
Imports extra-EC (1)	305	280	190	160	175	215	200	N/A
Index	142	130	88	74	81	100	93	N/A
X/M	2.3	2.3	2.9	3.2	3.3	2.9	2.9	N/A

(1) EC 9.

Source: PRE, US Department of Commerce, Japan Refractories Association and national export statistics.

of an ongoing industrial development programme in which that industry constitutes an important element of industrial infrastructure.

In regard to demand, of which two-thirds are accounted for by the steel industry, it appears that the United States and Japan are confronted, as is Europe, with a stagnant or even declining market. Only in 1988 did the situation improve, as steel production was back to its 1980 level in Europe and 6% higher in Japan. In the USA, 1988 steel production is still 10% below its 1980 level.

Outlook

In the medium term, a further decline in the use of refractory products by the steel industry must be anticipated due to the growth of continuous casting, which uses a smaller quantity of refractory bricks. Moreover, smelting and casting furnaces are being made with high-quality, long-lasting refractory products whose performance under wear and tear can be monitored by advanced methods.

At the beginning of the 1990s, the EC steel industry will use less than 8 kg of refractory products per tonne of crude steel produced. Thanks to the recent revival of the steel industry, the production of refrac-

tory ceramics has increased in 1988 and will do so in 1989. However, this should not improve the situation in the medium run, as the use of refractory products is declining. A downturn of steel production in the EC would even worsen the situation.

However, the value-added content of these products will increase sharply and although the overall quantities used by the steel industry may decline, the fall in the real value of production will be much slower.

Demand does not appear to be growing in other sectors. On the contrary, a growth in specific demand comparable to that seen in the steel industry must be anticipated for most of the industries using refractory products. If there is no fundamental alteration in the thermal manufacturing process found in the steel, glass, non-ferrous metal and cement industries, which are the main users of refractory products, it must be anticipated that the structural reorganization which has been taking place throughout the refractory products industry for so many years will continue until the mid-1990s.

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SANITARYWARE

(NACE 248.5)

Summary

The ceramic sanitaryware sector has been hard hit by the depressed situation in the construction industry since the end of the 1970s. However, the recovery of the construction market since 1986 and the increasing demand for more spacious housing has provided better demand conditions. This trend should continue in the coming years.

The production of this branch of the ceramic industry includes the whole range of porcelain and fireclay sanitary equipment for bathrooms, lavatories and kitchens.

Current situation

The demand for ceramic sanitaryware depends on the construction sector. Sustained activity in the renovation of buildings has partially made up for the considerable shrinking in demand originating from new constructions.

Overall consumption of ceramic sanitaryware in the EC was about 500 000 tonnes in 1985 of which about 5% was imported.

Production

Manufacture of sanitary equipment, which are relatively heavy products, has seen far-reaching changes during recent years, through mechanization. As a result, productivity has improved significantly.

Production, which was about 515 000 tonnes in 1983 (EC 9) with a value of about ECU 900 million, was achieved in about 100 factories employing about 35 000 people. Greece, Spain and Portugal together account for an additional production of about 100 000 tonnes.

Efforts at rationalization have also centered around the definition of European dimensional standards in collaboration with users as well as with installers and producers of taps.

Foreign trade

The industry's foreign trade has slipped since 1980, with the export/import ratio falling from 4.6 to 2.9 in 1988.

Outlook

Whilst awaiting the improvement in the house-building situation to become steady, the considerable requirements for the renovation of buildings will influence consumption favourably. It should also be stimulated by various factors such as the tendency to build more spacious houses requiring more sanitary equipment to be installed.

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Table 1
Sanitaryware
External trade (1)

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Exports extra-EC:									
Value (million ECU)	116.6	148.2	136.8	168.8	205.9	177.4	145.5	145.6	150.3
Quantity (tonnes)	71.7	76.3	66.0	75.7	89.9	75.1	66.3	63.4	61.7
Imports extra-EC:									
Value (million ECU)	23.3	22.9	22.5	25.5	31.5	38.2	43.5	47.7	51.6
Quantity (tonnes)	11.9	11.9	10.6	12.0	13.9	17.5	20.0	24.0	28.1
X/M	5.0	6.5	6.1	6.6	6.5	4.6	3.3	3.1	2.9
Imports intra-EC:									
Value (million ECU)	106.4	109.7	111.1	123.1	143.3	145.5	160.1	177.5	192.5
Quantity (tonnes)	70.5	70.4	64.5	71.4	79.7	80.3	80.8	87.9	90.4

(1) 1980 EC 9; 1981-83 EC 10.

Source: Eurostat (Comext).

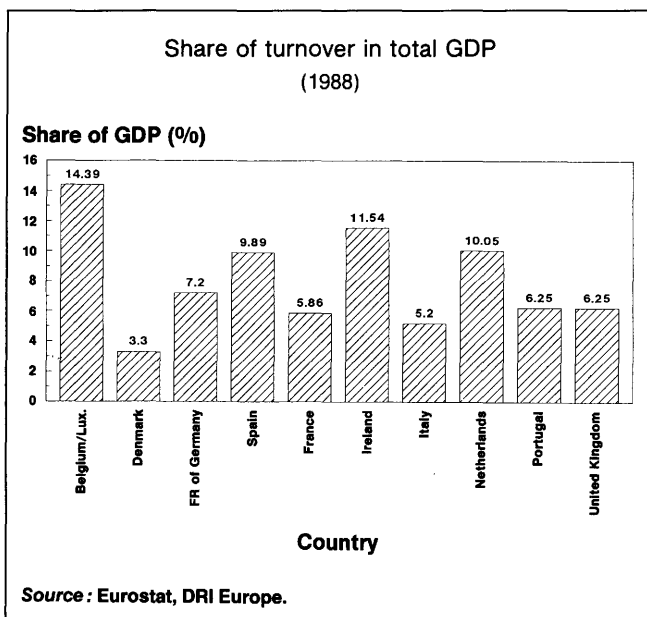
CHEMICAL INDUSTRY

(NACE 25 and 26)

The economic importance of the industry in the EC economy

The chemical sector is the third largest manufacturing industry in the EC, representing around 10% of total value-added in 1988. Turnover reached ECU 264 billion in 1988. This is an increase of 11% compared to 1987 (7.7% in constant price). International comparisons show that EC turnover is higher than that of the USA (ECU 203 billion) or Japan, where it only amounted to ECU 137 billion. If turnover has been growing in the EC and Japan since 1985, it has fallen in the USA. The share of turnover in GDP in the individual Member States is presented in Figure 1. This figure shows that proportionally, Spain, Belgium and Luxembourg, the Netherlands and Ireland have a larger chemical industry than the other EC countries.

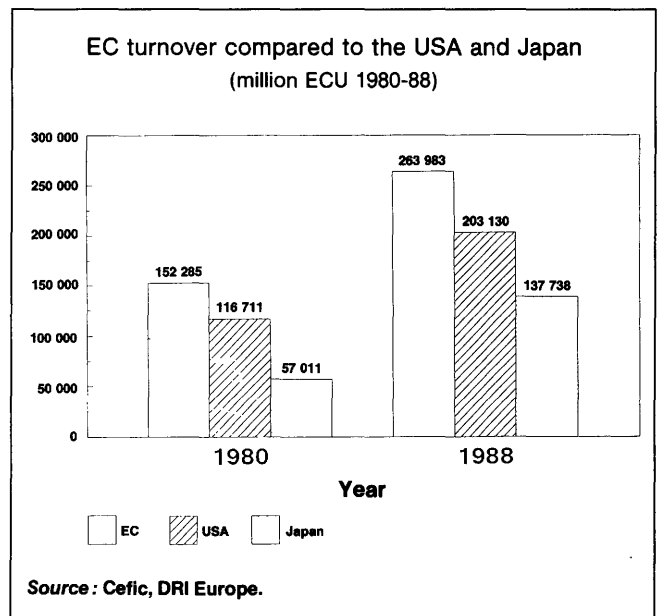
Figure 1



Despite being hit over the past 15 years by two major oil price shocks and two subsequent recessions, the EC chemical industry has maintained a rapid pace of growth in comparison with other industries: since 1970, the output of the EC chemical industry has

increased by 3.5% annually, whereas manufacturing output registered an average growth of only 2% per year.

Figure 2



In general, 1988 was an excellent year for the chemical industry. Strong demand, rising prices, low feedstock costs and continued improvements in operating efficiency led to the maintaining of high company profits.

Both internal demand and exports contributed to this strong performance. Home demand expanded rapidly, not only because of rising consumer demand, but particularly as a result of strong demand from the construction sector, and from the investment goods industry. Production and output therefore went up considerably in the basic chemicals and plastics segments of the market, and to a lesser extent for most other chemical products. During 1988, as was already the case in 1987 in many sectors, plants were running at high capacity rates, particularly in the petrochemical and plastics industries.

Table 1
Main indicators, 1980-89 (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	137 110	151 924	162 089	173 561	197 483	212 333	205 768	214 542	239 772	N/A
Net exports	15 175	18 272	18 556	22 001	26 367	28 140	23 563	22 315	24 211	N/A
Turnover (2)	152 285	170 196	180 645	195 562	223 850	240 473	229 331	236 857	263 983	274 542
Employment (1 000)	2 097	2 040	1 961	1 912	1 905	1 905	1 910	1 910	1 922	1 941

(1) Excluding Greece; fibres excluded for Belgium, Spain, France, Ireland, Luxembourg and United Kingdom; rubber and plastic manufacturing included for Belgium and Spain.

(2) 1989: Eurostat forecast.

Source: Cefic.

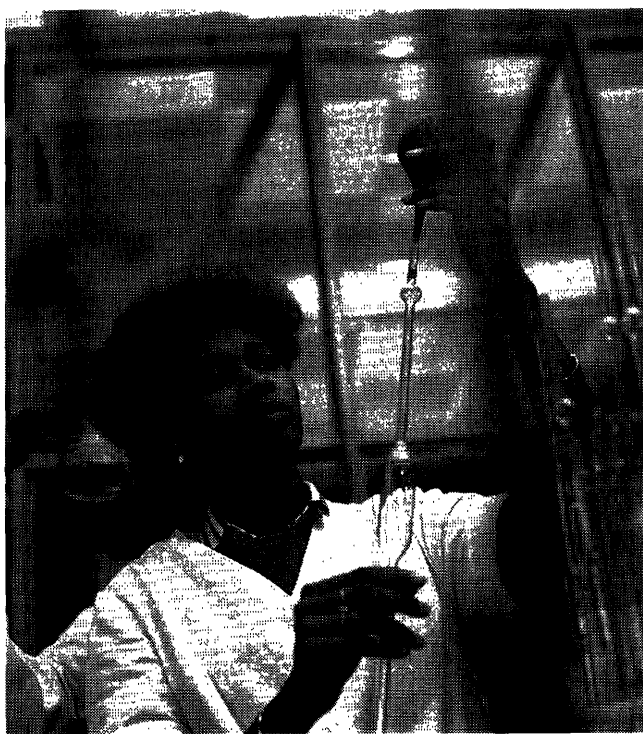


Photo: Solvay

Employment

The EC chemical industry provides direct employment to 1.9 million people, representing about 7% of the workforce. Many employees in the industry are highly qualified and well trained.

Along with the rest of the manufacturing industry, the chemicals sector has experienced a contraction in its workforce since 1974. However, from 1984 onwards, with the start of the recovery of production, employment has started stabilizing.

As a result, the increase of labour productivity since 1984 has only been of an average annual rate of 3.5%, whereas in the past this rate was normally higher than 5%. A period has probably now started with more mature growth and lower productivity

gains, due to the greater share of more labour-intensive chemicals, produced in smaller volumes.

The higher share of persons employed in the Federal Republic of Germany (575 000 persons or 30% of the total and this country accounts for 28% of total turnover) and in the United Kingdom (346 000 persons or 18%) has to do with the number of multinational headquarters located in those countries.

Table 2
EC production of basic petrochemicals

(1 000 tonnes)	1982	1987	1988	P/C (%) (1)
Olefins				
Ethylene	9 277	12 363	13 328	97
Propylene	5 511	7 097	7 755	93
Butadiene (2)	1 500	1 745	1 885	90
Total	16 288	21 205	22 968	95
Aromatics				
Benzene (2)	3 661	5 245	5 585	84
Toluene (2)	827	1 862	1 714	N/A
Xylenes (o+p) (2)	1 206	1 479	1 744	89
Total	5 694	8 586	9 043	N/A

(1) P/C (%): Production as a percentage of effective capacity.

(2) Western Europe production.

Source: Cefic, APPE.

Trade

Total EC exports amounted to ECU 51.1 billion in 1988, whereas total EC imports were ECU 26.9 billion. This resulted in a positive balance of trade of ECU 24.2 billion, which for the most part went to countries outside Western Europe. Net exports have been positive during the 1980s but are slightly falling since 1985 (Cefic data).

In 1988, export prices rose again contrary to the development in 1987. Nevertheless, the export performance was so good that a volume increase of 6.5% was reached. The export/import ratio, however, continued to fall to 1.9 as the growth in imports was higher than in exports. Trade between Member States is very important and still increasing. It

Table 3
Turnover and external trade (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Turnover in current prices									
EC	152 285	170 196	180 645	195 562	223 850	240 473	229 331	236 857	263 983
Index	63	71	75	81	93	100	95	98	110
USA (2)	116 711	161 673	176 378	212 532	267 808	258 555	201 541	184 254	203 130
Index	45	63	68	82	104	100	78	71	79
Japan (2)	57 011	73 649	75 816	90 583	107 762	113 437	116 287	116 571	137 738
Index	50	65	67	80	95	100	103	103	121
Turnover in constant prices									
EC	206 906	208 785	207 869	218 140	234 455	240 473	240 282	250 418	269 706
Index	86	87	86	91	97	100	100	104	112
EC trade in current prices (3)									
Exports extra-EC	27 329	32 923	34 273	39 581	47 705	51 656	45 879	45 922	51 055
Index	100	120	85	145	175	100	89	89	99
Imports extra-EC	12 665	14 029	15 844	18 167	22 099	25 331	23 665	23 607	26 844
Index	100	111	125	143	174	100	93	93	106
X/M	2.16	2.35	2.16	2.18	2.16	2.04	1.94	1.95	1.90
Imports intra-EC	43 127	38 828	37 166	43 101	50 899	60 789	60 543	64 200	73 417
Index	100	90	86	100	118	100	100	106	121
Import penetration	.09	.09	.10	.10	.11	.12	.11	.11	.11

(1) Excluding Greece; fibres excluded for France, United Kingdom, Belgium, Luxembourg, Ireland and Spain; rubber and plastic manufacturing included for Belgium and Spain.

(2) CMA for USA, JCIA for Japan.

(3) 1980-84 EC 9; 1985-88 EC excluding Greece.

Source: Cefic.

reached ECU 73 billion in 1988. Belgium, the Netherlands, Portugal and Ireland are the most active countries as far as trade between Member States is concerned.

According to Eurostat trade statistics (restricted to the chemical industry of SITC 5, i.e. man-made fibres excluded), EC imports are dominated by Western European countries outside the EC and by the USA (39% and 29% respectively of chemical imports).

The export pattern is different: Western Europe's (outside the EC) share of EC chemical exports is 28%, compared with a share of 33% exported to the developing countries; the USA and Japan have shares of 15 and 7% respectively, whereas centrally planned economies absorb 10% of EC exports.

Compared with this EC average, the patterns of export of the Federal Republic of Germany and of Denmark are the most Western Europe oriented. The UK and Ireland export comparatively more to

Table 4
Prices and volumes of EC chemical exports
(change over previous year)

(%)	Exports 1987			Exports 1988		
	Unit value	Volume	Current value	Unit value (1)	Volume (1)	Current value
Intra-EC	-0.8	7.2	6.3	3.8	8.5	12.6
Extra-EC	-0.6	.6	-0.1	4.5	6.5	11.3

(1) Estimated.

Source: Eurostat (Trend).

North America, whereas the share of chemical exports to developing countries is higher in France, Spain and Portugal than in the other EC countries.

Description of the sector

The chemical industry is a very heterogeneous branch of industry, whose principal activities are to transform materials chemically into different substances, giving them new chemical and physical properties. For these activities, the chemical industry basically uses products of the oil, mining and extractive industries, such as oil, minerals and metals but also agricultural products.

The output of the chemical industry covers a wide range of chemicals and chemical products; chemicals are used again in a series of processing steps in the chemical industry and in numerous processing industries. Further treatment is required to convert basic chemicals into downstream chemical products. These include a variety of products, used as auxiliary materials for producing such products as adhesives, solvents or fertilizers, but also many end-products, which serve consumer markets: cosmetics, medicines, washing powders.

The major activity sectors cover the following group of products:

- basic industrial chemicals
- fertilizers and nitrogen compounds
- plastics in primary forms and synthetic rubber

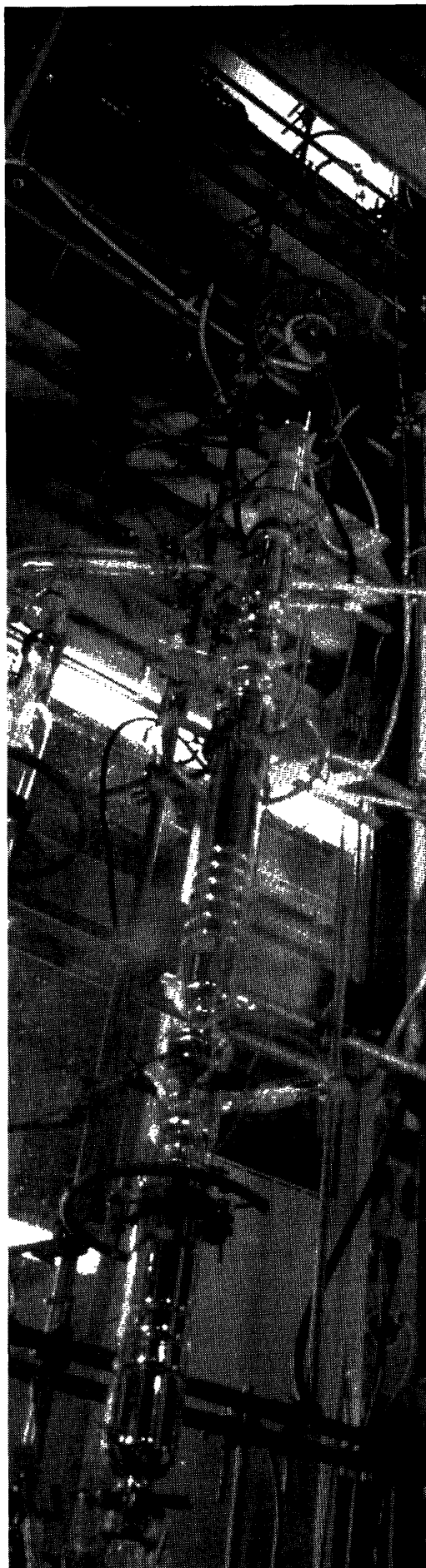


Photo: AK20

- pesticides and other agro-chemical products
- paints, varnishes and similar coatings, inks and fillers
- pharmaceuticals, medical chemicals and botanical products
- soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations
- chemical products
- man-made fibres (NACE 26).

The listed sectors reflect the generally accepted international definition of the chemical industry (NACE 25 and 26). Nevertheless, for historical or technical reasons statistical data sometimes deviate from the definition. Due to these technical problems, but also for reasons of membership regulations, the National Federations of the Chemical Industry have to provide statistical data, which are not always based on identical definitions. The most common deviation has to do with the man-made fibres industry, which is not included in France, the United Kingdom, Belgium, Luxembourg, Ireland and Spain, whereas in Belgium and Spain the plastic and rubber-processing industries are included, in contrast to the other EC countries. It is brought to the attention of the readers that this is also the case when Cefic data are used. These Cefic data furthermore do not include data on Greece.

As regards product segmentation, the chemical industries of the Federal Republic

of Germany, France and the Netherlands have a larger stake in basic chemicals and plastics, whereas the UK and Italy have a larger share in pharmaceuticals and some other consumer chemicals.

Figure 3

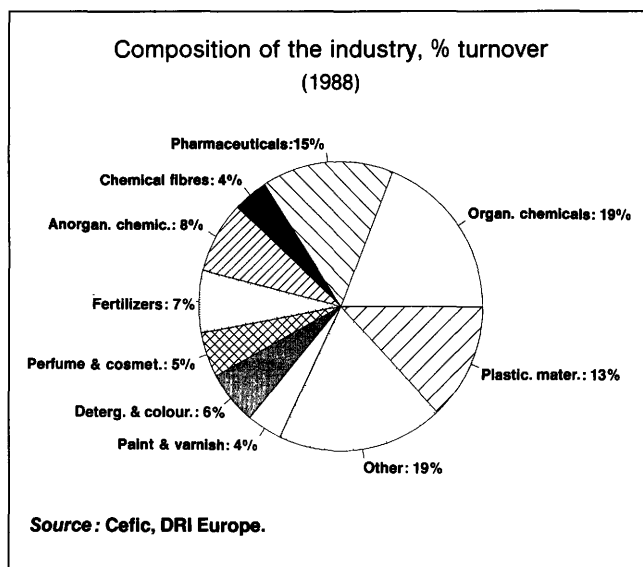


The structure of basic petrochemicals is given in Table 2. The evolution of production has been quite different from product to product between 1987 and 1988. Olefins' production grew by 8% (for propylene, growth was a little higher). Aromatics total production increased by 5%. This is mainly due to good results in xylenes (+17.9%). Production of toluene even decreased by 7.9%. It must also be noted that capacity utilization rates are very high, especially for olefins (95%).

Industry structure

At least 9 000 chemical companies operate in the EC. Seven of them are among the 10 largest chemical companies in the world. These are BASF, Bayer, Hoechst (all three of them German), ICI (UK), Shell Chemicals (UK/Netherlands), Montedison (Italy) and Rhône-Poulenc (France).

Figure 4



Of the top 30 chemical companies of the world, 17 are European (of which 13 EC-based), 10 American and three Japanese (*Chemical Insight* No 422, September 1989).

The sector is thus dominated by European firms. The turnover of the EC chemical industry represents 28% of the world turnover of the sector. Recently,

Table 5
The European chemical industry
Breakdown by country

	Turnover		GDP		Employment	
	(billion ECU)	(%)	(billion ECU)	(%)	(1 000)	(%)
EC (1)	264	100	3 815	100	1 922	100
Belgium, Luxembourg	19	7	132	3	92	5
Denmark	3	1	91	2	26	1
FR of Germany	73	28	1 014	27	575	30
Spain	26	10	263	7	239	12
France	45	17	768	20	266	14
Ireland	3	1	26	1	12	1
Italy	36	14	692	18	223	12
Netherlands	19	7	189	5	92	5
Portugal	2	1	32	1	51	2
United Kingdom	38	14	608	16	346	18

(1) Excluding Greece.

Source: Eurostat (sec1), Cefic.



During the 1980s, European groups have strengthened their positions in North America through acquisitions of local plants and development of their exports. Asian countries with high growth rates became a new target for American and European companies which have signed an important number of joint ventures with local plants over the last three years.

Part of the expansion of the chemical industry has been due to innovation and the substitution of traditional materials such as steel, wood, paper and glass by chemically derived new materials. This trend allowed the European chemical industry to increase its share in industrial markets and to expand at a higher rate than the average manufacturing industry (premium growth, i.e. the positive difference in growth between chemical industry production and manufacturing industry production). This observation still holds true, but the influence has changed. While in the early 1960s innovation and substitution could be held responsible for half of the huge expansion of 10%, nowadays the premium growth explains only one percentage point of the 4% growth rate of chemical output. This shrinking difference is the consequence of the chemical industry gradually becoming a mature industry.

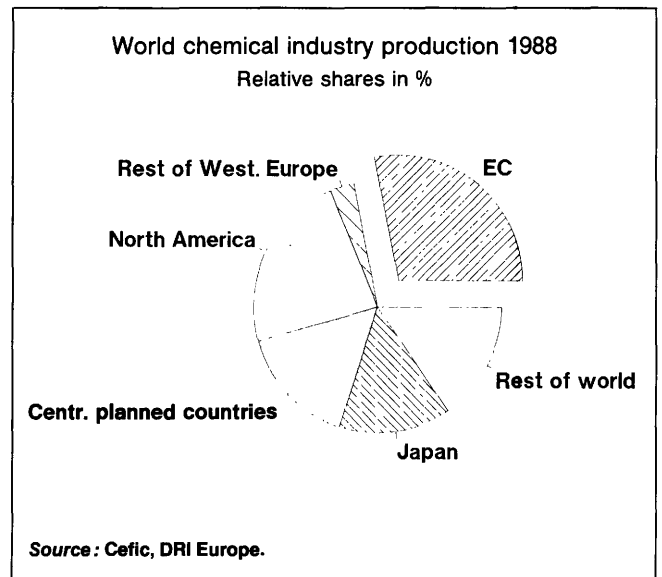
Figure 5

American firms are enjoying high growth rates, thanks to home market expansion but also to growing exports linked to the fall of the dollar.

During the 1960s and up to the middle of the 1970s, the main strategy of chemical groups was characterized by a wish to increase capacity. The economic crisis of the 1970s led to an important slowdown of prospects which stressed the necessity to restructure the industry. Specialization to increase the size of the facilities as well as concentration of plants were obtained through relocation and redistribution of activities.

The world economy's growth rates having recovered favourable levels since 1983-84, consumption of chemical products has been increasing and is expected to continue growing at least until the beginning of the 1990s.

New producers appeared on a world scale, especially from South-East Asia, but also from Brazil and the Middle East. The largest part of production is, however, still and by far in the hands of European and American groups.



As far as the European petrochemical industry is concerned, improved profitability and high demand led to statements that new capacities were being studied. However, the industry, bearing in mind the restructuring experiences of the early 1980s, will be cautious about investing in new installations; prior to building new installations, the industry will probably enlarge its capacity and replace old plants.

Risks and opportunities

The investment policy of many chemical industries has as its focus the strengthening of the core business and phasing-out of non-core business. This partly explains the numerous activities in mergers and acquisitions of at least the larger companies. These acquisitions are at the same time coping with the need for larger markets as a base for research and development. In this way, R&D will be carried by larger sales and hence a greater number of researchers can be employed and more ambitious research programmes can be undertaken.

R&D spending has increased even in years of adverse financial results. During 1987 the chemical industry spent on average an estimated 4.5% of total turnover, equal to ECU 10.5 billion on research and development (Cefic data). In sectors such as pharmaceuticals and agrochemicals, this can be as much as 10 to 12% of turnover.

Calculations made with data from *Chemical Insight* (No 422, September 1989) show that 12 EC-based chemical companies belonging to the world's 30 largest chemical companies spent in 1987 on average 4.5% of their turnover on R&D, whereas capital investment represented 7.8%.

R&D has entered several new areas. For the chemical industry the most innovative area is undoubtedly biotechnology: the application of scientific and engineering principles to the processing of materials by biological agents.

In contrast with classic biotechnology, which was primarily based on fermentation, modern biotechnology is a collection of many technologies, of which the most important are:

- recombinant DNA technology, to separate genes responsible for specific characteristics of an organism;
- cell fusion, to join characteristics of different types of cells into one cell (e.g. monoclonal antibodies for the treatment of diseases);
- enzyme technology, to bring out the desired reactions;
- process technology, to scale up and control biological production processes.

(See R. Van Tulder and G. Junne: *European multinationals in core technologies*. J. Wiley & Sons, 1988, p. 12 *et seq.*)

The exploitation of these new technologies will make possible many new products and new processes in

the pharmaceutical, pesticides, agrochemical, and fine chemicals industry, which will make a major contribution to enhancing the safety of people and their environment (e.g. low waste, low energy content, clean technologies).

A second category of innovation is the area of new materials: advanced composites, polymers, plastics and ceramics. These materials have formed important innovations in microelectronics (silicon, gallium arsenide, optical fibres) and in biotechnology (membranes).

Further new areas for research are new information and communication systems, new energy systems and, last but not least, low-waste technologies and clean technologies.

Many larger chemical companies and medium-sized companies have participated in projects under the umbrella of the framework programme for Community activities in the field of research and technological development. This programme not only provides financial support of up to 50% of research costs, but it brings together research from various institutes and regions and opens new market opportunities.

For the chemical industry the most important programmes are:

1. BAP (Biotechnology action programme, revised 1988-89) and Bridge (Biotechnology research for innovation, development and growth in Europe);
2. Brite (Basic research in industrial technologies for Europe) and Euram (Research programme on raw materials and advanced materials).

Investment

Capital investment spending amounted to ECU 13.3 billion in 1987 (+10.3%) and ECU 15.4 billion in 1988 (+16.2%). Although these figures are in nominal terms, they reflect a very strong increase in the volume of investments of about 13% in 1988 (Cefic data).

Most capital expenditure is now geared towards productivity improvements, introduction of new products and processes, computerization of plant operations and safety and environmental protection. As an example may be mentioned the European chemical industry's investment in the developing of the electronic data interchange project (EDI), aiming at a Europe-wide system of electronic transmission of commercial documents between chemical companies and their trading partners.

Expansion of existing plants and the construction of new ones had until recently a lower priority. The petrochemical industry foresees no major changes in basic technologies, although it continues to develop its technology through innovation of processes and products. Because, as a result of the restructuring of the early 1980s and strong market demand, returns on investment are back to acceptable levels, some installation of additional capacity could be observed as justified, given the need to maintain international competitive positions.

The investment quota (capital investments as a percentage of turnover) declined during the two recession periods in the 1970s and the beginning of the 1980s. This was due to the absence of large investment projects, as well as to the disproportionate growth of turnover because of huge price rises. Since 1984, this quota has been rising again, from 4.4% in 1985 to 5.8% in 1988. This demonstrates the good shape and bright future of the industry.

Capital investments of the chemical industry in the EC

	Billion ECU	Percentage of total turnover
1985	10 553	4.4
1986	12 024	5.2
1987	13 266	5.6
1988	15 410	5.8

Source: Cefic.

Environmental protection

The activities of the chemical industry concerning health, safety and environmental protection can be divided into four main areas of responsibility: risk analysis, risk management, risk communication and risk reduction. This will be demonstrated by the following review of the activities of authorities and industry on the international scene during 1987 and 1988.

Risk analysis comprises the development of methods:

- to evaluate the hazards of products and processes,
- to consider the risks they may pose to the environment, and
- to reduce these risks to as low as possible a level.

For chemicals this means testing physical, toxicological and ecotoxicological properties. Because of the need for uniform testing procedures and avoidance of competitive distortions, this is an area for international regulation.

An example is the EC directive providing for notification of new substances and an inventory of existing chemicals. Classification and labelling of mixtures (preparations) is governed by another directive, published in 1988. Also in 1987 the European Inventory of Existing Commercial Chemical Substances was finalized.

Assessment of environmental consequences during the life cycle of a product may result in restrictions, if the quantity produced is large. Of such a nature is the Montreal Protocol, which will restrict the use of CFCs by 50% within 10 years from now. The aim of the authorities concerned is an even further reduction and the Helsinki meeting in 1989 already decided on a complete ban before the end of this century.

As far as processes are concerned, risk analysis also covers all methods for identifying hazards or environmental damage from various steps of processes or items of equipment, to evaluate the probability of failure and to estimate the consequences of such events. These assessments and minimizations of risks are the task of the industry, even if a number of regulations now set the objectives and modalities for such an assessment. The Seveso Directive, for example, provides for such assessments.

Risk management should keep the risks of processing and marketing chemicals at the accepted level. Technical and managerial measures must be taken to keep processes under control, to detect and correct deviations, and ensure that emergency procedures are established to limit the consequences of accidental events. The so-called Seveso Directive, revised in 1987, instituted a system for notification of dangerous substances and installations, together with a string of measures to prevent accidents.

UNEP (United Nations Environment Programme) laid the foundations of two conventions on information and mutual assistance in the event of major accidents. Cefic made proposals for safe warehousing and the control of accidents in warehouses.

For improving the quality of the water of the river Rhine, the industry contributed in developing systems to reduce emissions and to improve management of accidental emissions.

An EC directive concerning health and safety at work provides values for regulatory limits in EC Member States. In 1988 the 'Proscription Directive' was also adopted, banning the use of four carcinogenic substances from the workplace.

Risk management also includes labelling and packaging. In this respect it should be stressed that the chemical industry, in view of its international character, favours the production of a series of International Chemical Safety Cards by the International Programme on Chemicals Safety with the help of EC experts.

Transport of chemicals has been on the agenda of many organizations several times. The International Convention for the Prevention of Pollution from Ships (Marpol) has been extended for bulk chemicals (1987) and for chemicals in packaged form (1988). The UN system for hazard classification has been accepted in 1987 for all kinds of transport.

The European chemical industry transports annually nearly 300 million tonnes of products, of which more than half by road. Total transport costs are more than ECU 10 billion or nearly 5% of production costs. The high costs are caused by specialized equipment, higher training of personnel and higher maintenance costs. The industry is using Transport Emergency Cards (Tremcards), which will be improved by developing a computerized system. Cefic has also set safety standards for hauliers. Furthermore, Cefic took part in the discussion of the European Parliament on transport of dangerous substances.

Producers, incidentally jointly with processors, are also involved in the establishment of recovery or disposal schemes of waste, i.e. waste from own operations and waste after the use of chemicals, such as spent catalysts or CFCs from refrigeration units. In this respect, a large number of EC directives have been adopted (discharge of titanium dioxide waste, mercury, cadmium, HCH, DDT, PCBs).

Risk communication has two dimensions: first of all intensive information has to be provided to customers using chemicals for further processing. This also applies to exporting chemicals or transferring a technology to developing countries. Secondly, good communication is necessary to inform the public authorities and the public in general, but in the strict sense of the word, this type of risk communication deals with the information to be given in case of emergencies. This subject is governed by many local and national regulations. Meeting regulatory requirements and developing good relationships thus go hand in hand. With the US Community Awareness and Emergency Response Program in mind the European chemical industry has mapped our programme for communication between the chemical industry and the Community on emergency response organization (Cicero), that aims at facilitating and

coordinating the information available to the public living in the vicinity of industrial installations about the risk of accidents to which they may be exposed. For those countries not having regulatory structures in this field UNEP has developed a similar programme: Appell.

Table 6
Environmental protection expenditure of the German chemical industry, 1987

	Investment		Current expenses	
	(million ECU)	(%)	(million ECU)	(%)
Total cost	499	100	2 138	100
of which:				
Waste disposal	33	7	478	22
Preservation of water	221	44	1 083	51
Preservation of air	233	47	535	25
Noise reduction	12	2	42	2

Source: Verband der Chemischen Industrie.

Risk reduction nowadays is driven more and more by environmental considerations: low-waste technologies, clean technologies, recovery of waste. Totally different processes may be developed, generating by-products in lower quantities or easier to reuse, as for example the finding of substitutes for CFCs.

Activities regarding protection of health and environment might provide new opportunities for the industry (new processes, recycling, catalysts, substitutes), although a large part of the existing pollution has been generated not only by the chemical industry but also by other sectors of the economy.

The chemical industry, operating on a world scale, has a preference for international regulations and harmonization of directives. This is the best way to avoid market distortions and to eliminate omissions and 'black spots'.

On the international scene, no solid harmonized statistics are available on the cost of environmental protection. An illustration of this is however presented for the German chemical industry in Table 6.

In this case, investments to protect the environment amount to 11% of the industry's total investments. The spread is however wide: some companies are reporting that they are spending up to 15% of their investments on environmental protection.



Photo: AK20

Operational expenses — these are annual costs — are four times the amount which is annually invested.

Impact of '1992'

The legislative measures by which the chemical industry is expecting rapid progress towards harmonization include: norms and standards, biotech-

nology, environment, energy, indirect taxation, fewer administrative constraints, transport deregulation, R&D, competition, statistics and trade policies.

Some concentration and rationalization will take place in the chemicals sector to maintain competitiveness, to exploit the large internal market and to adapt its organization to the larger scale. In particular this will affect localization and coordination of production, distribution, marketing and servicing.

Outlook

The exceptionally good growth performance in 1988 is giving way to more sustainable growth in 1989 with an increase in production of 4%; some slowdown is expected in the second half of the year.

Demand should remain firm and high capacity utilization could constrain production growth. In most European countries, the chemical industry is investing to increase capacity, and investment in environmental projects is also rising sharply. Overall, capital investment is expected to grow by 10% in real terms.

Table 7
West European chemical industry prospects for 1988 and 1989
(% change on previous year)

	1988	1989
Gross domestic product	3.5	3.0
Manufacturing	5.1	3.5
Industrial output	6.7	4.0
Exports (volume)	7.6	4.5
Imports (volume)	9.7	6.5
Investment (volume)	13.0	10.5
Employment	.7	1.0

Source: Cefic.

The growth of trade is expected to be slower than in 1988 with exports rising by 4.5% and imports by 6.5%.

Employment in the European chemical industry is expected to grow by 1%.

For 1990, a slight slowdown in GDP growth and manufacturing output growth is assumed. In that case, demand for chemicals will be growing less than in 1989, but a production increase of about 3% seems feasible.

Prospects for the longer term are good. The European chemical industry has grown stronger in structure as well as in performance. By accelerating spending on R&D and on capital investments the industry has improved its capacity to innovate and to expand in new markets.

If for the coming decade a future growth of GDP and manufacturing of about 3% is observed as a realistic forecast, maintaining its growth premium, the chemical industry could expand at a 4% per annum trend growth.

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FERTILIZERS

(NACE 256.8)

Summary

Although the production of fertilizers has remained relatively stable over the 1980s, the industry has undergone massive restructuring and rationalization in an effort to improve efficiency and revitalize its competitiveness. The industry is particularly vulnerable to the vagaries of world supply and demand and to global competition. Between 1980 and 1988 the volume of imports into the Community almost doubled, with EC consumption only increasing by 23%. In the same period, the volume of exports declined sharply.

The fertilizer industry produces and markets both uncombined fertilizers, comprising either nitrogen (N), extracted from the air, or phosphate (P) processed from imported mineral rock, and various compound fertilizers containing mixtures of N, P and K (potassium). This last element is either mined in the EC or imported. The industry also produces the intermediates used in fertilizer manufacture, such as ammonia, but the statistical data in this chapter relates only to fertilizers themselves; the intermediates are covered in the section on chemicals.

Current situation

In 1988 the EC fertilizer sector produced about 51 million tonnes of fertilizers valued at ECU 6.9 billion, of which around 10% was exported outside the EC. The Community industry, accounting for 15% of world fertilizer production, ranks third in the world, behind the USSR and the USA. Production decreased from 46 million tonnes in 1980 to 42 million tonnes in 1982 and 1983. Since then, the industry has recovered and more than 50 million tonnes were produced in 1988.

The industry is highly dependent on its supplies of raw materials, hydrocarbons (particularly natural gas) and natural phosphates, and manufactures heavy, low value-added products. Fixed costs are an important element of the cost structure since the industry is highly capital-intensive. On average, they account for around two-thirds of total costs. The construction of a modern ammonia plant, for example, with a capacity for production of about 500 000 tonnes per year, costs approximately ECU 250 million.

Fertilizer plants are often large, integrated operations that process raw materials into inputs for other industrial sectors. These inputs include ammonia, nitric acid, urea, ammonium nitrate, sulphuric acid and phosphoric acid. Apart from sales of such intermediates, which represent only 10 to 20% of total production, the industry has just one other source of revenue: farmers.

Consumption

Fertilizer consumption is seasonal and widespread: of 50 million tonnes, 30 million tonnes are utilized in three months on all the agricultural land of the Community. Because fertilizers are manufactured in continuous-process plants, distribution is maintained throughout the year thanks to a large transport and storage infrastructure. The cost of storage is recovered by the use of a seasonal price structure, products bought in the off-season being cheaper than those bought nearer the time of use.

Apparent consumption in volume terms has grown at an average annual rate of around 2.5% over the 1980s but an increasing proportion of Community

Table 1
Main indicators, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption (1)	5 700	6 100	6 600	6 500	7 200	8 100	7 900	7 000	7 200	N/A
Net exports (1)	133	241	-67	-141	98	42	-344	-510	-470	N/A
Production (1)	5 800	6 300	6 500	6 400	7 300	8 100	7 600	6 500	6 700	6 432
Employment (1000) (2)	N/A	N/A	N/A	N/A	60	N/A	N/A	50	50	N/A

(1) EC 10: 1980-85; EC 12: 1986-89. Manufactures made from imported semi-finished products are not included in Community production.

(2) Direct employment excluding maintenance and distribution.

Source: CMC-Engrais.

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production (1)	5 800	6 300	6 500	6 400	7 300	8 100	7 600	6 500	6 700
Exports extra-EC (2)	739	860	603	685	991	1 066	690	669	570
Index (3)	70	81	57	65	94	100	62	60	55
Imports extra-EC (2)	606	613	670	826	893	1 024	1 034	1 040	1 040
Index (3)	60	60	66	81	88	100	100	101	101
X/M (2)	1.22	1.40	.90	.83	1.11	1.04	.67	.50	.55
Imports intra-EC (2)	939	1 060	1 383	1 531	1 774	1 881	1 724	1 644	1 660
Index (3)	49	56	74	82	95	100	91	86	87

(1) EC 10: 1980-85; EC 12: 1986-88. Manufactures made from imported semi-finished products are not included in Community production.

(2) Reporting countries: EC 10: 1980-85; EC 12: 1986-88. 1988 Greek figures are estimated. Extra-EC is taken to be extra-EC 12.

(3) Taking into account changes in EC membership.

Source: CMC-Engrais, Eurostat (Comext).

consumption has been met by imports: from 10% of total Community consumption in 1980, their share grew to 14% in 1988.

Export

In 1988, the industry exported around 10% of total output, which represents about 8% of the total value of production. The external trade balance, which showed a surplus in the early 1980s, is now showing a deficit.

The European industry is faced with competition from both developing countries, which enjoy large resources of natural gas and natural phosphates, and centrally planned economies seeking to earn foreign exchange. Such competition is particularly fierce when supply exceeds demand on the world market as was the case in 1986 and 1987, when most Euro-

pean producers were unable to balance their accounts. In both 1987 and 1988, the EC trade deficit in fertilizers reached some ECU 500 million.

Given the obvious damage inflicted by low-priced imports and dumping practised by some exporters, the Community authorities, like other OECD countries, have imposed antidumping measures.

Major structural and geographic features

The Community industry has embarked upon a vast restructuring and rationalization process, first within national frontiers, then at the European level. Six companies occupy a leading position in Europe, Norsk Hydro, Kemira Oy, BASF, ICI, Grande Paroisse and Enimont. Restructuring is also underway in Spain. Sales networks have been developed in all countries; plants have been shut

Table 3
Production volume

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production (1)	46	44	42	42	45	45	49	50	51
Exports extra-EC (2)	6.7	5.6	4.1	5.0	5.8	5.9	5.1	6.0	4.9
Index (3)	116	97	71	86	100	100	84	98	80
Imports extra-EC (2)	4.4	3.8	4.1	5.0	4.9	5.4	7.1	8.6	7.6
Index (3)	82	71	75	93	91	100	129	156	138
Imports intra-EC (2)	8.1	8.1	9.8	11.0	12.0	11.5	12.2	14.0	13.8
Index (3)	71	70	85	95	103	100	105	121	119

(1) EC 10: 1980-85; EC 12: 1986-88. Manufactures made from imported semi-finished products are not included in Community production.

(2) Reporting countries EC 10: 1980-85; EC 12: 1986-88. 1988 Greek figures are estimated. Extra-EC is taken to be extra-EC 12.

(3) Taking into account changes in EC membership.

Source: CMC-Engrais, Eurostat (Comext).

down and production concentrated in the most favourably located plants, in terms of raw materials supplies and outlets. The necessary investment has been made in an effort to boost efficiency and productivity — particularly in the use of energy — to produce better quality fertilizers and to distribute them at the right time in the most adequate way.

Research and development

In the area of research, the industry is continuing its studies in the efficient and environmentally responsible use of fertilizers. These studies aim at determining spreading periods, modes of use and the best agricultural practices, the ultimate objective being to optimize fertilizer use while respecting the environment. Research is often carried out in cooperation with agriculture and public or private institutes. The results are circulated among farmers as part of the training traditionally offered by the industry.

Environment

The chemical origin of fertilizers together with the fact that they are spread over most cultivated land raises questions about their impact on the food chain.

The presence of nitrates in water and cadmium in the soil are two topics of concern in this connection. With reference to the first, the last Ecetoc (European Chemical Industry Ecology and Toxicology Centre) report led some parties to question the validity of the data on which the currently EC-enforced limit of 50 mg nitrate/litre for drinking water is based. As for cadmium, little is known regarding the link between, on the one hand, soil and plant content or plant and food content and, on the other hand, between the quantity of cadmium ingested and human health.

The above phenomena involve very complicated processes within the biotope (soil, plant, animal, human being).

Fertilizers supply plant nutrients according to the needs of the plant, so when fertilizers are spread in the right quantity and at the right time, they meet the nutritional needs of the plant, they are absorbed and very limited leaching occurs. The major source of nitrates in water, by far, is the mineralization of organic matter in the soil in arable systems during the period from August to October and farmyard manure in livestock systems.

Phosphate fertilizers may carry cadmium as an impurity in the rock-phosphate raw material. There is as yet no technical or economic process for eliminating this impurity. Even though the quantities going into the soil are very small (2.5 g/ha/year in the EC), the fertilizer industry is actively working to keep it under control.

Outlook

The increasing population of the world will mean that more and better food is needed with a consequent increase in fertilizer consumption. However, the growth in fertilizer production and consumption is likely to be erratic. Besides being influenced by economic and climatic factors, the fertilizers industry is also concerned by various political features: the common agricultural policy, environment policies and trade policies (as the market is very sensitive to import prices). As a result, there will continue to be cyclical imbalances between supply and demand, with market prices fluctuating accordingly.

Current efforts to cut production costs and to boost productivity will continue. The industry is constantly striving for a proper and balanced utilization of fertilizers. Increased understanding of both plant development and plant needs will lead to a more accurate guidelines on fertilizer use, providing at the same time economic and environmental benefits. From the standpoint of production, rationalization, energy-saving, plant reliability, safety and product quality are all areas in which continuing improvements will be sought.

The Community's fertilizer industry has undergone considerable transformation in the past few years. It continues to adapt industrial installations and structures to the needs of the vast European market. In future, its competitiveness will be substantially affected by the cost of raw materials and any constraints imposed on it regarding the operation of plants.

The reliability of fertilizer supplies to farmers is a major responsibility of EC producers. A significant reduction in the market share of the industry best adapted to meet requirements linked to the Community agricultural and environmental constraints could have serious consequences.

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PLASTICS

(NACE 252)

Summary

The plastics manufacturing industry in Western Europe has experienced a dramatic turnaround over the past few years, and is currently enjoying its sixth year of sustained output growth, the source of which is mainly within the Community; fulfilling domestic demand has taken precedence over exports, resulting in lower export levels in the industry. Investment in extra production capacity is viewed with caution due to uncertainties about the longer term in both the EC and the world economy.

Description of the sector

The plastics industry consists of the firms producing polymers and synthetic resins, compounded with additives into materials called plastics, as well as those processing these materials into semi-finished and finished structural articles. Apart from plastics manufacturers and plastics processors, other operators essential to the plastics industry include manufacturers of processing equipment and of ancillary products used in the various stages of plastics production and processing.

The EC plastics processing industry, which is mainly composed of small and medium-sized firms, achieved total sales of around ECU 52 billion in 1988 and provided employment for around 800 000 people. However, the information and statistics provided below only relate to the plastics manufacturing industry in Western Europe; plastics processing is covered in greater detail in Chapter 20.

Current situation

The 1988 output of plastics manufacturers in Western Europe was 17 million tonnes, having an estimated value of ECU 20 billion. Approximately 90% of the total is produced in the European Community, the remainder being shared by the Scandinavian countries, Austria and Switzerland.

Overall, the role of plastics and synthetic resins in the economy is important; most industrial and consumer sectors are users of plastics, either as raw materials or as ancillary products. Plastics manufacturers are not only suppliers of raw materials, but also strengthen the entire plastic products sector by contributing to the technical and commercial development of plastics applications; the prosperity and innovative potential of the plastics manufacturers significantly affects the whole plastics manufacturing and processing industry.

In general, engineering and specialty plastics continue to be a growing business. The so-called major or bulk plastics, which represent over two-thirds of total plastics production, have played an essential role in the dynamic development of the plastics industry since the Second World War. They have, however, been vulnerable to the explosions in the cost of oil and the economic slow-down during the period 1975 to 1983, which led to production overcapacities. The bulk plastics industry has been actively rationalizing and restructuring in more recent years, adjusting capacities and securing reductions in production costs. The past five years have brought a recovery of demand and financial returns.

Table 1
Main indicators, 1980-89 (1)

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption (2) (3)	11 088	9 982	10 572	12 051	12 500	13 140	14 190	15 915	17 125	N/A
Net exports (2)	1 174	1 407	1 005	1 594	1 651	1 141	900	720	615	N/A
Production	12 262	11 389	11 573	13 402	13 803	13 940	14 755	15 747	16 859	17 533
Employment (thousands)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	170	N/A

(1) West European figures; 1988 provisional data; statistics cover LDPE, HDPE, PP, PS, PVC; PS does not include expandable grades nor acrylate or acrylonitrile modified grades.

(2) Imports include LDPE.

(3) 1980-81 figures are estimated.

Source: APME.

Industry statistics collected by APME, the Association of Plastics Manufacturers in Europe, cover the whole of Western Europe. Statistics do not provide detailed breakdowns by member country because of confidentiality problems. Statistical data in this section relate to production of the five major thermoplastics:

- low-density polyethylene (LDPE)
- high-density polyethylene (HDPE)
- polypropylene (PP)
- polystyrene (PS)
- polyvinyl chloride (PVC).

These represent an estimated 70% of total plastics production in Europe — in terms of volume around 17 million tonnes, worth an estimated ECU 20 billion on the market.

Western European production of these plastics, in terms of volume, is equivalent to US output and more than twice as large as Japanese production.

Consumption

The broad range of product properties available, and the tailoring of property profiles for specific applications had led to a wide and diversified

demand for plastics. There are large and consolidated volume applications on the one hand, and technical applications characterized by continuous developments on the other. A very large number of industries use polymers along with other raw materials. The main outlets are found in the following industries: packaging, building and civil engineering, transport, domestic appliances, electricity and electronics, communications technology, textiles, agriculture and horticulture, toys and leisure, health care and medical applications, paper and wood, photography, armaments.

After the difficulties of the early 1980s, the plastics industry has enjoyed relatively sustained growth in demand since 1984, partly reflecting generally improved economic conditions both within the EC and elsewhere. Steady growth in a number of key industries that rely on inputs from the plastics industry has been a major factor in the recent upturn.

Most recently, double-digit growth for some grades of plastics has meant sustained high growth rates in 1988 for European plastics manufacturers in terms of production and sales. The continued growth in demand has often resulted in a maximal exploitation of capacity, which, in turn, has produced a



progressive recovery of market prices. The sustained growth in plastics demand is attributed to the improved economic environment, but more particularly, to good conditions in end-user sectors such as the automotive and construction industries.

All five major thermoplastics industries recorded significant improvements in 1988, with increases ranging from 3% to 14%; production and sales of polypropylene were particularly strong.

Exports

The Western European plastics manufacturing industry exports around 8% of its production in terms of volume. This percentage fell over the period 1984 to 1988; in 1984, 17% of the volume of production was exported outside the Community. By comparison, US exports in 1988 represented 10.3% of domestic production, while Japan exported 10.1% of the volume it produced.

Most recently, higher growth in the demand for plastics has come from within the Community rather than from export markets; given the full exploitation of capacity in the industry, it is apparent that a proportion of production has been diverted from exports in order that domestic demand in the Community should be fulfilled. In terms of volume, Western European exports have declined continuously since 1984, the 1988 level being 40% lower than that in 1984. By contrast, imports into Western

Europe have varied over the same period, and currently represent 5% of market demand. Import growth has been particularly marked for LLDPE (Linear Low Density Polyethylene), use of which has been growing rapidly in Europe; official industry statistics for this PE grade are limited. Industry estimates indicate that consumption of LLDPE in Western Europe increased from 85 000 tonnes in 1982 to 685 000 tonnes in 1988, with imports (mainly from the Middle East) totalling around 135 000 tonnes and representing 20% of EC consumption of LLDPE.

Growth in plastics manufacturing occurred over a period of particularly volatile exchange rates. Over the past couple of years, exchange rate parities have affected the competitiveness of EC manufacturers and made the EC market more attractive to Middle East and Far East exporters. However, indications are that domestic supply shortages within the EC have also led to increased import opportunities for some products, and particularly polypropylene.

Employment

The over-capacities of the late 1970s and early 1980s led to a substantial restructuring of the industry, particularly over the period 1982 to 1984. The resulting rationalization, which in some areas is still going on, has meant a reduction in employment in the plastics manufacturing industry to the present estimated figure of 170 000. However, more recently, the conti-

Table 2
Production and external trade

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production									
EC (1)	12 262	11 389	11 573	13 402	13 803	13 940	14 755	15 747	16 859
Index	88	82	83	96	99	100	106	113	121
USA	11 038	11 642	11 078	13 042	13 584	14 285	15 296	16 784	17 970
Index	77	81	78	91	95	100	107	117	126
Japan	5 344	4 941	5 023	5 566	6 529	5 948	5 983	6 397	7 045
Index	90	83	84	94	110	100	101	108	118
Exports extra-W. Europe	1 654	1 780	1 695	2 259	2 303	2 093	1 945	1 660	1 402
Index	79	85	81	108	110	100	93	79	67
Imports extra-W. Europe (2)	480	373	690	665	652	941	1 045	940	787
Index	51	40	73	71	69	100	111	100	84
X/M	3.45	4.77	2.46	3.40	3.53	2.22	1.86	1.77	1.78
Import penetration	N/A	N/A	.07	.06	.05	.07	.07	.06	.05

(1) West European figures; 1988 provisional data; statistics cover LDPE, HDPE, PP, PS, PVC; PS does not include expandable grades nor acrylate or acrylonitrile modified grades.

(2) Imports include LLDPE.

Source: APME.

ning expansion of demand and production has created some jobs in the industry, albeit at a slow pace.

Investment and related

The restructuring and rationalization of plastics manufacturing has not been uniform across the Community; although thermoplastics capacities have been reduced in most Member States, the United Kingdom and Federal Republic of Germany have borne the major share of these reductions across the range of products.

The revival in demand since 1984 has brought the industry back to high levels of capacity utilization. Furthermore, the financial position of firms has dramatically improved. Plastics manufacturers, by and large, have funds and credit available for investment in new business ventures; the determining factors appear to be increasingly environmental, including waste-management requirements and public acceptance of chemicals and chemical industry activity, of which plastics form a part. Further expansion of capacity is likely to be cautious, given the experiences of the last decade; investment patterns are primarily geared towards the development of new processes and products and a continued drive towards productivity improvements in order to maintain the competitiveness of the industry. In the future, the unified internal market is expected to provide greater impetus and opportunities for rationalized industrial structuring.

The EC plastics manufacturing industry has a strong technology base; its research and development record compares favourably with that of the plastics industries in the USA and Japan. This is a strategically important asset for a modern manufacturing industry in Europe, which depends on the availability of state-of-the-art materials and application technology.

Regulatory environment

Regulatory controls concerned with public and environmental safety and well-being are important

factors, influencing industrial operations. Areas of particular concern with reference to safety include:

- exposure of food and medical applications
- fire safety of plastics
- ecological aspects of plastics use.

These factors have a strong bearing on developments in the industry. Recycling of plastics after use is being developed as a contribution to municipal solid-waste management. In traditional applications, plastics comply with the same criteria as those applied to any alternative materials. In new applications, plastics and plastics combined with other materials often set improved or unique standards of performance and safety.

Outlook

Uncertainty regarding developments in major overseas markets and exchange-rate movements remains, but the general outlook for the industry continues to be cautiously optimistic. The first quarter of 1989, compared to the same period in 1988, showed little expansion in total major plastics consumption. Total growth in 1989 is expected to be lower than in 1988.

Over the medium and longer term, other factors will come into play. Since plastics are increasingly used in all the sectors of the economy, we can expect the plastic industry to show performances above the average of the other industrial sectors. Plastics manufacturing will continue to be highly competitive on a global basis; US investment in sizeable production capacities and the increased pace of plant construction in South-East Asia are likely to bring about increased competition. In the face of future limited market growth and expected increases in plastics imports, the EC industry will need to sustain its advanced technological standards and selective research and development efforts. In addition, an anticipated recovery in oil prices by the mid- 1990s will have effects on cost structures.

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THE AGROCHEMICAL INDUSTRY

(NACE 256.8)

Summary

The EC is currently the world leader in agrochemicals production, with a market share of 27%. In comparison, the world's second largest producer, the USA, has a market share of 24%. The total demand for agrochemical products is forecasted to grow at an average annual rate of 2% over the coming years. In the beginning of the 1990s, although growth in this sector will be comparatively lower than elsewhere, the EC will retain its leading position.

The agrochemical balance of trade within the EC market is in large surplus, with total exports nearly three times as large as total imports. Fast rising demand from the developing countries will boost export growth in the coming years.

Biotechnology has recently become a key area of research in the industry, with plant breeding dominating biotechnical developments. The new products will be environmentally safer and demonstrate stronger pest control. However, the new biotechnology products are not expected to be commercialized before the year 2000.

One of the major challenges faced by the industry, harmonization of product registration, is still under debate within the EC. There seems to be a movement towards a common procedure concerning active ingredients at a Community level, and specific national procedures for formulated products. However, a formal policy is not expected to be in place before 1992.

A more competitive environment will result from the advent of the single market, and it is likely that there will be fewer agrochemical companies converging by the mid-1990s. Prices will average out, probably towards the French levels, and further consolidation of the industry is anticipated.

Description of the sector

The agrochemical industry is relatively small compared to other sectors of the chemical industry. Highly technical rather than labour intensive, it is a complex industry scattered throughout the world.

Agrochemicals include insecticides, fungicides, herbicides, rodenticides, plant growth regulators and

all other chemicals designated for crop protection. Fertilizers, although listed under the same NACE code, fall outside this definition and are subsequently dealt with in a separate section.

Current situation

The EC is the largest producer of agrochemicals, with France, Italy, the United Kingdom, Spain and the Federal Republic of Germany constituting major producers in both the Community and the world.

In 1988, the EC's plant protection market was estimated at around ECU 5.3 billion, while forecasts for 1995 put its value at approximately ECU 5.6 billion. In comparison, the US market, the world's second most important plant protection market, was estimated to be of ECU 4.7 billion in 1988, and by 1995 is expected to stabilize at approximately ECU 5.1 billion.

Assuming that world volumes and prices remain more or less stable and proportional to crop acreages, the EC should continue to be the world's largest agrochemical producer.

Industry structure

The changes that affected the farming industry during the 1970s changed the landscape of international competition in the agrochemical sector, including:

- agricultural over-production in the developed countries
- European agricultural policies such as CAP
- reduction of arable land in the USA
- biotechnological products
- growing awareness of the environment
- information systems on farm management.

The number of large companies in the plant chemical industry in the world, in 1985, was estimated at about 40, taking into account their research and development capacity as well as their production levels or distribution networks: 16 were American companies, 12 European and 11 Japanese firms.



Figure 1

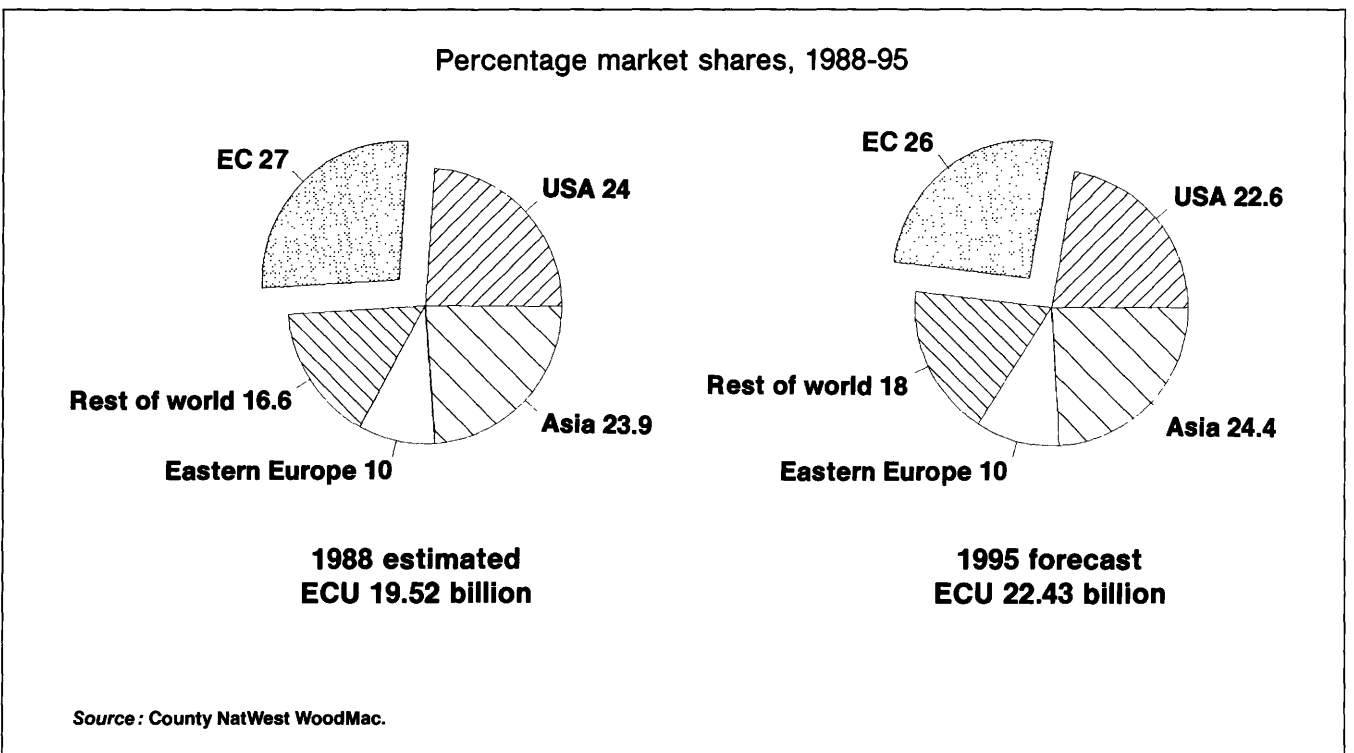


Table 1
External trade — Insecticides

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Exports extra-EC (1)	379	456	503	608	769	762	618	540	527
Index (2)	51	60	67	80	101	100	81	71	69
Imports extra-EC (1)	35	43	53	69	95	96	89	75	96
Index (2)	45	48	58	76	99	100	93	78	100
X/M (1)	10.82	10.60	9.49	8.81	8.09	7.94	6.94	7.20	5.49
Imports intra-EC (1)	133	162	182	239	291	265	259	281	324
Index (2)	60	66	74	98	110	100	98	106	122

(1) Reporting countries — 1980 EC 9; 1981-83 EC 10; 1984-88 EC 12.

Partner country — extra/intra EC 12. Greece estimated.

(2) Taking into account changes in EC membership.

Source: Eurostat (Comext).

Ninety per cent of the international market is covered by only five companies, Bayer, Ciba-Geigy, ICI, Monsanto and Rhone-Poulenc. The four European companies of this top five generated sales of ECU 2.3 billion within the Community during 1988.

Nearly all these firms are multinational chemical companies, whose agrochemical divisions only represent a small part of the total sales of the group to which they belong. We will continue to see changes in the positions of the companies in the international league as long as an overcapacity for research continues, and as long as the overall cost of research and marketing have not been brought under control so that real consolidation can take place.

Crops

In Europe, the main consumer crops are cereals (35 million ha) arboriculture and viticulture (11.6 million ha), beet (1.9 million ha), protein crops (1.6 million ha), potatoes (1.5 million ha) and clover (1.3

million ha). The United Kingdom, France, Spain, Italy and the Federal Republic of Germany produce between 70 and 90% of these crops.

Average yields of major crops worldwide, 1980-87 (kg per ha)

Crop	1980	1987	Increase (%)
Wheat	1 877	2 289	+22
Barley	2 030	2 305	+14
Maize	3 060	3 566	+17
Rice	2 770	3 110	+12
Soyabeans	1 561	1 901	+22
Rapeseed	996	1 360	+37
Sugar beet	29 284	36 640	+25
Potatoes	12 800	15 857	+24

The improvement of yields between 1980 and 1987 was achieved thanks to the use of better seed varieties, extended irrigation systems and, in many areas, as a result of high intensity farming, with sizeable inputs of agrochemicals and fertilizers.

Table 2
External trade — Herbicides

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Exports extra-EC (1)	314	302	304	289	362	433	380	356	351
Index (2)	73	70	70	67	84	100	88	82	81
Imports extra-EC (1)	122	94	111	131	169	152	133	168	190
Index (2)	86	64	76	90	111	100	88	111	125
X/M (1)	2.57	3.21	2.74	2.21	2.14	2.85	2.86	2.12	1.85
Imports intra-EC (1)	379	416	464	448	563	641	689	678	754
Index (2)	61	67	75	72	88	100	107	106	118

(1) Reporting countries — 1980 EC 9; 1981-83 EC 10; 1984-88 EC 12.

Partner country — extra/intra EC 12. Greece estimated.

(2) Taking into account changes in EC membership.

Source: Eurostat (Comext).

Product groups

Insecticides are used to control insect pests particularly on crops grown in tropical and sub-tropical climates. As such, these agrochemicals are widely used in southern EC Member States such as Spain and Greece, particularly in orchards.

Herbicides are used to control weeds. This is currently the largest product group and also the most rapidly growing market segment. Herbicides are particularly useful in countries where labour costs are high, and have been used more and more intensively since the early 1960s.

Fungicides are used to control fungal diseases in crops, mainly in high value markets such as cereals and vines. With much of Northern Europe experiencing heavy rainfalls and a cool climate, the use of fungicides is also increasing.

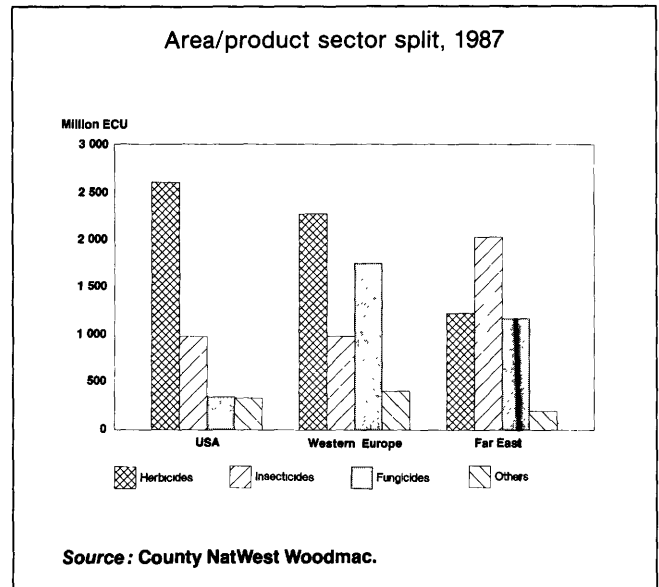
Agrochemicals are designed to protect agricultural crops against a wide variety of pests, weeds, fungi, rodents and insects. Agrochemicals, when employed correctly, can significantly increase crop yields and improve the quality of agricultural produce. There are four main groups of agrochemicals: herbicides, insecticides, fungicides, and plant growth regulators.

The fourth product group, plant growth regulators, is currently the smallest agrochemical market segment but has recently demonstrated steady growth. Plant growth regulators are used in a wide variety of horticultural and agricultural applications to control plant size and growth rate.

The remaining product groups include speciality agrochemicals such as nematicides, rodenticides and fumigants whose market shares are relatively small in comparison to the four main product groups.

France, Italy, the United Kingdom, Spain and the Federal Republic of Germany, whilst being the largest producers in the Community, are also the largest consumers of plant protection chemicals, utilizing 95% of the herbicides, 97% of the fungicides and 77% of total pesticides consumed in Europe.

Figure 2



Product distribution

There are three main types of distribution systems for agrochemicals in Europe, the UK, German and Spanish systems. All other forms of distribution networks resemble one or another of these three systems.

The UK distribution network involves few middlemen, a strong trading system, and little technical services for the farmers. Correspondingly, agrochemical prices in the UK are amongst the lowest in the Community. At the other end of the

Table 3
External trade — Fungicides

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Exports extra-EC (1)	108	151	178	232	261	397	445	326	328
Index (2)	27	39	45	59	66	100	112	82	83
Imports extra-EC (1)	28	63	78	80	87	152	120	107	136
Index (2)	18	42	53	53	57	100	79	70	89
X/M (1)	3.86	2.40	2.28	2.90	3.00	2.61	3.71	3.05	2.43
Imports intra-EC (1)	193	228	254	317	430	484	439	382	441
Index (2)	42	50	55	69	89	100	91	79	91

(1) Reporting countries — 1980 EC 9; 1981-83 EC 10; 1984-88 EC 12.

Partner country — extra/intra EC 12. Greece estimated.

(2) Taking into account changes in EC membership.

Source: Eurostat (Comext).

scale, the German system revolves principally around cooperatives selling lots of services to their customers, but whose prices are the highest in the EC.

Spain on the other hand has many stages in its distribution system between the time the product leaves the factory until it arrives at its final destination. The smaller the scale of the farm and the more isolated it is, the more 'intermediate' stages there are. The Spanish system is without doubt the most complicated distribution system in the Community.

In Italy, however, although there is widespread parcelling, the system is much simpler since it relies on a powerful cooperative network. In general, it can be said that the longer the distribution network the higher the price for the end-user, and the smaller the industry's capacity for value-added.

Product pricing

The cost of distribution, both local and national, varies from one country to another and directly affects end-user prices. In Denmark, it makes up 51% of the final price whilst in the Federal Republic of Germany, it amounts to 48.5%.

There are currently enormous price differences in Europe, with German prices the highest in the Community at almost double those of the United Kingdom, while prices in France lie somewhere between these two.

Recently however, the price differential between EC Member States has narrowed and this trend will undoubtedly continue. Over the past three years, all companies who have launched new products have been thinking in terms of a single European market, which means that they have launched their products with price differentials which have not exceeded 20 to 25%.

When the single market becomes reality, agrochemical prices will have found a common level. The industry will retain its flexibility to set higher pricing levels for products which do confer added benefits to the end-user. It is more than likely that the prices will eventually move close to those of France, for two reasons:

- it is the middle of the price range, and
- given the size of the French market, this country's producers will probably have a leading say in such issues.

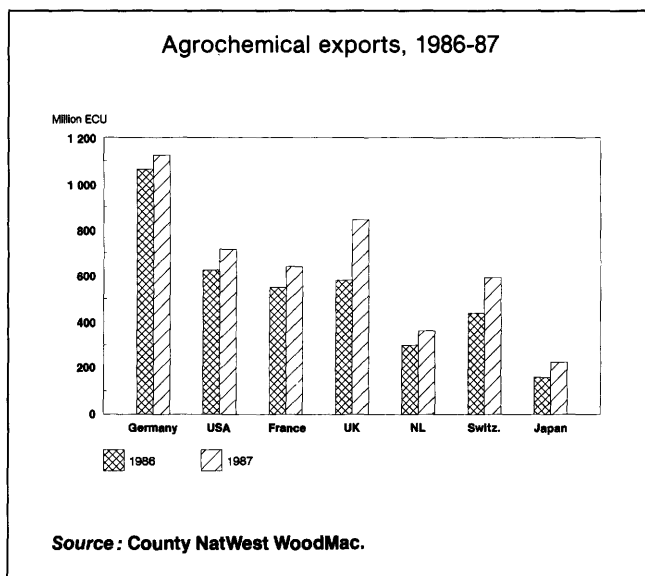
The whole area of average or near-average Community pricing does have ramifications for the agro-

chemical distribution systems in terms of competition across national boundaries, pan-European ambitions, perhaps also some of the national distributors and indeed the cooperative movement.

Trade

Figures from the major exporting nations indicate that there was a slight decline in the 1987 global export trade volume contrasting favourably with the 10% reduction in trade volume figures for the previous year. Details concerning export trade from the seven major agrochemical producing nations are given in Figure 3. For the third consecutive year the Federal Republic of Germany remained the No 1 exporter, both in terms of volume and value.

Figure 3



The balance of trade of the EC agrochemical market is extremely favourable, with total exports almost three times total imports. Both import and export values peaked in 1985. Between 1985 and 1988 exports have steadily declined, whilst imports, although lower than the 1985 peak value, have increased annually over the same period.

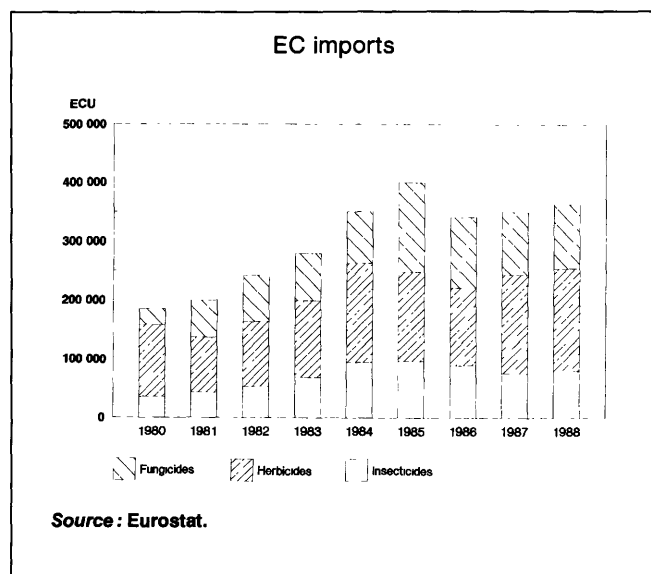
Continued export growth is expected in the coming years. With the continuing increase in demand for food production in the developing countries, agrochemical EC exports are expected to increase well into the 1990s.

Regulatory environment

One of the major challenges facing the agrochemical industry is the diversity of national product registra-

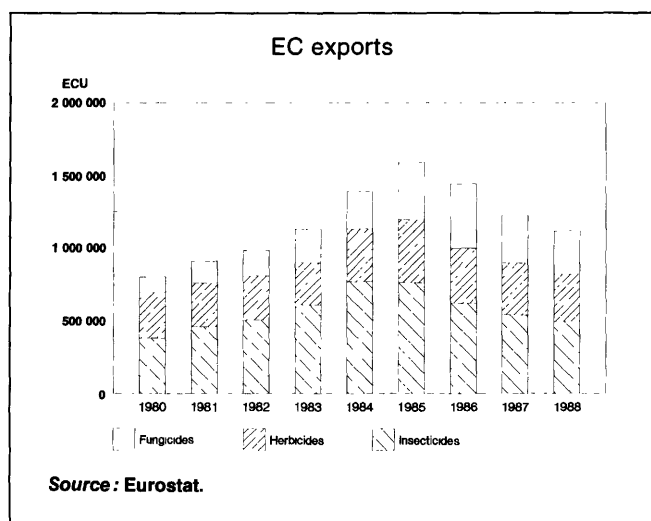
tion requirements. The absence of harmonization in the smaller markets frequently represents a considerable cost factor. A small local formulator or manufacturer for example, can find himself faced with a government requirement to carry out, sometimes at great cost, certain product testing on a product which no other government requires.

Figure 4



The European Community has been considering harmonization guidelines for agrochemicals since 1976. A motion was then proposed to differentiate between nationally used products and those which were applied beyond a country's borders. This proposal was discussed for six years without agreement being obtained. It was therefore withdrawn.

Figure 5



A new proposal was put forward in 1986 which suggested harmonization of registration procedures for

active ingredients at an overall European level and of formulations at national levels. A further proposal towards a common position on pesticides registration was issued in early 1988.

Thus, it appears that there is movement towards a common policy concerning active ingredients and a specific policy for formulated products. The outcome will probably be a central registration agency which would be empowered to consider active ingredient proposals, whether for new molecules or on a time-phased approach for existing agrochemicals.

National authorities would have the specific task of reviewing formulation requests taking into account local agronomic, environmental and climatic conditions, either for single products or mixtures thereof. What appears to be a major stumbling block to agreement to this system is whether or not the national authorities will be able to grant provisional approval pending review on the active ingredient by the central body.

This provisional authorization procedure is currently in force in a number of Member States such as France, the United Kingdom, Ireland and Greece, and it seems realistic that it should be extended to the whole Community.

The establishment of product data requirements to allow scientific evaluation of efficiency, toxicological and environmental efforts should in itself not be too onerous to achieve. The creation of a central regulatory body fully staffed and having the capacity to undertake existing product review and new product applications by the end of 1992 is more problematic.

The way in which the Commission currently views the use of pesticides is set out in broad terms in its paper on environment and agriculture published last year. Its strategy is aimed at reducing to a strict minimum the use of chemicals for agriculture. While proceeding with the revision for existing legislation, it intends to devote more attention to the broader effects of pesticides on the environment as a whole.

Thus, on the product registration front, a great deal of discussion is still required before a sensible scientifically based procedure can be agreed upon and established. Unless substantial strides are made in the next 12 to 18 months, a central regulatory body is unlikely to be in place and functioning by the end of 1992.

Trends

All major agrochemical companies have extensive research and development programmes with expenditures of between 8 and 9% of sales. Biotechnology is a key area of this research and will continue to expand into the 1990s.

Rapid advances in biotechnology will lead to novel microbial products and new crop varieties which will become important crop protection agents and increasingly supplement or supplant the effects provided by agrochemicals. Plant breeding will dominate in biotechnology development.

Crop resistance to insect pests and fungal pathogens will gradually replace some insecticide and fungicide usage. Initially, resistance will be limited to individual pests or pathogens. However, it will be decades before pest and disease complexes are controlled exclusively by biotechnology without the complementary use of agrochemicals. In the mean time, much of the research work in agrochemistry is to lower the effective dose rates and environmental residues of agrochemicals currently employed in the market place.

The development of herbicide resistance in crop plants which has been demonstrated in a variety of crops in recent years will also be important. The rate of uptake of this new technology will be limited at least as much by economies when compared to modern selective herbicides, as it will be by the time taken to develop the technology.

Biotechnology may also provide approaches to some technical targets which have proved elusive to traditional chemical control such as the development of virus resistant crop plants, and via specific assays for candidate agrochemicals.

Research in biotechnologies will not noticeably reduce total pesticide sales but will cause modifications to the types of products and to the competitiveness of those involved. The plant protection industry in general will continue to be competitive with a more limited number of participants, the products marketed will be similar although safer for the environment, with stronger pest control action, whilst the first results of the biotechnologies will appear on the European market around the year 2000.

In summary, biotechnology offers the promise of industry revival in the EC but it will be accompanied by a demanding legislative framework, some of which is already in place in the Community, which will constrain the rate of commercial exploitation.

Environmental protection

Since the beginning of this decade, agriculture has increasingly become an area of environmental concerns. These relate to the entire chain of the food production industry, plant protection, fertilizers, products for animal health, seeds and animal feed.

The arrival of biotechnology in the agricultural industry is also a cause for concern for the general public and is provoking wide debate at both local and governmental levels. While the search for complementary and alternative methods of controlling pests, weeds and diseases, such as resistant varieties and improved agricultural practices, will continue, the use of insecticides, herbicides and fungicides will remain an essential part of the agricultural industry for the foreseeable future.

Whilst some of the early pesticides were toxic to man and the environment in recent years, the agrochemical industry has made great progress in producing more selective and generally safer products. Biotechnological research features largely in the agricultural industry in the search for new and environmentally safer plant protection products.

The impact of 1992

Among the 300 directives listed in the Commission's White Paper, published in 1985, over one-third deal specifically with food and agriculture.

Since 1985, further proposals have been made to remove other distortions to agricultural production and trade within EC 12, including policy instruments such as monetary compensatory amounts or subsidies to farmers.

The creation of the single market should have no direct effect on overall crop acreages or crop harvest, whilst the removal of subsidies should indirectly be expected to operate in favour of the most efficient farmers, perhaps resulting in some crop pattern changes throughout the EC.

The more competitive market place, which is the basic tenet of the single market concept, makes it likely that there will be fewer agrochemical companies around by the end of 1992. Consolidation of the industry has not yet reached its logical conclusion. This will have an effect on the traditional supply routes, the agricultural merchants, private distributors and the cooperatives.

There are likely to be initiatives by national distributors to extend their sphere of operations over

national boundaries. With regard to the cooperatives in the Netherlands, Belgium and the Federal Republic of Germany, for example, discussions are well advanced concerning the single market opportunities.

Apart from any effects on crop production and food demand levels, changes brought about by the establishment of the single European market in the agrochemical business will be in two specific areas, which will undoubtedly have an impact. The first results from the removal of physical barriers to trade, theoretically leading to a single EC 12 product-pricing regime. The second concerns registration of agrochemicals.

Registration of agrochemicals within the Community, as discussed previously, seems to be developing towards a two-tier system. This system will probably follow the proposal made in 1986, which suggested harmonization of regulations pertaining to active ingredients at the European level with separate regulations for formulated products made at the national level according to local dictates.

The single market concept will not by itself bring about all the changes in the agrochemical industry in the EC. Any changes that do occur as a result of a single European market would probably have happened anyway, although the time scale would have been longer.

In conclusion, the establishment of the single European market will increase competition in the agrochemical sector. It is hoped that some cost gains can be achieved through regulatory harmonization and efficiencies to offset the expected lowering of prices foreseen in some Member States.

Outlook

On the basis of present agrochemicals product prices, post-1992 selling at or near the current French price levels throughout the Community, and given the likelihood that crop acreages will be no higher than at present, the EC market will demonstrate the lowest growth rate of all agrochemical regions between now and 1995.

Long-term growth will be lower worldwide (2 to 3% per annum, not including inflation), though the rate of growth will be higher in less developed countries (5% per annum) where intensification of agriculture will continue to be driven by population growth. Very low growth of agrochemicals will continue in the developed countries as a result of agricultural reform to restrict surpluses, Japanese agricultural liberalization and further subsidy reduction worldwide.

For the same period, the EC 12 growth rate is forecasted to grow at only 0.8% per annum on average compared to 1.1% per annum in the Far East and 2.3% per annum in the United States.

Markets in centrally planned economies and the developing countries are forecast to achieve average annual growth rates of between 3.5% and 4.0% between 1988 and 1995, pushed by their continuing population growth.

However, in spite of a lower than average growth rate, the EC 12 will retain its leading position in market share of the industry overall.

Competition between companies will increase in intensity and substantial further rationalization will occur through acquisition and mergers. During the last two years, there have been numerous takeovers. In many instances the plant biotechnologies were the target for these mergers; this was manifested by the large companies taking over the seed and biotechnology companies. All of them now have research teams at work on the new biotechnologies and their applications for agriculture. However, the commercial benefits of this work will only be felt in the medium or long term.

The most successful companies in the agrochemical industry of the future are those who are strong internationally, who have effective R&D aimed at generating both chemical and biological products and who give high priority to ensuring that their products are environmentally safe.

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PAIN, VARNISH AND PRINTING INK

(NACE 255)

Summary

The aggregate output of the paint, varnish and printing ink sectors (excluding painters' fillings) in the EC was worth around ECU 11.3 billion in 1988. The paints and printing inks sectors together employ around 115 000 persons. EC exports represent a comparatively small proportion of production, at around 7.5%. The industry is relatively stable and, over the medium term, moderate growth is expected for both the paint and printing ink sectors.

Description of the sector

The NACE definition of this sector includes 'paint, painters' fillings, varnish, and printing ink'. The information and data below cover paint and varnishes and, separately, printing ink.

Paint and varnish

Paint and varnish comprises a range of product categories with a wide variety of applications:

- architectural coatings including exterior and interior house paint, undercoaters, primers and sealers, varnishes and stains
- product coatings used for a wide variety of industrial and consumer products, for example, wood and metal furniture and fixtures, automotive, non-automotive transportation and aircraft, machinery and equipment, appliances, electrical insulation, film, paper and foil, toys and sporting goods

- special-purpose coatings formulated for special applications or extreme environments and including automotive and machinery refinishing, high-performance maintenance, road markings, bridge maintenance, crafts, metallic and multicoloured coatings.

These products exist in liquid form, as high solids, or in powder form.

Current situation

In 1988, the output of the EC paint industry reached around 4.3 million tonnes corresponding to more than four-fifths of total European production. This figure represents two-thirds of US production and more than twice the Japanese total.

The production of paints and varnishes in the EC peaked in 1981, and subsequently fell over the period 1982 to 1984. Output picked up in 1985 with growth continuing over 1986 and 1987.

The Federal Republic of Germany accounts for a large proportion (34%) of the output of the industry, followed by Italy, France and the UK which have a roughly similar share of EC production (around 15%) and employment. All Member States are producers.

During 1987, output in volume terms grew more rapidly in Italy (6.3%); in value, growth was more rapid in Portugal. However, in the latter country, a large part of this growth is accounted for by price increases.

Table 1
International comparisons
Painters' fillings, paints, varnishes and printing inks

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987 (1)	1988 (1)	1989	1990
Production in current prices											
EC	12 659	13 406	14 528	15 471	17 480	18 838	19 303	20 040	21 597	23 310	N/A
Index	62.2	71.2	77.1	82.1	92.8	100.0	102.5	106.4	114.7	123.7	N/A
USA (2)	6 914	9 475	10 957	13 323	16 054	17 547	13 982	11 566	11 985	13 275	14 534
Index	39.4	54.0	62.5	75.9	91.5	100.0	79.7	65.9	68.3	75.7	82.8
Japan (2)	2 870	3 908	4 060	4 906	5 846	6 306	6 122	6 115	6 115	7 237	N/A
Index	45.5	62.0	64.4	77.8	92.7	100.0	97.1	97.0	114.8	N/A	N/A

(1) Estimated.

(2) Census of Manufactures and Eurostat estimates.

Source: Eurostat (Inde).

Table 2
Production of paint and varnishes

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production (1)									
Volume (1 000 tonnes)	4 182	4 239	4 178	4 025	4 048	3 928	3 889	4 075	4 430
Index	82.6	88.4	90.8	90.2	98.0	100.0	108.3	113.7	112.8
Current value (million ECU)	6 588	7 056	7 247	7 197	7 822	7 979	8 637	9 075	9 540
Index	106.5	107.9	106.4	102.5	103.1	100.0	99.0	103.7	119.6
Constant value (million ECU)	6 588	6 429	6 112	5 770	5 310	5 795	6 078	6 243	8 585
Index	113.7	110.9	105.5	99.6	91.6	100.0	104.9	107.7	148.1

(1) Excluding Greece, Ireland and Luxembourg.

Source: CEPE.

Per capita consumption of paint also varies markedly from country to country. The highest level of per capita consumption was reported in Denmark (24.4 kg in 1988); the lowest figure is for Spain at 8.7 kg.

Member States with larger manufacturing capacities (Federal Republic of Germany, France, Italy and the UK) produce primarily for their domestic markets with exports, even to other EC countries, representing a comparatively small share of output. Conversely, the industry in Belgium, Denmark and the Netherlands exports a much larger share of production. However, it should be noted that many of the larger companies manufacture in a number of different countries and supply to the local market due to the transport cost factor for paints.

Production and consumption

During the last decade, consumption has slightly decreased. However, the overall figures obscure the increase (albeit rather slowly) in the use of powder coatings and the general trend to so-called high solids (products with the higher concentrations of 'colour'). While powder coatings may often reach double-digit growth rates, their share in overall consumption is still comparatively low and probably under one-twentieth of the total market. Higher market shares are also registered for high solids which indicate a reduction in the use of non-aqueous solvents. Here, quality criteria, but in particular cus-

tomers' reluctance to make use of new technologies, may be considered to be one of the reasons why growth remains disappointing.

However, within this context it should be recognized that stable production, combined with new techniques (e.g. high solids, powder, reduction in overspray, recycling), cannot be characterized as stagnation. The surface coated/painted unit is steadily growing, although the sector seems unable to turn this progress to their own advantage.

In general, overall technical standards equal, if not exceed those of any non-European competitor. This may have some bearing on the fact that not only is the world's largest paint manufacturer based in the EC, but four of the largest six paint producers originate from the EC; the other two are US companies, and the largest Japanese competitor ranks seventh.

Independent of the 'natural' product mix varying often considerably from country to country, production was hampered by some kind of technical raw material shortage and lack of technical staff.

Whilst in an industry where any normal producer uses far more than 1 000 raw materials some price changes are of minor importance, the present shortage and considerable price increase of titanium dioxide has a vital impact. This substance is by far the most important pigment used not only for white paint but in similar amounts to 'lighten up' most other shades. The present technical shortage through

Table 3
Employment

(1 000)	1980	1981	1982	1983 (2)	1984 (2)	1985	1986 (2)	1987	1988
EC (1)	106.4	103.7	98.1	93.6	90.9	88.8	88.1	89.1	88.0

(1) Excluding Greece, Ireland and Luxembourg.

(2) Estimated.

Source: CEPE.

low production capacities will last until the early 1990s.

Companies also suffer more and more from shortages in technically trained senior staff as a result of growing 'sophistication' on the one hand and reduced training facilities which are publicly sponsored.

Protected—painted surfaces of most kinds continue to grow whilst the unchanged trend to more productive paint (high solids, powder) means less volume and less expensive organic solvents. However, the acceptance of this new generation of ecologically friendly products stays well below reasonable expectations.

Trade

Exports to relatively close countries can sometimes provide a further growth stimulus although, generally, paint is a product which, due to transport costs, does not travel very far. The paint industry has many outlets (production, joint ventures, licences) in locations all over the world. One important reason for this expansion is the wish to serve the same customer (e.g. car, machine, other original equipment manufacturers) with the same specific product. Rationalization and intra-company exchange of products do render exchange statistics between Member States less and less valid.

Employment

Employment in the industry has still declined 2% from last year to 88 000 persons. This is a 17% fall since its level of 106 400 employees in 1980.

Investment

Concentration of production units is typical for the last years and is expected to continue. This is also true for environmental investments, but while in some countries such high investments are mandatory for legal reasons or public pressure, in other countries this follows with a certain time lag. US presence on the EC market is remarkably higher than Japanese, but the situation is far from making industry feel concerned.

The financial impact of ecology is in some countries rated to 2.5% of the turnover which equals the average profit rate.

Like the chemical industry, the paint industry has had a widely international experience for a long time. The EC White Paper therefore enumerated

only a very small number of barriers and correlating directives, almost all of which have been adopted.

Industry structure and geographic features

The last decade has seen many mergers and takeovers downstream and across national borders. This new orientation did not happen simultaneously in all Member States.

Some sectors, e.g. can lacquers or marine paints, may be considered oligopolistic, but as this applies to both producers and buyers, competition is still fierce.

R&D plays an important role for most fields of application and these costs have led to specialization. Many countries show a tendency towards large (publicly-owned) or small companies, although there are sufficient examples of highly competitive medium-sized and family-owned companies. A number of important production entities are located in the larger and, in particular, highly industrialized countries, but since more and more intra-company flow of paints takes place, intra-EC exchange figures lose transparency and no real geographic centre can be determined.

Industrial concentration will continue to increase and in particular many smaller companies, which have not yet discovered the market potential of a larger common market, will disappear as their local outlet can no longer safeguard their future. On the other hand, the wide variety of products and their multiple application provides opportunities for the flexible and innovative entrepreneur.

Apart from automotive and marine paints — and this due to customer industry — there is no typical geographic requirement. And even in these sectors, the necessity of a somehow universal presence softens this characteristic.

Table 4
Per capita consumption of paints

(kilograms)	1987	1988
Belgium	14.4	18.0
Denmark	26.3	24.4
FR of Germany	19.5	19.6
Spain	8.2	8.7
France	13.0	12.7
Italy	12.0	12.6
Netherlands	15.1	16.3
Portugal	10.3	10.4
United Kingdom	7.8	9.5

Source: CEPE.

Outlook

Constraints on the industry include the growing importance of product liability and decreasing possibilities of insurance coverage. The present shortage of titanium dioxide and its high price, which will probably last until the early 1990s, could become worrying in the near future. A negative impact is also felt from the wide field of environmental and similar legislation. In addition, since many raw materials are dependent on, or directly linked with, the price of crude oil, and the sector attributes about half of its costs to this factor, the exchange rate against the US dollar can be vital, although this problem has recently lost some of its impact.

Assuming steady, general economic growth in the EC, a 1 to 2% growth rate per annum is expected over the medium term.

Printing ink

The term 'printing inks' refers to one of the essential raw materials of the graphic (but not textile printing) industry. These printing inks are provided for the printing processes of letterpress, offset/litho, gravure, flexography, screen, and other.

They are used to produce, for example, newspapers, periodicals, books, catalogues, advertising material, packagings, wall coverings, posters, business forms, and security papers.

Current situation

The output of the EC printing ink industry of nearly 495 000 tonnes in 1988 (1980 about 368 000 tonnes) corresponds to nearly nine-tenths of the total production in Europe and is valued at around ECU 1 757 million. It is estimated to be half of US production and is two-fifths higher than Japanese production. Output in volume terms grew by 9.5% between 1987 and 1988 but real value grew only marginally.

Production and consumption

As in the allied paint industry, there are no comprehensive figures with breakdown of usage. For inks, with the exception of some screen inks for hobby purposes, the customer and applicator is always known. However, the printing process used does not necessarily indicate end-use and, in addition, border lines between ink types (per process) may be blurred. An additional uncertain factor within this context is, for example, the circulation of the newspaper, the requested quality of the printed products (the standard of European printing and *nota bene* printing inks rank highest in the world) and/or the time allotted for production. Similar to the allied paint industry, problems may arise from the use of non-aqueous solvents, although the rather restricted number of professional users allows better control of emissions.

Product prices do not always reflect the intensive service nature of this highly specialized industry.

The Federal Republic of Germany is the largest producer of printing inks, accounting for over 40% of EC production and employing one-third of total EC employment in the industry. Other large producers are France and the UK.

The Federal Republic of Germany is also the highest per capita consumer of printing inks in the Community (with 2.6kg), followed by Belgium (2.3kg) and Denmark (2kg).

The decreasing importance of book printing and the use of the letterpress process has not yet come to an end, even if it has reached a very low level now. On the other hand, offset printing continues to grow.

Packaging and in particular food packaging remains an interesting market but becomes more and more a specialist's job overdominated by legislation for food wrappers which still slightly differs from country to country.

Table 5
Printing ink sales

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Value (million ECU) (1)	962.9	1 022.2	1 100.6	1 173.8	1 306.2	1 430.8	1 499.3	1 582.2	1 757.0
Quantity (1 000 tonnes) (2)	367.9	366.8	368.9	381.2	405.1	413.4	430.8	451.4	494.6

(1) Excluding Greece, Ireland and Luxembourg; 1986 also excluding Portugal.

(2) Excluding Greece and Luxembourg; 1985-86 also excluding Ireland; production figures (not sales) for Ireland for other years.

Source: CEPE.

The long expected negative impact from the electronic media on newspapers starts to be effective. It remains, however, less important than predicted.

Table 6
Per capita consumption of printing inks

(kilograms)	1986	1987	1988
Belgium	1.6	2.1	2.3
Denmark	1.9	2.0	2.0
FR of Germany	2.4	2.5	2.6
Spain	.5	.5	.6
France	1.2	1.0	1.0
Ireland (1)	.7	N/A	N/A
Italy	.8	N/A	N/A
The Netherlands	1.6	N/A	N/A
United Kingdom	1.4	1.1	1.4

(1) 1985.

Source: CEPE.

Industry structure

Although the largest printing ink company is Japanese (Dai Nippon Ink), the second largest producer of printing inks is European. Most of the large manufacturers in the EC are quoted companies whereas the medium and smaller-sized companies are often family businesses. A noticeable feature in many countries is the often slowly but steadily growing importance of State or otherwise publicly-owned print shops.

The last decade has seen a number of mergers showing a pattern similar to the paint industry and occurring in waves which reached different countries at different times. The importance and further growth of large printing facilities will continue to have an influence on concentration in the printing ink industry. In general, production units in most southern countries of the EC are considerably smaller than elsewhere in the Community.

Whilst the branch is and will never be free of mergers, a certain stillstand seems to be reached. Some of the reasons may be anticartel considerations, expectance of „natural” adjustment of capacities, too much regional structure of potential partners and the like.

Further similarities to the paint industry are the importance of transport costs and the dependence on the oil price of many raw materials costs. However, unlike the paint sector, there are few multinational companies in the printing ink business.

Financial reserves of many companies may be considered to be below normal.

Employment

If employment in the printing ink industry fell over the 1980s, it has been stabilizing for some years now with approximately over 14 000 persons in more than 140 companies.

Trade

Trade between Member States is still relatively low compared to many other industries and this is partly due to the important service character of the product. The largest part of production is geared towards domestic consumption and this is particularly true for large producers (Federal Republic of Germany, France, UK). For the smaller producers, trade within the EC is more extensive. The still much lower export rates of, for example, the Japanese, where exports represent about 3 to 4% of production, or of the US producers confirms this situation, typical for the branch.

Investment

Investment are restricted to rationalization and modernization in particular under the auspices of ecology. Requirements seem to be considerably different from country to country.

As within the paint industry, no major obstacles to trade are expected to be abolished by '1992'. The particular service character of the branch will however require special efforts to keep its position on multicultural and multinational markets.

Outlook

As the current evolution showed that the future of the graphic industry is not basically threatened by the electronic media and provided a steady, general economic growth in the EC, the printing ink producers estimate the general growth rate to reach around 2% per annum over the medium term.

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SOAPS AND DETERGENTS

(NACE 258.1)

Summary

The soap and detergent industry has become a relatively stable sector with a strong international orientation and significant potential in both industrialized and developing countries. It is also a dynamic industry, operating in a highly competitive environment as indicated by its involvement in advertising as well as by the wide range of products on offer to the consumer. Overall, the consumption of soaps and detergents has increased at a moderate pace in line with rises in the standard of living; market development is enhanced by the introduction of new products and the satisfaction of new demand. Many companies active in the industry also have significant involvement in other areas of household demand including cosmetics, perfumery and other items.

Whereas many industrial products were developed only in the twentieth century, soap has been known and used for over 2 000 years. The soap and detergent

industry can therefore be considered as a combination of a 'classic' material and a modern 'high technology' product. Products covered by the information and statistics below include:

- toilet, household and industrial soaps
- washing products, surface cleaners and scourers.

Household products which are not covered include polishes, cleaning products for windows and mirrors, stain removers, household disinfectants and deodorizers, household insecticides, etc. Together, these items represent about 30% of the soap and detergent sector. These household products are covered in the monography on Maintenance products.

Current situation

The industry is stable and demand for its products is increasing steadily largely irrespective of changes in the economic climate in Member States. An impor-

Table 1
Main indicators, 1983-89

(million ECU)	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	7 628	8 197	8 540	9 286	9 827	10 495	N/A
Net exports	385	425	472	375	460	553	N/A
Production (1)	8 013	8 622	9 012	9 661	10 287	11 048	11 921

(1) 1988-89 Eurostat estimates/forecasts.

Source: AIS, Eurostat (Comext).

Table 2
Production and external trade

(million ECU)	1983	1984	1985	1986	1987	1988
Production	8 013	8 622	9 012	9 661	10 287	11 048
Index	89	96	100	107	114	123
Exports extra-EC (1)	483	526	577	462	569	644
Index	N/A	91	100	80	99	112
Imports extra-EC (1)	97	101	104	87	108	131
Index	N/A	97	100	84	104	126
X/M (1)	4.98	5.21	5.55	5.31	5.27	4.92
Imports intra-EC (1)	545	619	642	684	843	1 064
Index	N/A	97	100	107	131	166

(1) Reporting countries: 1983 EC 10; 1984-88 EC 12; 1988 Greek figures estimated.

Source: AIS, Eurostat (Comext).

Table 3
Breakdown of external trade by product (1)

(million ECU)	1983	1984	1985	1986	1987
Exports extra-EC					
Toilet products	185	227	224	169	240
Household and industrial products	32	34	39	35	37
Washing products, surface cleaners and scourers	266	265	296	258	292
Imports extra-EC					
Toilet products	24	26	29	23	25
Household and industrial products	3	5	5	5	6
Washing products, surface cleaners and scourers	70	70	70	59	77
Imports intra-EC					
Toilet products	158	178	184	185	211
Household and industrial products	28	29	32	31	33
Washing products, surface cleaners and scourers	359	412	426	468	599

(1) 1983 EC 10.

Source: Eurostat (Comext).

tant feature of the sector is the frequency of new product launches reflecting improved technology and changing patterns in consumer tastes. The sector therefore still has major development potential, against a background of very strong competition.

In 1987 the EC market represented just over 8 million tonnes and a value of ECU 9.8 billion. Between 1975 and 1980, annual volume increases of about 4% were recorded; between 1981 and 1987, annual increases had slowed to only about half of this figure.

Consumption and distribution trends

It is estimated that soaps and detergents, in their different forms (see Table 1), are used 750 million times per day in Europe, providing individual and collective hygiene. This industry also satisfies the needs of both institutions and other industries, for which specific formulations are developed, sold in bigger containers and better adapted to the specific needs of hospitals, restaurants, etc. The distributive network for these items is different to that for household products.

Since the 1960s, there has been a concentration of distributive channels, and the self-service market has developed considerably. It is estimated that almost 75% of soaps and detergents are currently sold in supermarkets and hypermarkets compared with less than 40% 20 years ago. This development has modi-

fied the relationship between the manufacturer and the distributive trade, which now has larger and more powerful purchasing groups. The distributive trade is becoming a competitor in that it often commercializes its own brands.

A certain amount of standardization of product container has taken place to provide easier organization of shelf-space for the retailer and for greater product comparability.

Table 4
Detergent market, 1985

(%)	
63	Laundry detergents
16	Dishwashing products
11	Household cleaners
10	Fabric softeners

Source: AIS.

Employment trends

The total of employees is stable and has remained so over many years; greater automation of production processes allowed for improvement of productivity.

A precise estimate of the total number of employees is difficult because many of the companies are also involved in the manufacture of related products such as cosmetics, toiletries, household products, etc. A reasonable estimate of personnel employed in soap and detergent manufacture for the whole EC would

be 80 000 to 85 000, indicating relatively high turnover per employee, at about ECU 130 000.

The increase in automation referred to above has meant that the workforce has needed to adapt itself to new technology. Historically, this need has been met by the implementation of training programmes in which the upgrading of existing personnel has had priority. Recruitment policies have also been aimed at attracting new personnel who are capable of benefiting from sophisticated training programmes.

Factors behind production trends

The evolution of textile materials between 1981 and 1987 triggered important changes in washing habits: boiling of laundry became less frequent; the average number of weekly washes increased significantly; and the quantity of detergent used for each wash decreased. Some product categories developed rapidly: consumption of softeners, in volume terms, doubled within a few years and it is now also sold in concentrated form. Moreover, liquid laundry products have gained a significant market share in some countries.

Table 5
Average number of machine loads per month

	1987
EC	18.0
Belgium	18.2
FR of Germany	14.2
Spain	19.3
France	17.8
Italy (1)	14.2
Netherlands	20.4
United Kingdom (2)	25.4

(1) Large machines only.

(2) Small machines only.

Source: AIS.

Each Member State retains some individual features, as illustrated in Tables 5 and 6. The development of the EC market is the sum of the changes in various independent national markets.

The following socio-demographic trends will play a role in the future development of the detergent market:

- Europe's population has almost stopped growing;
- the proportion of elderly persons is increasing;
- the percentage increase in the number of households is much higher than the percentage increase in population.

These trends mean that the average age of the consumer will be increasingly higher and that the average household will be increasingly smaller. However, there is really no 'typical European' consumer, nor will there be one in the near future. This is due to historical and socio-cultural influences on both attitudes and behavioural patterns. Differences in both climatic conditions and types of washing machines also play a part in the regionally different developments in washing habits. These factors have to be taken into account by the detergent industry in supply and product mix policies.

Table 6
Average number of hand washes per month

	1987
EC	9.6
Belgium	3.8
FR of Germany	4.3
Spain	11.6
France	9.3
Italy	19.4
Netherlands	4.9
United Kingdom	7.2

Source: AIS.

Detergent producers are continually involved in R&D activities with a view to improving their products and increasing their market share. In international companies, research is generally carried out by specialized scientists who have access to and participate in worldwide programmes. This has led to major innovations by adapting formulations to changing consumer needs and through the introduction of technological advances.

The soap and detergent industry carries out a thorough programme of fundamental and applied research including ecological, environmental and safety aspects. Overall expenditure is significant; in major companies, the percentage devoted to research varies between 2.5 and 3% of turnover.

Apart from the development of totally new products, existing products are constantly being modified in the laboratories to improve performance. Only significant improvements are implemented in the market — often without a special marketing effort — as part of the ongoing process of product improvement.

Research also includes development of new manufacturing processes; it was a manufacturing development which first allowed the industry to use enzymes in washing powders. The improvement in performance (on fruit stains, for instance) is widely known.

A recent development is the appearance of liquid formulations in the market-place; these formulations are especially efficient for low-temperature washing. Another recent trend is the introduction of more concentrated products; this will further reduce distribution costs.

Recently, there has been discussion, throughout the Community, on the reduction of the presence of phosphates in detergents. It is thought that the presence of phosphates may be responsible for the phenomenon of eutrophication (the proportion of the growth of certain organisms in water) in certain areas and under certain circumstances. As a result two Member States have introduced a legal restriction on phosphate levels (the Federal Republic of Germany and Italy); proposals are under way in Spain and a further restriction is foreseen in Italy; in the Netherlands, the industry has agreed to a voluntary restriction. In the Benelux countries, the industry has agreed to make available and/or promote zero-phosphate products. In the United Kingdom eutrophication is not a serious problem due to the geography and hydrography of the country.

Major structural and geographical features

The number of EC companies active in the manufacture and distribution of soaps and detergents approaches 1 000. This includes both national companies — basically supplying only their local market — and major international companies which are active worldwide. The names of these companies are not as well-known to the public as their brand names, which are widely advertised.

Anticipating 1992, many companies have already concentrated their production and technical facilities. A programme of cultivating awareness of the significance of 1992 to the smaller companies is being actually pursued through the Trade Association (AIS).

Outlook

It is difficult to make long-term forecasts, since consumer behaviour and therefore demand may change. In addition, the textile industry and the domestic appliance sector are also subject to new developments, which could strongly influence the detergent industry. Packaging is another area where changes occur, through new materials and new environmental considerations.

A stable and slow growth is expected for the soaps and detergents industry, that has the capacity to adapt to new requirements of the market. Growth will be higher in the southern regions of the Community, where detergents consumption is currently lower than in the northern regions.

An important part of research and development activities relates to the socio-economic environment. Factories and manufacturing plants are now designed more carefully than in the past to minimize environmental impact and to ensure better working conditions for the workforce. Health and safety, and the protection of the environment are an important element of research programmes.

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PERFUMERY, COSMETICS AND TOILETRY PRODUCTS

(NACE 258.2)

Summary

In 1988 the cosmetics, perfume and toiletry products industry continued the progress registered over the preceding years. Between 1985 and 1989, sales rose by 27% and amounted to nearly ECU 14 billion in 1989.

Given the size of the European market compared with that of the world market, and the fact that the industry is largely export oriented, the trends of the EC market ought not to be confused with that of the industry itself. The industry is undergoing increased concentration. World sales figures are not available but the two largest markets outside the EC were, in 1987, the United States, at ECU 11.8 billion, and Japan, at ECU 6.1 billion.

Current situation

The following sectors are involved:

- toiletry products (for face and body care)
- make-up
- perfumery products
- products for men
- hair products
- tanning products
- toilet soaps.

Similar diversity is also found in the distribution circuits where structures and tendencies are currently undergoing change.

The industry closely follows these trends, thereby ensuring that the various social and economic groups on the European market are made aware of the products available.

While the toilet soap and toothpaste markets are developing rather slowly, most of the other products are enjoying sustained growth.

This is particularly true for beauty care, make-up and perfumes where consumption tends to expand as the standard of living rises, when new consumers arrive on the market, and, more particularly, when

people develop a desire to improve the quality of their lives.

Consequently, the use of hygiene and grooming products on the one hand, and a desire to slow the ageing process on the other, create a favourable backdrop that gives a boost to the industry.

Within this general evolution, men's products have expanded favourably and in 1988 accounted for 6% of total sales. Of course, men have always used hygiene and toiletry products, but the current trend is moving in the direction of specific products adapted to men's particular needs and partialities.

As a result, increased consumption of specific care or treatment products for the skin and hair, as well as perfume products, have generated renewed interest on the part of manufacturers and distributors.

The press also participates in this movement by paying more attention to what is happening in this market sector.

Structure of the industry

The perfumery, cosmetics and toiletry products industry can be subdivided into three categories:

- national enterprises
- European companies
- transnational companies.

In recent years the first of these three groups have acquired added dynamism.

In the Federal Republic of Germany, Italy and Spain, companies are developing at a rapid pace and new firms are being set up. This is particularly true in the area of perfumes, where numerous initiatives have recently been taken.

In the most recent EC Member States, there is an abundance of firms offering a variety of innovations, a fact that should be borne in mind.

Firms operating in Europe have already secured a prominent position in most of the EC Member

Table 1
Main Indicators, 1980-88
Perfumery, cosmetics and toiletries

(million ECU)	1981	1982	1983	1984	1985	1986	1987	1988	1989
Ex-factory sales (1) (2)	6 850	7 582	7 705	8 430	10 963	11 334	11 948	12 815	13 935

(1) Excluding exports and toilet soaps.

(2) 1980-84 EC 10; 1985-89 EC 12.

Source: Colipa.

States where they have to cope with stiff competition. These firms, of whatever nationality, are seeking new horizons for expansion while at the same time they are striving to develop their position on European markets.

Some firms are well established on the world market. This is beyond a doubt where most changes have taken place, and will continue to be introduced.

By way of example, the following takeovers were conducted in 1988:

American companies:

- Johnson and Johnson acquired Piz Buin
- Avon acquired the Stern and Giorgio perfumes.

German companies:

- Wella acquired Rochas
- 4711 Mühlens purchased JC de Castelbajac, C. Jourdan and Diploma.

Table 2
Ex-factory sales by product category

(%)	1987	1988
Alcohol-based products	12.2	7.8
Beauty and care products	28.6	25.9
Hair products	26.1	28.2
Toiletries	20.3	22.5
Men's toiletries	4.9	5.9
Other products	7.9	9.7
Total	100.0	100.0

Source: Colipa.



Japanese companies:

- Shiseido took over Carita and Georges St Gilles.

French companies:

- Sanofi bought Nina Ricci and Fendi
- L'Oréal purchased Helena Rubenstein.

The companies in this category are clearly undertaking strategic mergers to ensure the following:

- improvements in their market positions
- new market entrance in foreign countries
- penetration of new market sectors.

The overriding characteristic of our industry in 1988 is a notable dynamism, revealing the following:

- that competition is strong
- that possibilities for development exist
- that prospects for exploration by EC companies are very good.

Table 3
Ex-factory sales by country

	(%)
EC	100.0
Belgium, Luxembourg	2.6
Denmark	0.9
FR of Germany	24.9
Greece	1.2
Spain	7.9
France	22.5
Ireland	.3
Italy	19.6
Netherlands	3.4
Portugal	1.0
United Kingdom	15.7

Source: Colipa.

Regulatory environment

Current regulations are now being revised by the EC, and there is a hope that the new versions will foster solid development in this particularly sturdy industry that has the ability to step up the EC's weight on the world cosmetics market.

Colipa: European Federation of the Perfumery, Cosmetic and Toiletries Industry
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MAINTENANCE-PRODUCTS INDUSTRY

Description of the industry

Maintenance products are defined as preparations and substances that are marketed ready for use, or those which may easily be used by diluting with water. They are designed for household and institutional purposes and have some industrial applications. They include products such as cleaning, metal-polishing and scouring preparations, waxes and polishers, disinfectant and anti-parasite preparations, stain removers, etc.

These materials cover an important range of essential products required to achieve and maintain the high standards of domestic health and hygiene deemed necessary in the modern household and institutional environment. They help to keep things that surround us running, to save time in our household activities, and to raise our standard of living.

The European market

The consumption pattern for maintenance products varies widely across EC Member States, because of different washing habits, climate, etc. In this respect, the European market is essentially an amalgam of the individual Member-State markets, which behave quite independently. The market for maintenance products has, nevertheless, changed steadily throughout the past decade, and is both strongly consumer-oriented and highly competitive. There is an increased number of smaller households, more single-parent families and a larger senior-citizen population which implies a more intensive use of space and more frequent cleaning. For all these reasons, convenient products that save the user's time are called for. Continuous research and development in this industry are thus necessary to satisfy consumer requirements.

Table 1
Dimensions of the EC maintenance-products industry

	1986
Number of companies	550
Number of employees	25 000
Turnover (million ECU)	3 000

Source: FIFE.

Structure of the industry

The total number of companies and employees is difficult to assess precisely since a large number of them operate in other consumer-related product areas, alongside their maintenance-product sections, which leads to some overlap. Furthermore, many small or medium-sized companies operate in this sector, and the range of products is very broad. This makes the collection of statistical data somewhat difficult.

There are an estimated 550 companies active in manufacturing and selling maintenance products in the EC. This includes major international companies operating world-wide, as well as many smaller companies supplying their home market.

It must also be noted that there is growing inter-trade competition between supermarket groups promoting their own brands. They are generally lower-priced, either because of lower concentrated products or because important quantities are put on the market. Manufacturing of these generic products is generally performed by recognized companies.

Employment trends

The total number of employees in EC Member States has remained fairly stable in the 1980s, at around 25 000; productivity improvements have allowed the industry to face the increased demand without increasing employment.

Wages and salaries in the maintenance industry are in general above the average for other industrial sectors. This is due to the high level of training that is required in this industry. The number of qualified jobs is higher than average, be it in the research, testing, sales, or producing area, and continuous training is needed to catch up with the continuous flow of innovation in this sector.

External trade

Thanks to its good competitiveness, the European maintenance product industry is a net exporter to the rest of the world. As is shown in Table 2, the ratio of extra-EC exports to corresponding imports remains around 4. However, data on trade in this

sector have to be taken with caution as insecticides and pesticides for agricultural purposes, which are part of the agrochemical sector, are also included in the statistics; they represent an important share of trade in the maintenance-product sector.

Looking at maintenance products excluding insecticides and pesticides, the trade balance is increasing by 20% both in 1987 and 1988, with extra-EC exports growing by more than 10% in both years, and extra-EC imports being stable in 1987 and growing by 5% in 1988. The ratio of extra-EC exports to extra-EC imports is around 3, and remains stable.

Investment trends

The intense competition in this market, as well as the rapid evolution of consumer tastes and of new regulations, necessitate continuous research and development to keep ahead of the market. The continuous improvements and changes brought to the packaging and manufacturing processes require a flexible work force, employing well-paid, high-calibre personnel, who upgrade themselves through on-going training programmes.

Consumer safety and environmental considerations are always influential factors in product development. Packaging and labelling are designed in such a way as to make the product easy to use and safe, and to adapt to new regulations. Recently, much work has been carried out to produce alternative propellants for aerosols and new types of packaging eliminating the need for pressurized containers. A significant amount of standardization has taken place among member companies concerning product containers, and there is a widespread use of packages conforming to the EC ranges of sizes Directive.

The products covered here are produced to conform both with Community and national regulations as well as with all consumer-safety, health and environmental requirements. The introduction of thickened bleach products, which considerably enhances these products' performance, is a good example of this trend. Another illustration is given by the hypochlorites commission. This body monitors approximately 1 million tonnes of products per annum that provide, at low cost, essential and very effective protection in the public-health field. The commission is conscious that in a very limited number of situations a possible hazard can arise from the improper use of hypochlorites. This can occur if these products are mixed with other acidic cleaners in use at the same time. The hypochlorites commission has strongly supported improved labelling to ensure that hypochlorites are not used incorrectly, as well as a public information programme on their benefits and safety when used correctly.

For brands introduced by supermarket groups, formulation and packaging is generally carried out in accordance with the advice and guidance of member companies in the federation.

Conclusion

Because of the variety of products manufactured by this industry, it is difficult to provide a global outlook. However, the use of maintenance products can not be easily reduced, as they perform necessary tasks in many areas of our life. They are thus less subject to the ups and downs of the economy. One can expect a stable market, with growth lower than that of GDP. Southern countries in the EC, where the use of maintenance products is less generalized than in northern countries, should reveal better growth perspectives.

Table 2
External trade (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Exports extra-EC	641	813	891	1 067	1 304	1 446	1 332	1 163	1 151
Index (2)	46	57	62	75	90	100	92	80	80
Imports extra-EC	115	166	196	216	253	323	288	267	315
Index (2)	40	54	63	70	78	100	89	83	98
X/M	5.57	4.90	4.55	4.94	5.15	4.48	4.63	4.36	3.67
Imports intra-EC	513	609	685	816	1 031	1 084	1 048	1 023	1 097
Index (2)	52	60	67	80	95	100	97	94	101

(1) Reporting countries EC 9: 1980; EC 10: 1981-83; EC 12: 1984-88. Partner country extra/intra-EC 12. Greece estimated.

(2) Taking into account changes in EC membership.

Source: Eurostat (Comext).

The maintenance-products industry provides almost all retail groups selling its brand products with advice and guidance together with manufacturing and packaging facilities.

The industry includes sections of multinational groups together with many large and small companies, which, together, cover a wide product range.

The standard of the personnel is high, with well-trained and competent operators in marketing, commercial and technical fields.

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THE NON-PRESCRIPTION PHARMACEUTICAL INDUSTRY

(Included in NACE 257)

Summary

About ECU 6.7 billion were spent in 1988 by EC consumers on medicines without any medical prescription. This represents about one-third of the total pharmaceutical market. Encouragement of self-medication and public awareness of general health will probably lead to moderate growth in the industry (about 5%) in the coming years. The situation varies widely from country to country, mainly because of differences in prescription laws and reimbursement systems, but also in registration procedures, product advertising and pricing. Further harmonization of EC legislation should therefore help the industry to take full advantage of the recent positive trend.

Definition of the sector

The non-prescription pharmaceutical industry produces medicinal products which can be bought directly by the consumer without a doctor's prescription. These products are mainly used for minor illnesses. The purchase without medical prescription (OTC or over-the-counter) can thus be regarded as acceptable under certain circumstances, since it leads to:

- a reduction of the expenses of the health care system;
- a reduction of doctors' workloads with cases which do not require medical treatment;
- a strengthening of self-responsibility as far as health problems are concerned.

OTC products are not defined in the same way in all European countries. This report only relates to products which are medicines according to the drug laws in the individual countries.

Current situation

The size of the OTC-market in Europe is difficult to determine because prescription laws, reimbursement systems and outlets for medicines vary widely from country to country. One particular product may be

prescription-bound in one country and OTC in another. It may be sold exclusively in pharmacies, or in *drogueries* or food-outlets, in which case statistics are difficult to collect. Finally, there are many products which are basically prescription-free, but can be reimbursed if prescribed by a doctor.

After many years of discussion, data collection and continuous improvement of the available data, the best figure for the market size of non-prescription drugs on a consumer-price basis which AESGP could work out in cooperation with the Institute of Medical Statistics (IMS) would be ECU 12.9 billion, which is about one third of the total pharmaceutical market in 1988.

The turnover of these products is also defined as the OTC-potential. Almost 50% of this potential however is prescribed by doctors. About ECU 6.7 billion are actually spent by the consumers in Europe for medicines without any medical prescription. In this report, explanations concerning the OTC-potential (turnover of all non-prescription medicines) as well as the real self-medication or OTC-turnover will be given to characterize the industrial sector as well as possible.

Table 1
Turnover of non-prescription medicines and their share in the total pharmaceutical market

	Turnover (million ECU)		Share of total market (%)	
	1987	1988	1987	1988
Belgium	500	500	30	29
FR of Germany	4 700	5 100	37	36
Spain	450	500	15	13
France	3 700	4 100	35	35
Italy	900	900	13	11
The Netherlands	700	700	47	46
United Kingdom	900	1 000	22	22

Source: Institute for Medicinal Statistics, 1989.

The importance of self-medication medicines differs widely from one country to another. Whereas at least officially hardly any use of non-prescribed medicines exists in Greece, and is relatively low in other southern European countries, such as Italy, Spain or Portugal, it is well established in countries like France, the Federal Republic of Germany and

the United Kingdom. The 1987 and 1988 turnover of non-prescription medicines in the seven major markets is indicated in Table 1. Table 2 shows the overall turnover of the real self-medication together with the percentage share.

Table 2
Turnover of self-medication products and their share in the total pharmaceutical market

	Turnover (million ECU)		Share of total market (%)	
	1987	1988	1987	1988
Belgium	300	300	18	18
FR of Germany	2 200	2 300	16	16
Spain	400	400	12	11
France	2 000	2 200	19	19
Italy	800	800	11	9
The Netherlands	150	150	9	9
United Kingdom	500	600	14	13

Source: Institute for Medicinal Statistics, 1989.

However, the turnover as well as the market share do not always cover the same scope of products with the same promotion opportunities. In France, for instance, only around half of the total turnover for self-medication is actually covered by advertised medicines; the other half are reimbursable non-advertised medicines. The latter are, however, subject to price control and cannot be advertised. In other countries, practically all non-prescription medicines are advertised and are purchased by the consumers themselves.

The size of the major product groups in these seven countries is shown in Table 3.

Table 3
Turnover of the major self-medication product groups, 1988 (public prices)

(million ECU)	Turnover
Product group	
Cough-and-cold preparations	1 140
Pain relievers	1 070
Digestive and intestinal remedies	940
Skin treatments	700
Vitamins/Mineral supplements	600

Source: Institute for Medicinal Statistics, 1989.

As these statistical data about the non-prescription market were calculated with this definition in 1987 for the first time, no development of the overall market for non-prescription medicines and the share of real self-medication can be indicated, without leading to confusion. Up to now, practically only

overall pharmaceutical turnover was registered by IMS, not taking special account of non-prescription and self-medication products. Therefore, past estimates cannot be linked directly with the figures for 1987, as the method of establishing these data changed. However, it can be shown that there are considerable differences in the development of non-prescription medicines and self-medication in the individual countries of the European Community. This concerns for example:

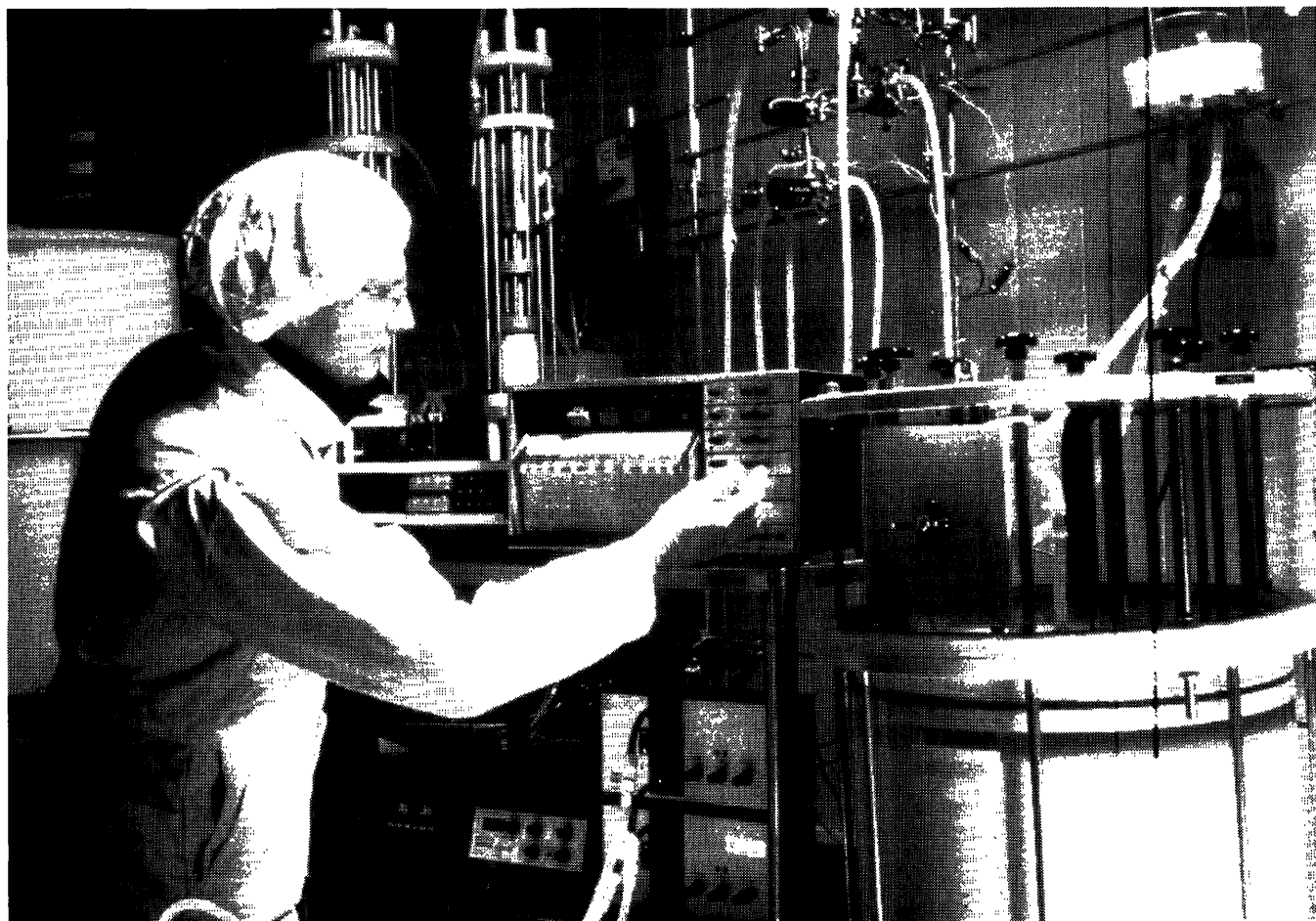
- the OTC-turnover in the last three years (which increased in the United Kingdom, hardly changed in the Federal Republic of Germany, and decreased in France);
- the important OTC product categories. In practically all European countries, cough and cold preparations or pain relievers are the main non-prescription medicines. However, tonics, for instance, are far more important in the Federal Republic of Germany than in most other countries, while vitamins and mineral supplements are especially relevant in the Netherlands;
- coping with the problem of financing the health care systems, which leads to completely different measures of cost containment and thus to different reimbursement systems. As this basically influences the economic incentives for practicing self-medication, the different development of this industrial sector is obvious.

Furthermore, both members of parliament and health officials in different European countries have realized the contribution of self-medication to the financing of the health-care systems. In the Federal Republic of Germany, for example, it is estimated that self-medication reduces the spending of the national health-care systems by at least ECU 1 billion.

Regulatory environment

The registration of OTC products is in most cases and countries identical or similar to the registration of prescription products. Currently, this procedure is repeated in every country for the same product, which is not only a waste of time and money but also the main legislative barrier for free movement of products as manufacturers receive separate marketing authorizations in each country.

As the national development of self-medication shows considerable differences, it would be important to achieve a system of mutual recognition, allowing the supply of a product accepted as safe



and effective in one country to be supplied in other Community countries.

Product information and advertising

The OTC pharmaceutical is a product which needs continuous information concerning availability, improvements and renewal, so that the consumer knows about it and buys it when he or she needs it. The best product will not help if the patient with a minor ailment does not know about its existence. This goes hand in hand with the need for health education and cost-awareness.

It is necessary to present this information in advertisements that are readily accepted and understood by the users. These ideas are generally accepted in all Member States, and all media are available for OTC advertising in most of them.

Advertising controls for non-prescription medicines, however, vary considerably from country to country. Some have established a self-controlling industry, while others apply controls through official bodies, like ministries of health. Often inserts or special messages are required for pharmaceutical products. This message should be short and clear to convince the consumer to read the label or leaflet carefully

because this is the most complete piece of information, and includes the limits of self-medication, i.e. when the patient should see the doctor.

A prohibition on advertising of medicines (for example, as far as television advertising is concerned, as is the case in Belgium), would harm the future development of this sector, because ingredients and products which have proved to be safe and suitable for use without medical prescription can only be made known to the population by advertising. This takes into account the fact that according to a high number of studies, the advertising of medicines does not cause any abuse or over-consumption.

Pricing

Price controls of OTC medicines with reimbursed prescription medicines can be justified, according to the EC Commission. However, the Commission has also pointed out that in the case of products which can be purchased directly by the consumer, normal competitive prices apply, since the consumer can select the product which represents the best value for money himself, if necessary after consulting the pharmacist. It would, therefore, seem appropriate to aim for the elimination of controls on these pro-

ducts. In that case, however, Member States would still be able to impose a freeze on their prices, provided that such a freeze also applied to other sectors of the economy as part of an overall anti-inflation strategy.

This view is shared by the vast majority of the EC countries and is a very important point for the future development of the OTC industry.

Outlook

As a high number of non-prescription medicines are reimbursed at least to a certain degree by the health-care systems, the incentives for an increase of self-medication are limited. However, different studies, such as the publication *Self-medication in Europe*, published by the WHO Regional Office for Europe in 1988, show an increasing awareness of self-medication and a great willingness among people to take care of their health and illnesses without professional treatment.

Consequently, the outlook for this sector can be regarded as positive. An annual increase of the whole turnover of about 5% is expected for the next years, however, with significant differences in the individual countries.

An overall trend towards prophylactic self-medication products and non-prescribed diagnostics can be seen. In some countries, for example, purchases of products containing garlic or ginseng could grow very fast, leading to considerable gains in turnover

and market shares. This goes along with an increase in vitamins and mineral supplements in many countries. Both tendencies are expected to continue. On the other hand, product groups which had relatively a high turnover for a number of years (for instance, pain relievers or cough-and-cold preparations) are stagnating, and will only slightly change in many countries. This, however, concerns more the countries with an already high self-medication turnover than the countries where self-medication is coming up and where non-prescription product groups like cough-and-cold preparations or pain relievers will increase in a more significant way.

However, like the whole pharmaceutical industry, the future development of the non-prescription medicine manufacturers also depends to a relatively high degree on the regulatory environment of the single market of 1992. If the proposed system of mutual recognition of registration visa and therefore fast availability of marketing authorizations as well as the principles of continued responsibility, but liberal advertising and market-oriented pricing are observed, self-medication with OTC medicines will be able to enlarge its role in supporting governments to control their health expenditure. It will also assist the medical profession in health-education and cost-awareness and help many people to overcome minor health problems.

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PHARMACEUTICALS

(NACE 257)

Summary

Although the pharmaceutical industry in the EC has reported a positive trade balance with the rest of the world over the 1980s, it is currently faced with a number of problems jeopardizing the future health of the sector. These include the high cost, currently estimated at ECU 100 million, of developing and bringing to the market a product or a new chemical entity (NCE); the period of exclusivity granted under existing patent protection legislation; the varying degree of State involvement in Member States' social security systems; the favourable treatment granted to certain generics manufacturers; and increasing competition from the US and Japan, which are generally able to operate in a freer domestic environment.

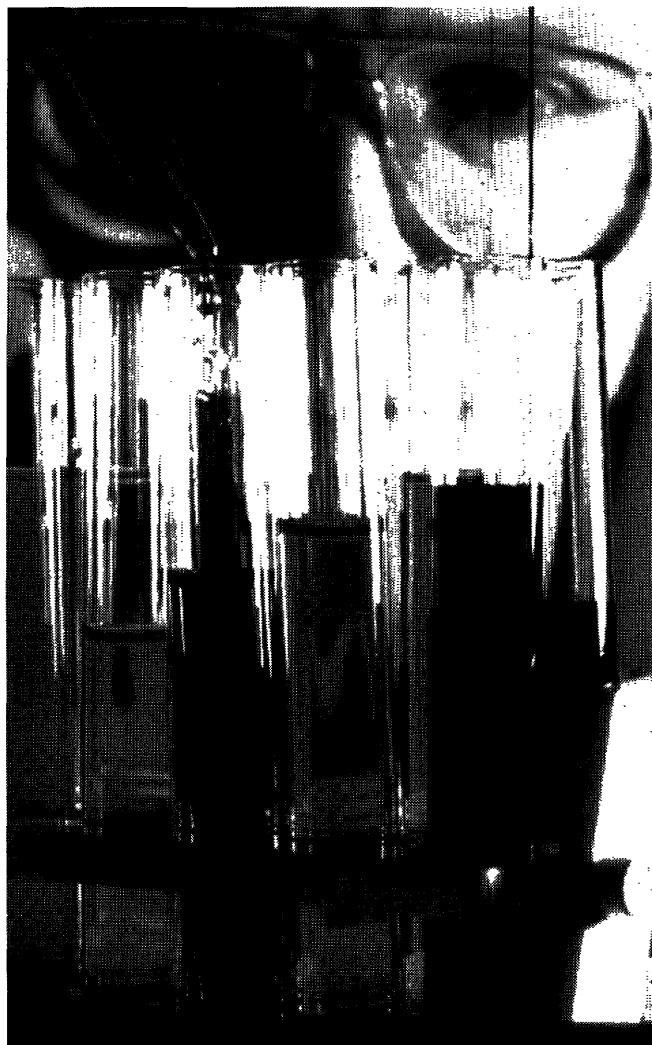
Description of the sector

A survey of the pharmaceutical sector requires first of all a definition of what is meant by medicinal products, and how this translates into economic data.

Within the EC, the first Article of Directive 65/65 defines medicinal products as shown in Table 2.

It is not so easy to translate the concept of medicinal products into economic terms. Until recently, each Member State had its own classification. To avoid any confusion, the sector has adopted, as reasonably representative, the Standard International Trade Classification (SITC), heading 54 of the OECD, i.e. the entire 'medicines' section, as well as the sections covering specific active substances.

The key figures are based on this definition. Missing data have been completed, wherever possible, with



Eurostat data drawn from a NACE 257 base, but the statistics are slightly different and less complete (see Table 3).

The data reported here are approximate and should be considered as trend indicators, providing an acceptable basis for comparison.

Table 1
Main indicators, 1980-91 (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption (2)	15 352	17 316	19 382	21 438	23 350	26 495	34 759	36 624	N/A	N/A	N/A	N/A
Net exports	1 797	2 044	2 250	2 470	2 842	3 129	3 174	3 800	N/A	N/A	N/A	N/A
Production (3)	18 601	21 199	24 234	26 585	28 952	32 397	37 775	40 422	44 343	48 378	52 502	57 385
Employment (1 000) (3)	389	397	397	395	398	443	446	455	460	460	N/A	N/A

(1) Figures based on SITC 54.

(2) Excluding Spain. The 1980 figure is estimated.

(3) 1988 estimated.

Source: EFPIA.

Definitions and scope

Table 2

Article 1 of EC Directive 65/65

- Proprietary medicinal product
Any ready-prepared medicinal product placed on the market under a special name and in a special pack.
- Medicinal product
Any substance or combination of substances presented for treating or preventing disease in human beings or animals. Any substance or combination of substances which may be administered to human beings or animals with a view to making a medical diagnosis or to restoring, correcting or modifying physiological functions in human beings or in animals is likewise considered a medicinal product.
- Any substance irrespective of origin. Such substances may be:
 - human, e.g. human blood and human blood products
 - animal, e.g. micro-organisms, whole animals, parts of organs, animals secretions, toxins, extracts, blood products, etc.
 - vegetable, e.g. micro-organisms, parts of plants, vegetable secretions, extracts, etc.
 - chemical, e.g. elements, naturally occurring chemical materials and chemical products obtained by chemical change or synthesis.

Source: OJ C 22, 9. 2. 1965.

Table 3

Composition of SITC 54

Combined Nomenclature Codes (CN)

CN	29.36	Provitamins, vitamins
	29.37	Hormones
	29.38	Alkaloids
	29.41	Antibiotics
	30.01-30.06	Pharmaceutical products

Composition of NACE 257

Eurostat		
130311 to 130396		Opium, vegetable extracts, mucilages
150419		Fish liver oils
294410 to 294499		Antibiotics
300110 to 309700		Pharmaceutical products
340790		Dental cements
381974		Pharmaco-surgical products including plasters

Sources: SITC and Eurostat.

Current situation

The pharmaceutical industry is present in every Member State of the Community. However, the various stages of the production of pharmaceuticals are implemented in different ways as a function of the company. Luxembourg is a special case in that it only imports pharmaceutical products.

The combined production of pharmaceutical companies active in the European market doubled bet-

ween 1980 and 1987, from ECU 19 billion to ECU 40 billion.

Europe is currently the world's leading location for production and export of pharmaceuticals, with an external trade surplus of over ECU 3.8 billion in 1987, twice as much as in 1980. Moreover, intra-Community trade is growing fast, and was worth ECU 5.3 billion in 1987, 2.6 times bigger than in 1980.

The European pharmaceutical industry continues to invest close to ECU 5 billion each year in research. However, its position is precarious. Domestically it faces problems of various regulatory environments, pricing policy and patent's law which differ from country to country in the EC (see below for more details). Internationally it faces strong competition from the United States and Japan.

The pharmaceutical industry employs over 450 000 persons in the EC, more than 10% of whom are involved in research.

Factors behind production trends

Production is very diversified as it meets specific and very diverse demands. It varies as much in its degree of integration (from the synthesis of basic chemical entities to the preparation of finished products) as it does in the type of dosage formulation produced, (from the most widely used solid formulations, i.e. tablets, pills, etc., to the specific formulations meeting the needs of particular therapeutic activities, i.e. injectable ampoules, capsules, etc.).

Table 4
Insurance and State spending as a percentage of total spending on medicines, 1987

(%)	
52.0	Belgium
53.4	Denmark
56.4	FR of Germany
N/A	Greece
66.9	Spain
65.2	France
N/A	Ireland
64.0	Italy
33.5	Netherlands
67.2	Portugal
75.6	United Kingdom

Source: EFPIA.

Production must meet the demand for both widely prescribed medicines intended for the treatment of major illnesses, as well as for medicinal products used to treat certain rare conditions, of which only a

few hundred cases have been diagnosed in Europe. However, in all cases the legislative framework is the same, production standards are very strict and high quality is essential.

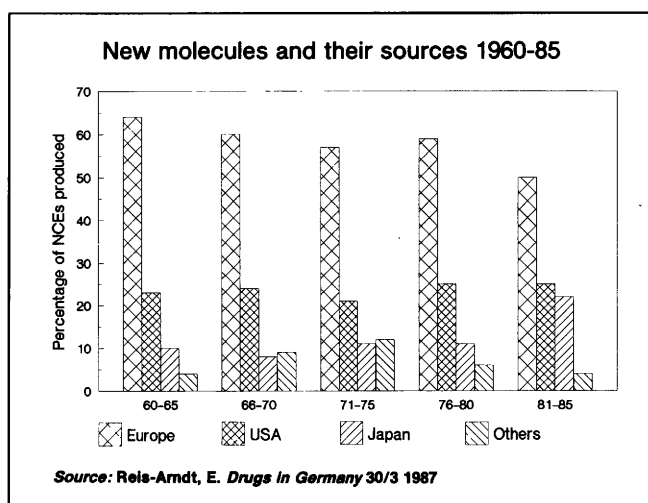
Production has increased steadily to meet the demand of the world market, with the European industry active in scientific and technical research.

Research

As an innovative sector, medicinal products depend heavily on research for progress. In 1987, the Community industry invested close to ECU 5 billion in research, which amount represents nearly 15% of its turnover and one of the highest research/turnover ratios in the industry. Depending on the size of the national industries, investment varies between 3.5% and 24.6%. Research is carried out principally in Germany, France, Italy and the United Kingdom, and to a lesser extent in Belgium, Denmark, the Netherlands and Spain.

As a result of this important investment, seven European companies (five of EC origin) rank among the leading 10 worldwide in terms of nominal R&D spending. However, if companies are ranked according to profitability (the percentage of turnover accounted for by profit), only three European companies get into the top 10.

Figure 1

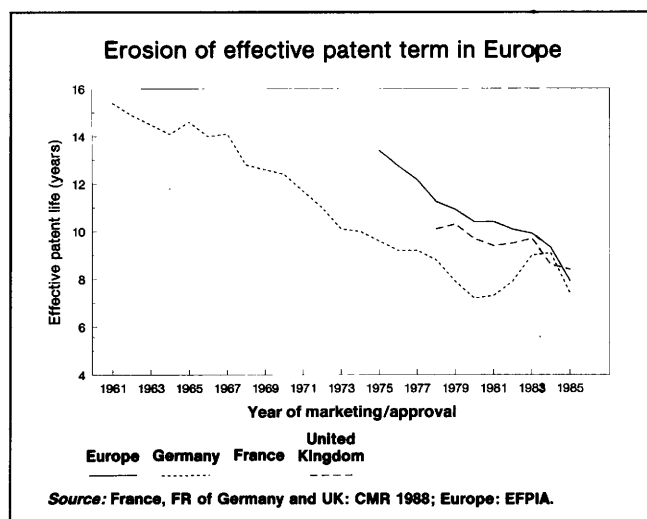


As can be seen in Figure 1, European research is still the most productive, but the result achieved by Japan in particular (19 NCEs out of 56 introduced in 1987) demonstrates that a redoubling of effort is required and that more investment is essential.

Strong competition exists both in Europe and worldwide, and no single company has a dominant position; the 10 largest companies in the world represent only 25% of the world market. However, the diversity of research fields has required companies to specialize in certain research areas, and in corresponding production areas. In addition to research costs (essentially for personnel), other necessary investments (see Table 5: well over ECU 2 billion in 1987) are of sufficient size to confirm the need for specialization. However, this is a changing situation and not one company or product is protected from the arrival on the market of a competitor with a newer therapeutic profile.

Another problem area is the long development time of a product. It takes over 10 years from the time a patent is applied for until a marketing authorization is obtained. This actually uses up more than half the patent protection period granted to the innovator. Companies are left with too short an exclusivity period to ensure profitability of their investment in R & D before the appearance on the market of a second, and obviously much cheaper, type of competition: the imitator (see Figure 1). By comparison, American and Japanese companies have been granted by their government, an extension of the patent-protection period.

Figure 2



Consumption

In 1987, the EC market was worth around 37 billion ECU.

A patient can obtain medicine either through a medical prescription — and in this case he will probably (but not necessarily) be reimbursed by his social security system — (see Table 4) or without a pres-

cription in which case he pays the full price if he wishes to obtain a product for minor indications. By the latter are meant products available over the counter (OTC), which have been advertised directly to the public.

The American concept of an 'ethical' or an 'OTC' product does not cover all the above possibilities; a clearer definition should therefore be given of the terms 'OTC' and 'non-prescription medicine'.

For products dispensed on the basis of a prescription, reimbursement mechanisms differ in the 12 Member States. A 1986 survey examined the extent of government subsidizing as a percentage of total patient spending on medicines (see Table 4).

Apart from varying reimbursement systems, the EC also has 12 different price-structure systems, which are summarized below:

For a price to the public of 100 units:

- the manufacturer receives between 49 and 70 units,
- the distributing wholesaler between 6 and 13 units,
- the dispensing pharmacist between 22 and 38 units,
- the State, through VAT, between 0 and 25 units.

(NB: in view of the uniqueness of the UK system, this country was not included in this survey.)

Employment

The EC pharmaceutical industry has a workforce of approximately 450 000 persons and, in general, employment is stable. However, indirect employment generated upstream and downstream should be taken into account. It has been calculated that the pharmaceutical industry generates employment for a total of 1.2 million people throughout the EC.

In addition to employment stability, the workforce covers a wide range of skills within companies. University graduates account for 20% of these. Women represent, on average, 30% of the total workforce, and up to 50% in certain manufacturing countries.

Export

The trade balance has been positive since the beginning of the decade, and has doubled in the last eight years. However, export growth is showing signs of slowing, and despite a clear improvement in 1987, imports are still increasing faster than exports. This is reflected in the export/import ratio, which has slid from 2.48 to 2.16.

Table 5
Production, foreign trade and gross investment (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Production in current prices								
EC	18 601	21 199	24 234	26 585	28 952	32 397	37 775	40 442
Index	57	65	75	82	89	100	117	125
USA (2)	14 273	19 987	25 207	30 791	36 704	41 058	34 915	32 722
Index	35	49	61	75	89	100	85	80
Japan (2)	9 181	12 755	13 977	17 234	19 574	21 115	20 831	24 141
Index	43	60	66	82	93	100	99	114
EC trade in current prices (3)								
Exports extra-EC	3 013	3 527	3 953	4 497	5 174	5 772	6 103	7 076
Index	N/A	61	68	78	90	100	106	123
Imports extra-EC	1 216	1 483	1 703	2 027	2 332	2 643	2 929	3 276
Index	N/A	56	64	77	88	100	111	124
X/M	N/A	2.38	2.32	2.22	2.22	2.18	2.08	2.16
Gross investment (4)	927	1 072	1 313	1 384	1 504	1 764	1 998	2 378

(1) Excluding Greece. Figures cover SITC 54.

(2) Census of Manufactures and Eurostat estimates.

(3) 1980: Excluding Greece and Spain.

(4) Excluding Ireland and Portugal; 1983, 1985, 1986 and 1987 are estimates.

Source: EFPIA.

Table 6
Evolution of the world market

(million ECU)	1984	(%)	1985	(%)	1986	(%)	1987	(%)	1988	(%)	1992 ⁽¹⁾	(%)
World	110 389	100	123 314	100	112 202	100	116 420	100	130 573	100	148 037	100
Europe	25 601	23	28 831	23	30 295	27	32 916	28	36 703	28	46 516	31
USA	30 704	28	34 663	28	29 723	26	28 778	25	32 982	25	46 889	32
Japan	16 567	15	18 396	15	20 134	18	21 966	19	25 874	20	28 394	19

(1) World total excludes Eastern Bloc.

Source: US estimates.

The world market for pharmaceutical products has evolved, as shown in Table 6, growing by more than 18% in ecus from 1984 to 1988. This rapid expansion provides good opportunities for export growth.

Outlook for 1992

Europe as a whole represents the largest potential market in the world. However, unlike in the USA and Japan, the existing structures do not allow it to benefit from a market free of internal barriers. The EC market effectively consists of 12 separate markets as opposed to one large market.

The pharmaceutical industry must cope with a series of specific uncertainties which make attempts at forecasting difficult. In short, the trend appears to be one of slower growth than the 4.6% per year (in volume terms) registered from 1980 to 1987. The challenges confronting the industry are formidable:

- rising research costs and the need to invest simultaneously in new fields such as biotechnology. For example, in the USA, 1987 R&D spending in this area was estimated at ECU 1.7 billion (USD 2 billion), 69% of which was on health care. This is to be compared with the ECU 5 billion spent in the EC for R&D in the whole pharmaceutical sector;
- pressures on the industry in respect of cost containment by national authorities who are, for their part, interested in controlling healthcare budgets;
- erosion of protection afforded by existing patent legislation due to lengthy administrative procedures and the sophistication of control techniques in the industry;
- parallel to the erosion of effective patent life, the threat from lower-priced imitator products to the detriment of the innovative medicine. The EC Commission, convinced of the importance of this issue to pharmaceutical industry research and competitiveness, has expressed the wish to present a proposal for the restoration of a patent term in the autumn of 1989;

- strong competition from the the principal US and Japanese competitors who already benefit from a large internal market. However, internationally, the outlook is good since demand is likely to grow. The increase in population and especially of the proportion of elderly people in industrialized countries will necessitate a greater number of therapeutic agents and means.

According to US projections, the European market will evolve in a more limited way than the other principal markets, but still has undoubted potential. However, in view of Japan's increasing share of the world market, the prospects of growth for Europe based producers are less favourable.

It therefore appears that operating in a complex, domestic and internationally competitive environment, the European pharmaceutical industry faces an uncertain future. Its innovative and technical capacity is well established, but the investment necessary for healthy growth is essential. In short, a balanced and global solution must be sought within the EC to compete successfully and in line with the Commission's views, as expressed in the Explanatory Memorandum to Document COM (86)765 final (which became the so-called 'transparency' Directive 89/105).

'The aims of Community policy must be to ensure that such measures (i.e. those taken by national authorities to control the cost of medicines and social security) do not adversely affect the operation of the internal market and take due account of the need to maintain a high level of innovation within the Community.'

'The maintenance of a high level of public health within the Community will to a large extent depend on the activities of the Community's own pharmaceutical industry.'

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MAN-MADE FIBRES

(NACE 26)

Summary

The manufacture of man-made fibres in the Community has undergone a lengthy period of restructuring which started in the late 1970s. The industry is now struggling to maintain its market share against a background of intense competition particularly from developing and newly industrialized countries. The rationalization process in the industry is ongoing with investment geared towards this process. Following a sharp fall in the beginning of the 1980s, employment is now stabilizing at around 74 000 persons. Benefiting from a recent rise in demand, EC production has slowly increased since 1987 and is expected to follow this positive trend over the medium term.

Description of the sector

In 1987, man-made fibre consumption represents over 60% of total fibre consumption in the EC. These fibres are especially used in the clothing industry (51%), while home-furnishing and industrial applications account for 34% and 15% respectively. For this reason, the development of this industry is largely dominated by the performance of the textile and clothing industries.

Production of the EC man-made fibre industry covers three categories of commodities; synthetic staple fibres (53%), synthetic filament yarns (33%), and cellulosic fibres and yarns (14%).

Current situation

The EC man-made fibre industry has undergone a process of widespread restructuring since the end of

the 1970s. After having reduced capacity by 220 000 tonnes over the 1978-81 period, the industry engaged itself in a second programme of capacity cuts as the sector continued to incur heavy losses. The objective was a further reduction in capacity of more than 500 000 tonnes.

While the first operation provided for a more or less linear cutback in capacity, the second one aimed at allowing companies to restructure towards a specialized fibre.

Despite these cutbacks in capacity, the number of producers in relation to production is still much higher in the EC than in Japan or in the USA.

The main man-made fibre producers in the Community are shown in Table 2.

Foreign producers such as Du Pont de Nemours (with plants in the Federal Republic of Germany, Luxembourg, the Netherlands, the United Kingdom) and Asahi (Ireland) are also present in Europe. The German company Hoechst took over Celanese Corporation (USA).

Poor growth in textile consumption in Europe in the 1970s and 1980s following the oil-price shock of 1973, as well as the growing deficit of the EC textiles and clothing trade balance, and the development of man-made fibre capacities in the rest of the world, are the main factors which led to cutbacks in the production capacity of the EC industry.

Finally, many investments by EC companies were made in other parts of the world, in particular in developing countries.

Table 1
Main indicators, 1980-91

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption (1)	N/A	2 010	1 926	1 943	2 560	2 725	2 844	2 896	3 008	N/A	N/A	N/A
Net exports (1)	N/A	412	268	371	296	192	39	7	-64	N/A	N/A	N/A
Production (1) (2)	N/A	2 422	2 194	2 314	2 856	2 917	2 883	2 903	2 944	3 002	3 044	3 068
Employment (1 000) (2)	113.6	98.9	92.5	87.3	85.1	80.5	77.2	75.4	73.8	73.9	N/A	N/A

(1) 1981-83 EC 10.

(2) 1988-91 estimated/forecast.

Source: CIRFS, Eurostat (Comext).

Table 2
Main European man-made fibre producers
in the Community

Name	Country	Production capacities or participation in other EC countries
AKZO (NV)	Netherlands	FR of Germany Spain
Bayer AG	FR of Germany	Belgium
Courtaulds, PLC	United Kingdom	France Italy Spain
Hoechst, AG	FR of Germany	Belgium United Kingdom
Imperial chemical industries LTD	United Kingdom	FR of Germany Portugal Spain
Montefibre SpA	Italy	Spain
Rhone Poulenc SA	France	FR of Germany Spain
SNIA Fibre	Italy	France

Source: Textile Organon.

Employment

The industry has experienced a large and steady reduction in the number of people employed, partly due to the reduction in production capacities and technological labour saving developments.

Employment in the man-made fibres manufactures fell from 113 600 persons in 1980 to 73 800 in 1988. It is expected to stabilize at 73 900 in 1989.

Production and consumption

In 1988, world production of man-made fibres increased by approximately 4%, to 18.4 million

tonnes. This means a further production growth at a new record level for the sixth consecutive year. This growth was mainly noticeable for synthetic fibres, which represented 82% of total production with 15 million tonnes (4% growth in 1988), while cellulosic fibres production stabilized at 3.3 million tonnes or 18% of total production (2% growth).

Between 1977 and 1987, EC share of world production fell by 5 points and now represents 16% of total production. The USA, which is the first producer, also saw its market share shrink but by a lesser extent, since it remains at 21%. The Japanese production, which represents about 10% of world production, decreased between 1982 and 1987. It stagnated over the last two years. The Comecon countries accounted for 14% of total production in 1987. The countries which benefited most from the general growth trend were Taiwan (which accounts for 8.5% of total production in 1987), China (6%) and the Republic of Korea (6%).

The European man-made fibre industry is turning to products with a higher value-added content and is steadily pursuing a dynamic investment policy chiefly oriented towards rationalization and research and development.

A further analysis by product shows that the EC countries lost market shares in both synthetic and cellulosic yarns and staple fibres (respectively 9.2% and 6.4%). Although demand for man-made fibres rose by 3.5% in 1988, much of this was met by increased imports.

Domestic demand for man-made fibres in the USA continued at the previous years' level, although volumes processed by the textile industry decreased. Exports increased again and production capacity utilization was comparatively high (nearly 90%). As in 1986, there was a small decrease in the production of cellulosic fibres but the synthetic sector grew substantially.

Table 3
World production

(1 000 tonnes)	Production			Share (%)		
	1977	1982	1987	1977	1982	1987
World	12 826	13 607	17 755	100	100	100
EC	2 693	2 514	2 903	21	18	16
USA	N/A	2 930	3 755	N/A	22	21
Japan	1 696	1 759	1 724	13	13	10
China	198	554	1 120	2	4	6
Republic of Korea	372	646	990	3	5	6
Taiwan	434	724	1 511	4	5	9
Comecon	2 037	2 200	2 543	16	16	14

Source: CIRFS.

In 1988, the man-made fibre industry in Japan had to cope with strong competition from its South-East Asian neighbours, which was intensified by exchange-rate changes. Textile and clothing imports went up, benefiting from the consumption increase. The relatively important man-made fibre and textile exports dropped further.

Table 4
Community share of world production by product

(%)	1977	1987
Synthetic filament yarns	20.3	14.4
Synthetic staple fibres	23.1	19.5
Cellulosic yarns and staple fibres	18.8	12.4

Source: CIRFS.

In South-East Asia (including China), restraining influences made themselves felt. Shortages of polyester feedstock led to under-utilization of the spinning capacity on the one hand but, on the other hand, export growth of textiles and clothing slowed down.

Synthetic fibres

Contrary to previous years, world production of synthetic filament (+7% in 1988) showed a higher growth than staple (+3%). In 1988, the shift in the structure of production continued: the share of polyester and 'other' synthetic fibres increased, at the expense of polyamide and acrylics.

Worldwide, the production of polyamides was in 1988, 2% higher than in the previous year. While filament rose by 3%, staple showed a modest decline (-2%). The key factor in this decrease was the decline in the USA (-5%), where approximately 60% of the world production is manufactured.

The substantial growth of polyester of the previous years slowed down somewhat at almost 7% in 1988, but was still above the average of total man-made fibre production. Growth was recorded in all regions: Western Europe (+4%), the USA (+4%),

Japan (+2%) and other regions (+9%). The geographical breakdown of polyester production shows a further shift in favour of the 'other regions'. Worldwide production of filament (+9%) rose more sharply than that of staple (+5%). The market share of polyester staple fibre of EC producers in the EC fell from 83% in 1984 to 77% in 1987.

The average price of first quality fibres, which account for the bulk of Community production, fell by some 13% to 15%. With the exception of two producers, the Community industry saw its profits fall, and become negative in some cases.

An investigation conducted by the EC Commission led to the introduction in June 1988 of provisional protective duties on deliveries from Turkey, Taiwan, the USA, the Republic of Korea, Mexico and Romania, which for the latter two countries were above 40%. Its decreasing margins being the highest in December 1988, the EC Council of Ministers confirmed the provisional anti-dumping duties inflicted on imports from those countries. The specific sector of filling fibres benefited from a temporary five-month exception period during which the EC Commission examined the question of the availability of this type of product on the European market. The definitive duty became effective in May 1989.

World production of acrylics did not increase for the first time since 1982. Decisive for this development was the substantial reduction in Western Europe (-7%), which is largely attributable to a weak demand from the weft knitting sector. Production in the USA (-1%) and Japan (-1%) remained below the previous year's level. A growth of 4% was realised only in the 'other regions' of the world.

The situation in the acrylic sector changed dramatically since the end of 1987. Because of a downturn in the consumption of acrylics in certain end-uses, the unfavourable trend in fashion and a large increase in imports of finished products made from acrylic, especially from Turkey, the market situation has become very depressed.

Table 5
National production by product, 1988

(1 000 tonnes)	EC	Benelux	DK	D	GR	E	F	IRL	I	P	UK
Synthetic-filament yarns	938.5	110.1	N/A	394.7	9.4	79.6	60.2	13.0	210.9	2.8	102.8
Staple fibres	1 543.1	64.8	27.0	431.0	11	188.8	117.4	67.2	448.9	55.4	131.6
Cellulosic yarns and staple fibres	417.8	53.6	N/A	170.8	7.1	37.3	15.3	N/A	24.6	.7	108.4

Source: CIRFS.

Table 6
Production and external trade, 1980-88

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production	2 585	2 752	2 514	2 636	2 856	2 917	2 883	2 903	2 944
Index	89	94	86	90	98	100	99	100	101
USA	N/A	N/A	2 930	3 380	3 521	3 450	3 568	3 755	N/A
Index	N/A	N/A	85	98	102	100	103	109	N/A
Japan	1 832	1 798	1 759	1 786	1 834	1 834	1 760	1 724	N/A
Index	100	98	96	97	100	100	96	94	N/A
Exports extra-EC (1)	452	524	401	492	561	588	516	565	532
Index (2)	82	94	72	88	95	100	88	96	90
Imports extra-EC (1)	306	264	275	286	364	416	472	501	531
Index (2)	79	60	62	65	88	100	113	120	113
X/M (1)	1.48	1.98	1.46	1.72	1.54	1.41	1.09	1.13	1.00
Imports intra-EC (1)	853	935	869	953	1 069	1 154	1 140	1 203	1 214
Index (2)	82	87	81	89	93	100	99	104	105

(1) Reporting countries — 1980 EC 9; 1981-83 EC 10; 1984-88 EC 12. Partner country — extra/intra EC 12. Greece estimated.

(2) Adjusted index, giving true year-on-year changes.

Source: CIRFS, Eurostat (Comext).

Cellulosic fibres

World production of cellulosic fibres increased by approximately 2%. Growth was strongest in Western Europe (8%), while the USA (1%) and the 'other regions' (2%) registered a weaker growth. Japan (-3%), on the other hand, showed a decline. The rise in world production was a little higher for filament (3%) than for staple (1%).

In Western Europe, both filament and staple benefited from the favourable trends in fashion. Demand was so high that it could not be fully met.

Polyolefin textiles

In the mid-1960s, the process of extruding polypropylene and polyethylene (polyolefins) into a film or sheet — slitting it into narrow strips and creating, by stretching, a tape with textile yarn characteristics — reached the stage of commercialization.

The tapes thus produced were found to be ideal for weaving and knitting into fabrics that very quickly found a use, initially in some of the traditional markets. The industrial textiles produced in this manner proved to be very cost effective. For the first time a synthetic replacement for jute products manufactured 100% within Europe became available.

The challenge presented by this new product was taken up by the technicians within the traditional industry on the one hand and the polymer and machinery manufacturers on the other.

The unprecedented rapid growth in demand in traditional markets, in particular tufted carpet backing, knitting fabrics, ropes, twines and nets, was soon followed by development and innovation resulting in demand from other major market sectors.

In the early 1970s, special tapes for carpet weaving, fibres for spinning into yarns for carpet and other

Table 7
Community production by product

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Synthetic-filament yarns	801	861	789	802	879	919	916	925	983
Staple fibres	1 217	1 368	1 262	1 384	1 511	1 579	1 568	1 576	1543
Cellulosic yarns and staple fibres	567	523	463	450	466	419	399	402	418
Total	2 585	2 752	2 514	2 636	2 856	2 917	2 883	2 903	2944

Source: CIRFS.

end-uses and mono-filament and multi-filament yarns became established as important new markets.

The conversion of the polyolefin tapes into textile products was initially carried out on the traditional looms and equipment, but it became quickly apparent that investment in new specialized equipment would be necessary if full advantage was to be taken of the product. This investment in specialized machinery has continued over the last 15 to 20 years.

Table 8
Western European production of polyolefin granules and woven cloth (1)

(1 000 tonnes)	1986	1987	1988
Granules	578	603	659
Of which:			
Monofilaments	14	14	25
Multifilaments	91	94	103
Staple fibres	250	278	292
Tapes	166	161	181
Split films (2)	57	57	58
Applications:			
Woven cloth	135	142	151
3m wide and over	70	70	78
Below 3m wide	64	72	73

(1) Excluding Turkey.

(2) Estimated.

Source: EATP/CITH.

New end-uses for the polyolefin textiles requiring high standards of quality control and assurance are still being introduced into the field, such as fabrics for intermediate bulk containers, geotextiles for civil engineering use and fine denier fibres for use in the disposable coverstock market. In many cases, the products from polyolefin are not only cost effective but offer technical advantages over their alternatives. The rapid growth in polyolefin textiles, registered throughout the 1960s and 1970s, slowed at the beginning of the 1980s except for staple fibres. In 1988, the tonnage of polyolefin granules extruded for textiles showed a significant growth in Western Europe.

The main reason for concern is the growth in imports of manufactured products, especially in

polyolefin fabrics for bags and in polyolefin twines and ropes. These products are mainly shipped from developing countries and State-trading countries, such as China, at prices below production costs, especially in the field of polyolefin light woven bags.

Outlook

After a relative stagnation of EC production between 1984 and 1987, short-term prospects for manufacturers of man-made fibres are slightly positive again. Up to 1991, production is expected to grow at 1.3% annually.

Future performances will be influenced to a large extent by the decisions adopted by the EC with regard to the complaints about unfair pricing practices introduced by the producers. Due to the duties charged on imports from a number of suppliers from third world countries, pressure should diminish in terms of price and volume. This should allow for an upward adjustment of prices, thus restoring some profitability. EC net exports sharply decreased during the 1980s. The measures taken by the EC Council of Ministers and their influence on price should have a favourable effect on the trade balance.

However, these adjustments will have to take into account the situation downstream. The large increase in imports of textile and clothing products in 1988 hampers the activity of the textile processing industry, since this reduces demand for EC textile products.

A further reduction of capacities may have to be considered. Present surplus capacities are estimated at 150 000 tonnes and could be reduced through a series of rationalization agreements.

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MANUFACTURE OF METAL PRODUCTS

(NACE 31)

Summary

The European metal products sector covers a wide variety of products and is mainly made up of a large number of small to medium-sized companies. Producing essentially intermediate and investment commodities for other manufacturing industries, it was hit by the industrial slump of the early 1980s. However, restructuring took place with important layoffs and improvements in productivity. This allowed metal product producers to take advantage of the recovery experienced by the manufacturing industry in 1987 and 1988. As a result, real production in 1988 exceeded its 1980 level for the first time in nine years. Though the industry is a net exporter, trade doesn't account for a large share of the market. Furthermore, only a small share of production is traded between Member States.

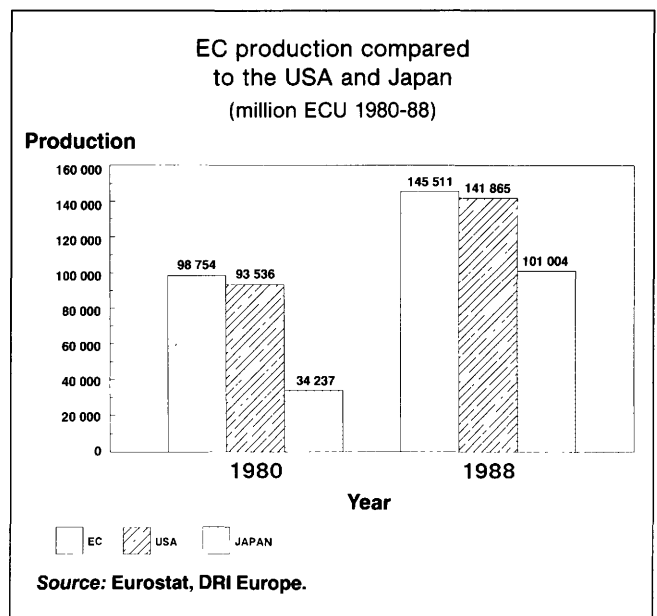
The economic importance of the industry in the EC economy

Current situation

The European producers of metal products (NACE 31) constitute one of the major sectors in the metal manufacturing industry. With an output of about ECU 145 billion in 1988, this industry accounts for nearly 7% of European industrial production. Its labour force, with 2.1 million employees, is larger than, for instance, those of the motor vehicles or chemicals sectors.

The European Community is the first world producer of metal products, closely followed by the United States with ECU 142 billion and well above Japan with ECU 101 billion.

Figure 1



Production and consumption

Metal products are essentially intermediate goods and to a lesser extent investment commodities. On average, final consumption doesn't account for more than 10% of total demand. Among the major clients of the industry are:

Table 1
Main indicators, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	92 306	93 337	97 512	99 790	108 317	115 021	119 212	124 561	139 185	N/A
Net exports (1)	6 448	8 702	9 915	9 362	9 204	9 446	8 365	7 164	6 326	N/A
Production	98 754	102 039	107 427	109 427	117 520	124 467	127 577	131 725	145 511	163 296
Employment (1 000) (2)	2 467	2 491	2 371	2 317	2 230	2 158	2 131	2 123	2 123	2 166

(1) 1980 EC 9; 1981-85 EC 10; 1986-88 EC 12.

(2) 1980-85 Spain estimated by Eurostat.

Source: Orgalime, Eurostat (Bise, Comext).

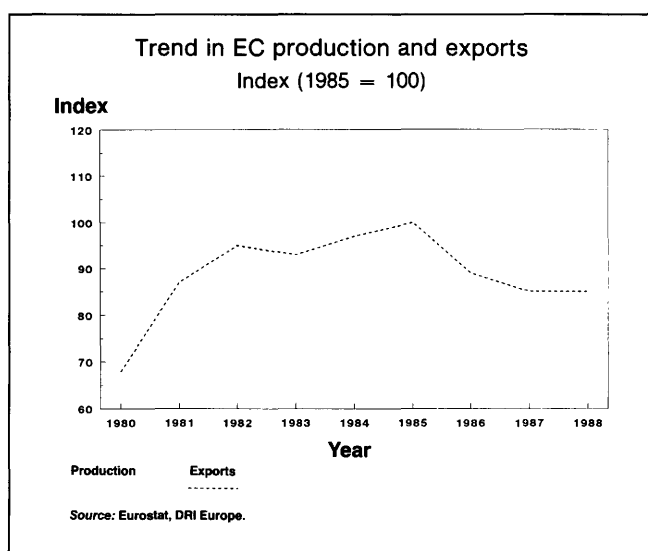
- transportation equipment
- mechanical engineering
- construction.

Such sectors fared rather badly during the first half of the 1980s and this explains the slump in the metal products industry during the same period. Real pro-

duction decreased constantly between 1980 and 1983.

The recent recovery of the European industry sparked the revival of the metal products market, which experienced constant small growth between 1984 and 1987 and posted a real growth superior to 6% in 1988. This allowed, at last, real production to exceed its 1980 level.

Figure 2



External trade

The EC metal products industry is concentrated on the European domestic market. In 1988, only 8% of total production was exported. Since the Community is a net exporter, imports are still lower than exports. In 1988, imports accounted for only slightly more than 4% of domestic consumption. However, the export-import ratio has been constantly decreasing since 1982, thus indicating that imports are growing faster than exports.

On the other hand, trade between Member States is not much more developed than extra-EC trade. It amounted to about 11% of production in 1988. This indicates that Member States' markets are quite independent from each other.

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production in current prices									
EC	98 754	102 039	107 427	109 427	117 520	124 467	127 577	131 725	145 511
Index	79	82	86	88	94	100	102	106	117
USA (1)	93 536	123 293	131 773	148 595	189 315	199 874	155 032	136 234	141 865
Index	47	62	66	74	95	100	78	68	71
Japan (1)	34 137	46 306	46 933	55 628	64 657	74 998	79 608	81 989	101 004
Index	46	62	63	74	86	100	106	109	135
Production in constant prices									
EC	132 871	128 763	123 783	120 804	122 241	124 467	127 196	130 863	139 289
Index	107	103	99	97	98	100	102	105	112
EC trade in current prices									
Exports extra-EC (2)	9 458	11 814	12 959	12 735	13 191	13 652	12 345	11 837	11 808
Index (3)	68	87	95	93	97	100	89	85	85
Imports extra-EC (2)	3 285	3 447	3 718	3 928	4 479	4 809	4 642	5 100	6 089
Index (3)	68	72	77	82	93	100	104	114	137
X/M	2.88	3.43	3.49	3.24	2.95	2.84	2.66	2.32	1.94
Imports intra-EC (2)	7 528	7 645	8 267	8 750	9 703	10 879	12 796	13 754	15 904
Index (3)	70	70	76	80	89	100	109	117	136

(1) Census of manufactures and Eurostat estimates.

(2) 1980 EC 9; 1981-85 EC 10; 1986-88 EC 12.

(3) Taking into account changes in EC membership.

Source: Orgalime, Eurostat (Bise, Comext).

Table 3
Employment

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC (1)	2 646.8	2 490.6	2 371.0	2 316.8	2 230.3	2 158.1	2 131.1	2 123.0	2 123.2
Belgium	65.9	62.3	58.7	56.6	54.3	53.3	51.2	49.5	47.8
Denmark	26.4	23.3	22.5	22.5	24.6	27.3	29.3	30.3	28.2
FR of Germany	823.6	799.6	766.1	728.2	717.6	726.9	741.6	738.5	737.6
Greece	19.3	18.2	18.4	18.4	18.3	20.5	20.5	20.4	20.4
Spain	N/A	N/A	N/A	N/A	N/A	N/A	175.0	174.3	174.4
France	467.0	446.8	435.7	426.0	394.2	380.1	364.9	356.1	356.1
Ireland	13.2	12.0	11.5	9.5	8.3	7.6	7.2	7.0	6.8
Italy	248.1	237.9	225.3	280.0	268.6	228.0	217.2	216.4	216.4
Netherlands	83.8	79.1	73.7	67.8	68.9	69.7	71.4	72.8	75.9
Portugal	81.7	84.7	85.0	68.1	58.4	52.8	48.8	48.6	48.6
United Kingdom	578.0	499.0	467.0	436.0	426.0	411.0	404.0	409.0	411.0

(1) 1980-85 Spain estimated by Eurostat.

Source: Orgalime.

Employment

As production declined in the metal goods industry, it comes as no surprise that employment also declined. Between 1980 and 1988, employment decreased by 14%, from a level of 2.647 million in 1980 to an estimated 2.123 million in 1988.

The number of employees improved only in Denmark and Greece, and in all other European countries employment declined, ranging from a decline of 48% in Ireland to a modest decline of 9% in the Netherlands.

important increase in productivity took place in 1988.

Productivity in the metal products industry is slightly lower than in other metal-working industries. For instance, in 1987, production per employee in the mechanical engineering and electrical engineering sectors was higher. Nevertheless, the development of productivity since 1980 has been very similar to that in all the other metal-working industries.

Table 4
Productivity in the EC (1)

(1985 = 100)	Productivity
1980	88
1981	87
1982	89
1983	89
1984	95
1985	100
1986	101
1987	101
1988	108

(1) Excluding Spain.

Source: Orgalime.

Productivity

Productivity in the European industry improved considerably between 1980 and 1988, in spite of the decline in production, thus indicating that some restructuring took place. On average, productivity measured as production per person, grew by 2.6% per year. However, between 1980 and 1983, productivity remained more or less at the same level and started to improve strongly only in 1984. The second

Table 5
Investment in the EC (1)

(million ECU)	Investment
1980	3 937
1981	3 612
1982	3 547
1983	4 035
1984	4 433
1985	5 046
1986	5 288
1987	5 336
1988	5 658

(1) Excluding Spain.

Source: Orgalime.

Investment

After a drop in 1981 and 1982, investment recovered gradually during the following years. Investment reached an estimated level of ECU 5 658 million in 1988, a 44% increase in value since 1980 (excluding Spain). However, the investment rate (investment divided by turnover) was, in 1988, slightly inferior to its 1980 level. Investment in the UK was well below average and declined during the period.

Structure of the industry

The European metal products industry consists of a large number of firms (about 40 000) producing a large number of different products.

The NACE-group 31 includes:

- 311 Foundries,
- 312 Forging; drop forging, closed die-forging, pressing and stamping,
- 313 Secondary transformation, treatment and coating of metals,
- 314 Manufacture of structural metal products (including integrated assembly and installation),
- 315 Boilermaking, manufacture of reservoirs, tanks and other sheet-metal containers,
- 316 Manufacture of tools and finished metal goods, except electrical equipment (this includes among others hand tools, metal boxes, domestic heating appliances, kitchen appliances, metal furniture etc.),
- 319 Other metal workshops not elsewhere specified.

The range of products varies from bolts and nuts to metal packaging and from metal furniture to castings.

As can be seen in Table 6, the total size of these various industries is rather different.

Table 6
Sectoral share of production and employment, 1987

NACE code	Production (%)	Employment (%)
311	12	13
312	8	7
313	16	17
314	14	14
315	12	11
316	37	37
319	1	1
31 Total	100	100

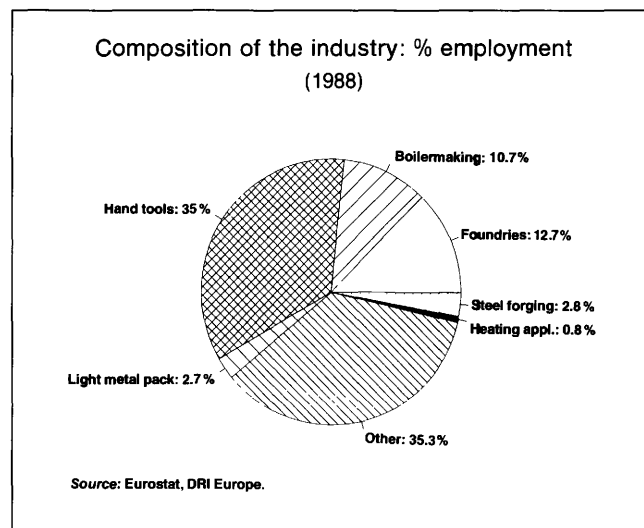
Source: Eurostat (Inde).

The European industry of metal products producers is an industry with a large number of small firms. The average number of employees per firm can be estimated at 50 people in 1988. Eurostat figures for 1983 illustrate this structure, although more recent information from various countries indicates that the share of large firms is slowly increasing. Inclusion of data on Portugal in the EC figures would, however, lower the average company size in the EC.

Geographical distribution

The European industry is concentrated in a few countries, while 84% of the total production value is concentrated in four countries: the Federal Republic of Germany, France, Italy and the United Kingdom.

Figure 3



Spain included, 91% of production is concentrated in five European countries.

Table 7
Number of enterprises by employment band, 1983

(%)	20-99	100-499	500+	Total
EC (1)	81	17	2	100
Belgium	80	18	2	100
Denmark	80	19	1	100
FR of Germany	73	23	4	100
Spain	84	14	2	100
France	83	15	2	100
Italy	88	11	1	100
Luxembourg	86	14	0	100
Netherlands	83	16	1	100
United Kingdom	78	19	3	100

(1) Excluding Greece, Ireland and Portugal.

Source: Eurostat (Inde).

The regional distribution is illustrated in Table 8.

The distribution of production did not change very much over the last nine years. It was nearly identical in 1980 and 1988. Such a distribution obviously reflects, at least partly, the global economic importance of the Member States. To avoid this bias, Figure 4 provides an indicator of the degree of specialization of each country in the metal products industry.

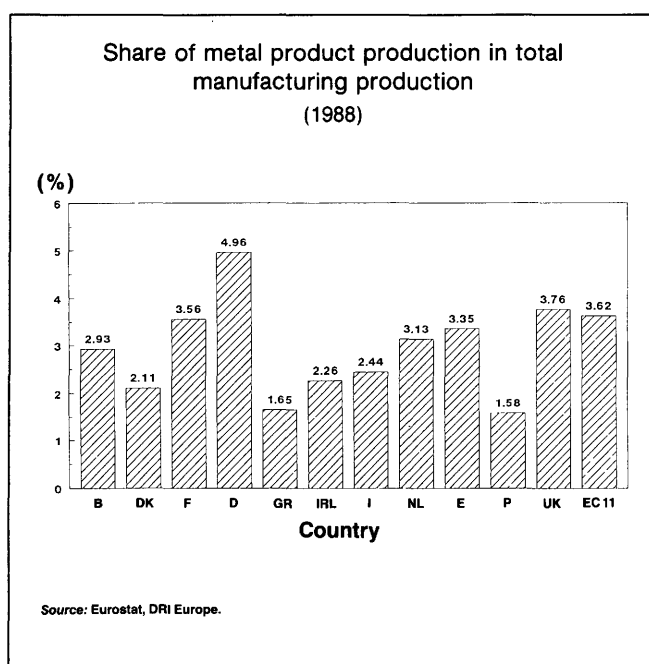
Table 8
Production

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	AAGR
EC	98 754	102 039	107 427	109 152	117 520	124 467	127 577	131 725	145 511	5.0
Belgium	2 763	2 760	2 822	2 907	3 056	3 506	3 513	3 517	3 769	4.0
Denmark	1 043	988	1 102	1 204	1 493	1 791	1 955	1 987	2 000	8.5
FR of Germany	32 681	32 838	35 250	36 485	39 387	41 808	46 240	47 297	50 720	5.6
Greece	545	705	685	678	725	729	750	720	725	3.6
Spain	8 294	8 888	8 895	8 086	8 500	8 800	8 200	9 155	9 705	2.0
France	19 378	20 763	21 185	21 609	22 575	24 071	25 041	25 842	28 478	4.9
Ireland	409	406	429	458	530	573	560	560	612	5.2
Italy	10 706	11 108	11 426	12 365	13 678	14 248	14 379	15 280	17 080	6.0
Netherlands	3 826	3 740	4 201	4 138	4 542	5 074	5 390	5 472	6 085	6.0
Portugal	539	639	665	614	591	662	581	530	550	.3
United Kingdom	18 570	19 204	20 767	20 608	22 443	23 205	20 968	21 365	25 787	4.2

Source: Orgalime.

As in the case of mechanical engineering, the Federal Republic of Germany is both the largest European producer and the most specialized country. It is followed by the UK and France, the former ranking second in terms of specialization but only third in terms of production. It is furthermore interesting to note that Italy, the fourth largest European producer, is much less specialized than Spain, the Netherlands or Belgium.

Figure 4



production of respectively 5.1% and 1.5% per year. On the other hand, Denmark, France and Italy are posting the highest average annual growth over the same period (2.8%, 1.8% and 1.8%).

Table 9
Distribution of production by country, 1988

(%)	Share
Belgium	2.6
Denmark	1.4
FR of Germany	34.8
Greece	.5
Spain	6.7
France	19.6
Ireland	.4
Italy	11.7
Netherlands	4.2
Portugal	.4
United Kingdom	17.7
EC	100.0

Source: Orgalime.

Outlook

The outlook for the metal products industry is favourable for 1989. Production improved by more than 6% in volume during 1988 and growth is expected to continue during 1989, even if at a lower level: 2.8% in volume terms.

Except for the UK and Greece, all the Member States will experience an increase in metal products real production in 1989. Very fast growth is foreseen in Spain, Portugal and Belgium.

Employment is expected to decline by 0.3% during the same year. Investment, however, is expected to develop favourably with an increase of 8%. This indicates a continuing trend to improve production

The distribution of employment is quite similar to that of production.

In terms of growth in constant prices, Portugal and Spain must be mentioned. Between 1980 and 1988, they both experienced, on average, a decrease in

Table 10
Production in constant prices

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	AAGR
EC	132 871	128 763	123 783	120 804	122 241	124 467	127 196	130 863	139 289	.6
Belgium	3 583	3 321	3 222	3 176	3 231	3 506	3 375	3 343	3 648	.2
Denmark	1 499	1 326	1 344	1 377	1 603	1 791	1 904	1 895	1 873	2.8
FR of Germany	44 536	42 474	40 149	38 841	40 486	41 808	43 293	42 687	45 485	.3
Greece	801	875	759	720	705	729	809	819	777	-0.4
Spain	10 444	10 344	9 708	9 435	8 889	8 800	8 375	9 401	9 254	-1.5
France	26 152	27 141	25 253	24 248	23 367	24 071	26 573	28 425	30 061	1.8
Ireland	580	521	490	512	568	573	561	597	619	.8
Italy	13 954	14 064	13 655	13 839	14 199	14 248	13 631	14 457	16 048	1.8
Netherlands	5 073	4 778	4 738	4 439	4 725	5 074	5 077	5 007	5 493	1.0
Portugal	818	796	771	718	627	662	588	542	536	-5.1
United Kingdom	25 431	23 121	23 695	23 500	23 841	23 205	23 010	23 691	25 496	.0

Source: Orgalime.

Table 11
Growth of production volume, 1989

(%)	Growth
EC	2.8
FR of Germany	3.0
France	3.0
Italy	3.7
Netherlands	1.5
Belgium	7.0
Luxembourg	4.0
United Kingdom	-0.7
Ireland	0.0
Denmark	3.0
Spain	7.0
Greece	-1.0
Portugal	7.0

Source: Orgalime.

facilities in order to remain competitive and improve productivity.

Exports are also forecast to improve during 1989. Intra-EC exports are expected to rise by 6.9% in value, whereas extra-EC export growth should grow by 8.5%.

Imports are expected to grow even faster, with a 10% increase in intra-EC imports and an 8.8% increase in extra-EC imports.

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FOUNDRIES

(NACE 3111 AND 3112)

Summary

At a production rate of 11.4 million tonnes annually, the EC is the world's second largest producer of castings, after the Soviet Union. The activities of foundries can be classified either on the basis of the production technique used or the nature of the product (iron and steel castings or non-ferrous castings). Most foundries are small or medium-sized enterprises, working for customers and with suppliers that are typically large companies.

Large investment projects aiming at expanded capacity and improved productivity have been undertaken in this sector over the past few years. Employment in the EC as a whole fell by more than 30% between 1980 and 1988, permitting substantial productivity improvements. New technologies were introduced, and quality was enhanced thanks in particular to the production of new, often lighter, alloys.

External trade statistics on castings are very inaccurate since a significant portion of the trade is reported in the 'miscellaneous goods' category.

Description of the sector

Foundries produce castings, i.e. articles made from melted metals and cast in a mould. The shape and geometry of these articles can be very sophisticated. In principle, engineers have complete freedom in deciding which shape the mould should have.

To produce castings of various sizes and shapes, different techniques can be used, and foundries can be classified on the basis of these techniques as follows:

- sand casting foundries
- shell mould foundries
- gravity die casting foundries
- pressure die casting foundries
- centrifugal casting foundries
- continuous casting foundries

- precision casting foundries and
- art casting foundries.

Below, we shall nevertheless use the NACE classification of foundries, by making a distinction between:

- iron and steel foundries (NACE 3111) and
- non-ferrous foundries (NACE 3112)

In the national accounts, the products turned out by these two types of foundries are often categorized as cast iron, ductile cast iron, malleable cast iron and cast steel on the one hand, and copper cast, aluminum cast and zinc cast, on the other hand. Naturally, many alloys exist for each metal mentioned, further increasing the variety of castings that can be considered.

It is impossible to give such detailed figures for the EC, however. Eurostat provides figures to an accuracy of three digits. At this level, even the distinction between ferrous and non-ferrous castings is impossible to make. The European Federation of Foundries (CAEF), on the other hand, only has figures on volumes, but these are not readily comparable with those provided by Eurostat, and are not available for all countries. While missing data for minor producers may not be a major problem, inaccurate information, especially for non-ferrous castings in Italy, also makes any disaggregation of production tonnage for the EC impossible. Until harmonization of national statistics at a more disaggregated level is done, however, the information on which this description of the activity of foundries was based will remain somewhat imperfect and incomplete.

Few castings are used as end-products. Most of them serve as components in the car industry, the mechanical engineering industry, building construction, pipes, rolls and fittings, sanitary facilities, household articles and many other areas. For this reason, most of the production of castings, and in particular series castings, are used by the foundries themselves since they are often part of a larger enterprise. When foundries are independent (i.e. not vertically integrated) as in the case of jobbing foundries, they mostly act as sub-contractors.

Current situation

Strongly influenced by business cycle factors, the tonnage of foundries in the EC increased by about 7% in 1988. At a production rate of 11.4 million tonnes annually, the EC is the world's second largest producer of castings, after the Soviet Union. Its share of total world production is estimated at 20%.

Industry structure

Given that foundries are generally small or medium-sized companies whose typical suppliers and customers are large enterprises, they often have a weak market position. This tends to put downward pressure on castings prices.

Another important development for the industry is the increased emphasis put on environmental protection. Huge investment will be required to reduce emissions, avoid waste deposition and improve protection against noise.

Over the past years, foundries have made large investments to raise both capacity and productivity. Other investments concerned the introduction of new technologies, or the production of new alloys. Thanks to this development, the trend towards increased substitution of castings by other materials was stopped, and maybe even reversed.

Production and consumption

The Soviet Union is probably the world's largest producer of castings. This is, however, not certain, as

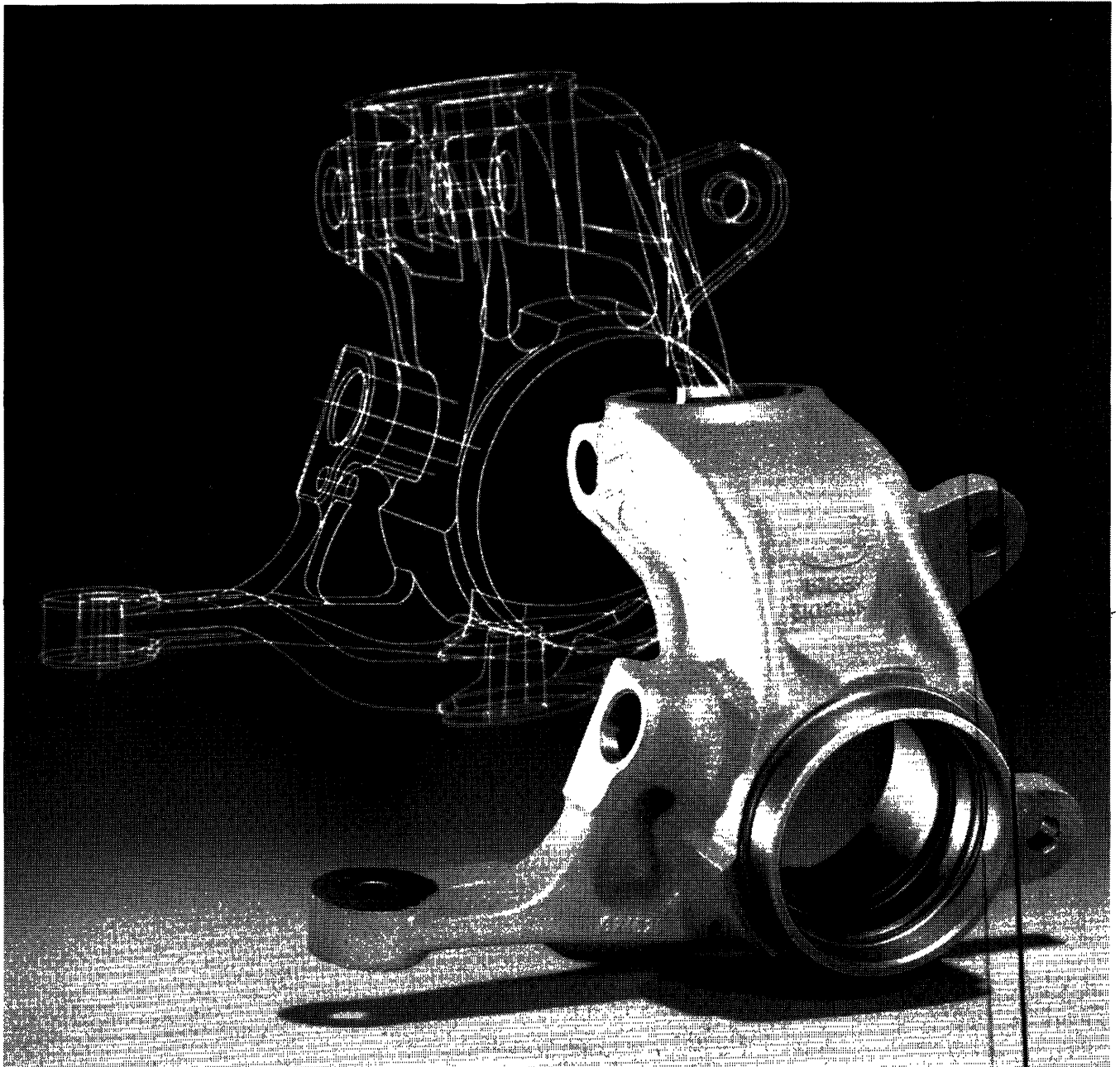


Table 1
Main indicators, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption (1)	12 292	11 984	12 526	13 110	14 185	14 413	14 984	15 787	17 241	N/A
Net exports (2)	547	766	853	702	739	837	653	597	587	N/A
Production (1)	12 839	12 750	13 379	13 812	14 924	15 250	15 637	16 383	17 827	19 437
Employment (1 000) (1)	379	346	333	315	300	283	277	271	270	275

(1) 1987/88 estimated.

(2) 1980 EC 9; 1981-85 EC 10.

Source: Eurostat (Inde, Bise, Comext).

reliable statistics are not available for the USSR. On the basis of information that is available, the EC produces nearly the same tonnage as the Soviet Union: about 11.4 million tonnes a year. The third largest world producer is Japan, at 7 million tonnes a year, followed by the People's Republic of China, at 6.5 million tonnes a year.

The output of the world's three largest producers represents about two-thirds of world production, and the EC's share about 20%.

About 10 to 15% of the total production of EC foundries is accounted for by non-ferrous metal castings — and the rest by ferrous metal castings. Within these two groups, the most important products are AL-based castings on the one hand, and grey iron castings, on the other hand. Their share amounts to approximately 80% and 60% of each sub-category respectively.

Since castings are mainly intermediate products, foundries are highly sensitive to changes in econ-

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986(4)	1986	1987	1988	1989
Production in current prices											
EC (1)	12 839	12 750	13 379	13 812	14 924	15 250		15 637	16 383	17 827	19 437
Index	84	84	88	91	98	100		103	107	117	128
USA	12 749	16 253	14 535	16 238	22 244	22 026		16 480	14 540	15 142	16 177
Index	58	74	66	74	101	100		75	66	69	73
Japan	6 481	7 999	7 946	8 917	11 162	11 840		11 729	11 479	13 330	14 677
Index	55	67	67	75	94	100		99	97	113	124
Production in constant prices											
EC (1)	17 213	16 193	15 650	15 396	15 557	15 250		15 529	16 018	17 038	17 785
Index	113	106	103	101	102	100		102	105	112	117
Production in 1 000 tonnes											
EC (1)	13 502	12 388	11 585	11 036	11 008	11 161		10 929	10 660	11 405	11 620
Index	121	111	104	99	99	100		98	96	102	104
EC trade in current prices											
Exports extra-EC (2)	783	1 005	1 103	809	911	975	913	952	911	943	N/A
Index (3)	79	103	113	83	93	100		96	92	95	
Imports extra-EC (2)	312	319	327	328	364	414	368	377	388	445	N/A
Index (3)	75	77	79	79	88	100		104	107	123	
X/M	2.51	3.15	3.37	2.46	2.51	2.35	2.48	2.53	2.35	2.12	
Imports intra-EC (2)	702	670	700	699	780	891	1 038	1 095	1 099	1 238	N/A
Index (3)	79	75	79	78	87	100		109	110	123	

(1) 1987/88 estimated.

(2) 1980 EC 9; 1981-85 EC 10.

(3) Taking into account changes in EC membership.

(4) EC 10.

Source: Eurostat (Bise), CAEF.

Table 3
Production by type of metal used, 1987

(1 000 tonnes)	B	D	DK	E	F	I	L(1)	NL	P	UK	EC(2)	JAP	USA
Grey iron	113 2 169		61	440	929	1 151	50	110	48	748	5 819	3 304	5 159
Nodular and malleable iron	15 861	15	160	735	254	20	50	27	358	2 495	1 941	2 937	
Steel	47 185	0	101	119	93	4	5	12	104	669	389	753	
Total ferrous metals	175 3 215	76	701	1 783	1 498	74	165	88	1 210	9 015	5 634	8 849	
Cu-Base	2 72	0	15	22	81	2	2	2	42	240	93	216	
Al-Base	11 433	0	57	205	338	10	13	4	112	1 183	834	1 013	
Other non-ferrous	2 79	0	24	39	64	2	0	2	43	254	63	250	
Total non-ferrous metals	15 584	0	96	267	483	14	15	8	197	1 677	990	1 479	
Total	189 3 799	76	797	2 050	1 981	88	180	95	1 407	10 660	6 623	10 327	

(1) Estimated.

(2) Ireland and Greece not available.

Source: CAEF.

omic conditions in those sectors which use castings as an input. This is true in particular for those foundries that essentially produce for the car industry or the mechanical engineering sector, but also for all the other sectors mentioned above. This circumstance explains the foundries' relatively poor performance in the early 1980s — and the profitability improvements recorded in more recent years.

Total tonnage dropped by 15.5% between 1980 and 1988, from 13.5 million tonnes to 11.4 million tonnes. In constant prices, the industry reached in 1988 its 1980 production level. In other words, there has been an important shift of production towards the upper end of the market.

Geographic features

Production trends have been very different across Member States. In the Federal Republic of Ger-

many, production for 1988 exceeded the 1980 figure, both in terms of tonnes and constant prices, that country's share of total EC production increasing from 32.5 to 35%. The pickup of business activity in the FR of Germany took place sooner than elsewhere, and contributed to faster rates of growth of production than in Europe as a whole.

In a few EC countries, the decline in castings production (in volume) persisted beyond 1983: the recovery only started in 1984 in the United Kingdom, and in 1986 in France, and only brought about a small increase in production in constant prices.

Trade

The statistics on external trade in castings are not complete. Many castings, especially those used as components in car manufacturing, for which the

Table 4
Production by country (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	AAGR
EC	12 839	12 750	13 379	13 812	14 924	15 250	15 637	16 383	17 827	19 437	4.7
Belgium	251	246	204	206	246	243	244	243	266	293	1.7
Denmark	100	97	98	107	119	136	138	135	141	155	5.0
FR of Germany	4 567	4 585	4 616	4 836	5 266	5 752	6 208	6 395	6 878	7 336	5.4
Greece	18	29	30	30	31	28	28	22	26	29	5.2
Spain	850	997	1 055	933	1 032	1 044	1 041	1 130	1 296	1 435	6.0
France	2 747	2 879	2 941	2 799	2 698	2 704	2 744	2 860	3 069	3 372	2.3
Ireland	40	27	23	21	25	28	32	30	33	36	-1.1
Italy	1 510	1 466	1 881	2 554	2 862	2 525	2 706	2 892	3 217	3 564	10.0
Luxembourg	34	32	33	39	63	62	60	56	66	73	8.9
Netherlands	190	191	228	230	246	274	249	244	202	220	1.6
Portugal	143	157	172	163	166	182	213	202	219	238	5.8
United Kingdom	2 389	2 043	2 100	1 894	2 171	2 270	1 975	2 174	2 415	2 688	1.3

(1) 1987/88 estimated.

Source: Eurostat (Inde).

demand is growing rapidly, are not recorded separately. They are included in the 'miscellaneous goods' category. The 13% export share and the 9% import share in total production thus underestimate the importance of external trade. On the basis of the published statistics, exports of castings are greater than imports, implying that apparent consumption of this product is less than domestic production (see Table 1).

Between 1980 and 1983, intra-EC trade amounted to approximately ECU 0.7 billion. Following the entrance of Portugal and Spain to the EC in January 1986, intra-EC exports started rising, and reached ECU 1.24 billion in 1988. Imports from non-EC countries remained nearly stable between 1980 and 1983, at around ECU 0.3 billion, and increased to ECU 0.4 billion in 1985 before falling back in 1986 after Spain and Portugal joined the EC. Total imports grew from ECU 1 billion in 1980 to ECU 1.5 billion in 1987, and ECU 1.7 billion in 1988, while quantities purchased fell from 0.941 million tonnes in 1980 to 0.915 million tonnes in 1987.

Exports to non-EC countries rose from ECU 0.8 billion in 1980 to ECU 1.1 billion in 1987, and then declined to an average of around ECU 0.9 to 0.95 billion between 1986 and 1988. This, along with the 70% rise in intra-EC trade between 1980 and 1988 (with intra-EC exports being equal, except for statistical discrepancies, to intra-EC imports), implies a rate of growth of total export values of about 45% between 1980 and 1987, and a slight drop in total export volumes over the same period.

Employment

In the four major EC producers, employment decreased by 31.5% between 1980 and 1987, while

production fell by 21.2%. In the EC as a whole, in 1980 319 800 persons produced 11 724 million tonnes, which is equivalent to a productivity of 36.7 tonnes per year per person. In 1987 9 236 million tonnes were produced by 219 100 persons giving a productivity of 42.2 tonnes per person per year — a 15% increase over 1980. If it is taken into account that castings today are typically lighter and more sophisticated than before, the 'real' increase in productivity per person is even greater.

Looking at the employment structure in each country in turn, one finds that the greatest changes took place in the United Kingdom. Between 1980 and 1987 the drop in employment reached 51.3%, while that in production was only 36.8%. This corresponds to a total productivity growth of 29.7% over 7 years. In France, production fell by 25%, from 2732.4 tonnes to 2049.8 tonnes, while employment fell by 40%, from 73 310 to 43 957 persons. Thirty thousand persons thus lost a job in this sector, while productivity per person-year rose by 25%. Changes were least dramatic in the FR of Germany, with productivity per person employed rising by 6%, from 37.6 tonnes to 39.9 tonnes.

Given that the data for Italy are of questionable reliability, France is thus the country with the highest productivity level nowadays.

Labour costs are highest in the FR of Germany, however, as they have been in the past. Wages per person amounted to ECU 16 500 in 1980, and increased to ECU 28 400 in 1987. France is just behind, with labour costs at ECU 14 100 in 1980 and ECU 21 800 in 1987. The United Kingdom is in third place, and can also lay claim to a rise in labour costs over the period considered: only 45.7%, from ECU 10 500 to ECU 15 300.

Table 5
Constant value by country (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	AAGR
EC	17 213	16 193	15 650	15 396	15 557	15 250	15 529	16 018	17 038	17 785	.4
Belgium	300	279	244	252	284	243	224	215	242	253	-1.9
Denmark	151	140	124	124	128	136	133	128	130	136	-1.1
FR of Germany	6 330	6 070	5 492	5 315	5 491	5 752	5 795	5 755	6 098	6 372	.1
Greece	29	37	34	33	32	28	29	24	30	32	1.1
Spain	1 195	1 242	1 230	1 111	1 107	1 044	1 070	1 171	1 247	1 312	1.0
France	3 707	3 764	3 505	3 141	2 793	2 704	2 911	3 146	3 240	3 418	-0.9
Ireland	56	35	26	23	27	28	32	32	33	35	-5.3
Italy	1 901	1 762	2 190	2 797	2 911	2 525	2 568	2 803	3 066	3 184	5.9
Luxembourg	47	41	37	43	65	62	62	64	74	78	5.7
Netherlands	245	238	254	246	253	274	235	222	178	184	-3.2
Portugal	217	196	199	191	176	182	215	207	213	221	.2
United Kingdom	3 035	2 389	2 315	2 120	2 291	2 270	2 255	2 250	2 486	2 561	-1.9

(1) 1987/88 estimated.

Source: Eurostat (Inde).

Table 6
Employment trends (1)

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
EC	379.2	346.2	332.8	314.5	300.4	283.2	276.6	270.6	270.0	274.7
FR of Germany	117.1	113.6	104.8	98.8	97.7	100.3	100.9	100.6	100.7	101.7
France	73.3	67.9	65.7	62.0	56.4	47.3	44.9	42.1	43.2	42.3
Italy	36.9	35.1	43.5	48.8	43.4	38.5	35.8	34.4	33.4	33.5
United Kingdom	93.3	71.9	63.8	52.3	51.6	48.2	46.6	45.5	43.7	47.4

(1) 1987/88 estimated.

Source: Eurostat (Inde).

Figures by the CAEF (Comité des Associations européennes de Fonderie) show similar results. On the basis of this data, total hourly labour costs (i.e. including insurance, taxes and other charges or contributions) are highest in Germany. In October 1987 these amounted to ECU 15.62. Italy is however now in second place, with hourly labour costs of ECU 13.84, while the figures for France and the United Kingdom are ECU 11.32 and ECU 6.56.

Investment and related

Investment tends to mirror expectations about the future. In the early 1980s economic activity slowed down as did investment. Towards the mid-80s, however, the general economic outlook seemed to improve, and this fuelled an investment recovery.

The proportion of turnover represented by investment was highest in the early 1980s in Italy, and it fell most dramatically there subsequently: from 6.6% in 1980, and 6.9% in 1981, to 3.6% only two years after. France also saw a large drop in the proportion of turnover accounted for by investment, and is currently, along with the UK, the country in which investment remains most depressed.

Since demand for castings is not expected to increase very rapidly in the long term, future investment by foundries will mainly take the form of rationalization investment, or investment in new technologies. These are described in greater detail below.

Environmental protection

Recycling has always been extremely important for foundries, as a large portion of materials used can be recycled in the production process: metals can be smelted again, and the sand used in moulding or the core shop can be reconditioned.

Nevertheless, environmental legislation can have a negative impact on the sector's competitiveness. Many new regulations have been introduced in recent years, and although foundries have always been very active in the area of environmental protection, large new investments are now necessary, in particular to reduce emissions. On the other hand, it has become increasingly expensive to deposit waste, so that further investment to limit waste has become necessary. This will lead, among other things, to the construction of additional sand conditioning plants.

Table 7
Investment trends

(million ECU)	1980	1981	1982	1983	1984	1985	1986
FR of Germany	202.6	168.8	171.1	211.1	201.1	241.5	304.7
% of turnover	4.2	3.5	3.5	4.2	3.8	4.0	4.7
France	139.2	129.5	109.0	97.8	80.4	112.5	N/A
% of turnover	5.0	4.4	3.6	3.5	2.9	4.1	N/A
Italy	101.1	101.7	74.0	93.2	124.9	119.3	154.7
% of turnover	6.6	6.9	3.9	3.6	4.3	4.7	5.7
United Kingdom	115.5	65.1	66.3	58.3	67.6	82.9	71.8
% of turnover	4.7	3.1	3.1	3.0	3.1	3.6	3.6

Source: Eurostat (Inde).

Finally, the problem of protecting against noise should be noted, especially with reference to fettling shops.

Since not all foundries have the financial capacity to undertake such investment, some of them will have to give up production after the transition period.

The impact of 1992

The direct effects of a single European market on foundries are likely to be small, since the simplification of border formalities and the elimination of delays at borders will have little impact on international trade in castings.

Changes in other sectors, however, will probably have significant spill-over effects, such as the liberalization of public procurement, which will have important implications for pressure pipes or castings for sewerage. Furthermore, the forthcoming changes in the transport and insurance sector will make it possible to sell castings in more distant, external markets. But since the demand for castings itself is not expected to increase very rapidly in the EC, this will also mean enhanced competition. The foundries in low-labour-cost areas, as well as those having the lowest production costs with reference to environmental legislation will enjoy a competitive advantage. Both factors vary widely across EC Member States.

In those segments of the market where a high quality is requested, foundries with a more advanced technology will have an advantage, in terms of both sales and expected profits. Similarly, on the 'low-price' end of the market, proximity to customers will be advantageous.

New technologies

The long-term prospects for this sector depend upon the introduction of new technologies and the availability or use of new materials, especially new alloys. In the past, mass production became possible with the introduction of automatic moulding machines, which also led to significant increases in productivity. It now seems likely that the development of CAD/CAM systems could have a similar effect on productivity, this time via pattern-making and/or fettling shops. Benefits may even be observed for production in small series.

The development of new alloys (which in some cases was connected to the development of new tech-

niques) made it possible to construct lighter castings. It is estimated that, in the past, the reduction in the average weight of castings per year has been around 2%, which partly explains the drop in the production of tonnage.

The main competitors of foundries are those enterprises which use other processes to mould metals. The most important of these processes is forging. Others are welding, sintering or stamping. More importantly, however, a new form of competition has emerged in recent years as a result of a shift in demand towards new materials — in particular certain plastic products. Their importance in the production of cars, pipes and fittings, or household articles for example, has increased rapidly. Currently, it seems that the substitution process has slowed, and some say that it has even been reversed as a result of the need to recycle rather than deposit materials.

In the future, mineral products, such as ceramics, or composite materials such as fibre plastics, could become important substitutes.

Geographic features

Historically, foundries were built near collieries and/or smelting works. It is thus in those regions that one still finds the greatest density of foundries. Things have changed, however, and today foundries are more customer-oriented. As a result, modern and efficient foundries now tend to locate in those regions of Europe where one finds a high-capacity car production plant, or a productive mechanical engineering company. It is thus also in such large industrial centres that most of the EC production of castings now takes place.

As noted earlier, and again for historical reasons, foundries are generally small or medium-sized companies. More than half of them have fewer than 50 employees. Likewise, more than half are, in fact, part of a bigger enterprise, producing castings 'for use in house', such as machine components.

Outlook

Favourably influenced by cyclical factors, the tonnage of foundries increased by 7% in 1988, compared to the previous year. This (higher) production level is expected to be more or less maintained in 1989 and 1990; increases of the order of 1% to 2% may even be possible. In the longer term, the volume of production is expected to stabilize at this higher

level. Should cyclical factors continue to exert a favourable influence, even greater gains could be recorded.

The use of castings in car manufacturing, in particular, is expected to expand, but deliveries to the building and steel industry are expected to continue to fall.

Not everything looks rosy, however. Over-capacities still exist in the industry, which makes it difficult to charge a sufficient price. On the other hand, the rate of growth of the demand for raw materials and intermediate products like metal products is generally smaller than the overall rate of growth of the economy. Also, since both suppliers and customers of foundries are large enterprises, while they themselves are generally small and medium-sized companies, foundries have a relatively weak market position. Last but not least, competition from non-EC countries is increasing.

To limit the damaging effects that these factors may have on the overall growth of the industry, different strategies are possible: firstly, foundries could develop higher-quality products, for instance by using more sophisticated alloys; secondly, they could offer additional services, through a higher grade of value-added, for instance (i.e. by finishing operations); thirdly, they can adopt on a large scale modern techniques for developing complex cast constructions, such as axle-trees, which were impossible to cast only a few years ago. Finally, it may be possible for them to find new end-markets, by producing lamp-posts or bells, for example.

The international position of EC foundries is not bad at present. However, since many steps of the operations are highly labour-intensive, particularly in fettling shops and in the finishing process, low-cost producers in the Far East, for instance, could have a competitive advantage, endangering Europe's

future competitiveness. Further rationalization is therefore necessary. CAD/CAM systems for pattern-making and/or the fettling shops, as well as CNC machines for finishing operations could be a solution. Speeding up the delivery process, avoiding factory rejects by supplying castings 'just in time', and producing high-quality products are important ways of improving the world-wide competitiveness of EC products.

Statistical appendix

Many different sources were used in the preparation of the tables. Not all of them are fully comparable, however, and for some variables data were simply not available. Accordingly, in some respects the tables remain inaccurate, and incomplete.

The following sources were used:

- *Eurostat*
- CAEF, Comité des Associations européennes de Fonderie
- *Modern casting*, USA
- *US Industrial Outlook 1988*, Chapters 20 and 21
- Annual statistics of materials processing industries, Japan
- Our own calculations and estimates.

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STEEL-FORGING

(NACE 312.12)

Summary

With a production worth about ECU 3 billion in 1988, the European forging industry ranks first in the western world, ahead of Japan and the United States. The main customer for this industry is the motor vehicle sector, which consumes more than 50% of total production. Many vital parts of cars are forged, such as steering and transmission parts. Despite strong competition from other techniques, production increased in 1987 and in 1988 as steel-forging companies cut costs thanks to increased specialization and technical innovation.

Description of the sector

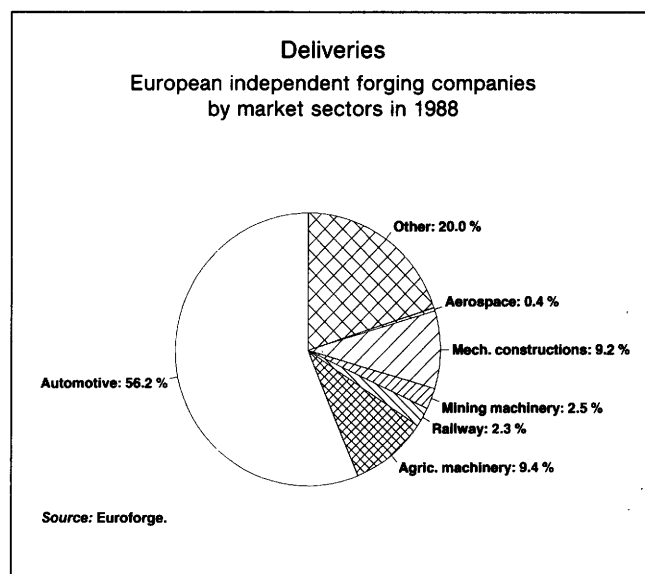
Forging consists of taking a piece of steel, known as a slug, and heating it until it becomes malleable. It is then shaped by dies, which are brought together more or less rapidly by devices using impact or pressure. The semi-finished steel products used for forging are generally round or square bars, known as billets, which are formed either by rolling ingots or continuous casting, with or without rolling. These semi-finished products are sawed or sheared into slugs, depending on the thickness of the billets. Their weight and length are calculated in order that they should be suitable for forging specific items.

The main types of steel processed are carbon steels or ordinary steels, low-grade alloyed steel and strong alloy steels. There are strict rules for deciding which grades of steel are appropriate for a given piece. The criteria include stress analysis, data on the environment in which the piece will be used, the size and shape of the piece, ease of machining, the mechanical characteristics sought and the heat treatment to be applied.

Current situation

The forging industry went through a recession between 1980 and 1986, but production stabilized in 1987 and started rising to a satisfactory level in 1988.

Figure 1



Consumption and production

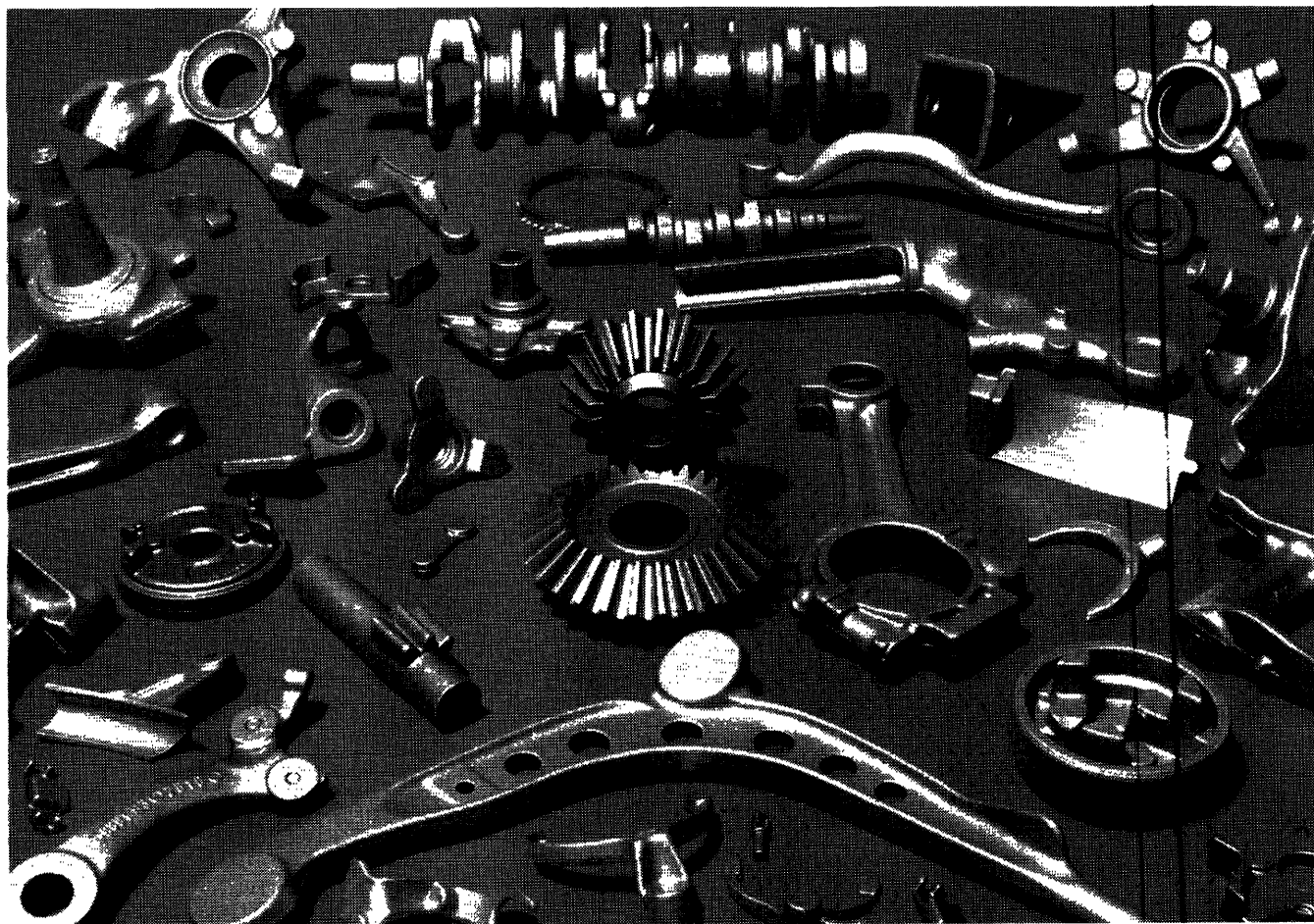
Forged parts are used in nearly all industries: car-making, aeronautics, shipbuilding, machine-building, agricultural machinery, construction machinery, mechanical engineering, electricity (conventional and nuclear power stations). The car industry is, however, by far the biggest customer, accounting for 73.5% of the total in the Federal Republic of Germany, 48% in the United Kingdom, 61% in Spain, 37% in France and 44% in Italy. Similar large percentages can be observed in Japan and the United States. In fact, the only country where the

Table 1
Main indicators, 1980-88 (1)

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	N/A	N/A	N/A	N/A	N/A	1 457	1 451	1 493	1 680
Net exports	N/A	N/A	N/A	N/A	N/A	161	153	154	141
Production	2 040	1 814	1 719	1 612	1 602	1 618	1 604	1 647	1 821
Employment (1 000)	65	63	62	59	58	57	56	54	60

(1) Belgium, FR of Germany, Spain, France, Italy and the United Kingdom.

Source: Euroforge, Eurostat (Comext).



forging industry does not supply the car industry is Belgium.

The forging industry is, therefore, very susceptible to the technical options adopted by the car industry, the effects of which also spill over onto other industrial sectors.

Forging industries in all the EC countries have made major efforts to improve productivity through the purchase of more productive machinery, extending the induction heating process, mechanizing and robotizing work stations and introducing CAD/CAM (computer aided design/computer

aided manufacturing). Such moves had become inevitable because of advances made in this direction by competing production techniques and customer pressure for lower prices.

Employment

The industry's workforce has generally shrunk as a result of the slack market and the mechanization of production. This trend did not continue in 1987-88, however, owing to the improved economic situation. Forging, which used to be essentially a labour-based industry, is becoming mechanized.

Table 2
Production by country, 1980-88

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988	AAGR
Total	2 040	1 814	1 719	1 612	1 602	1 618	1 604	1 647	1 821	-1.4
Belgium	14	16	16	17	16	17	16	15	16	1.7
FR of Germany	831	793	777	728	745	794	807	783	866	.5
Spain	134	108	122	120	113	127	137	144	153	1.7
France	209	188	169	141	143	146	148	155	173	-2.3
Italy	557	473	416	385	365	328	322	328	351	-5.6
United Kingdom	295	237	220	223	223	206	174	223	261	-1.5

Source: Euroforge.

Investment

In the most efficient and productive companies, investment levels have reached 10% of turnover or more. Investment and productivity gains have brought production costs down. However, the metal used accounts for a large part of the costs (at least 35%) and this is virtually impossible to reduce. The rest of the input costs consists of labour (45%), energy (8%) and various other costs (12%). Of course, these percentages vary widely according to the weight and grade of the metal used, as well as the treatment and the shape of the piece to be produced. Production costs have also been decreased as a result of technical progress such as improved yields, the use of new, high-output equipment, and the manufacture of lighter, higher-precision parts.

Structural change

Most companies are becoming increasingly specialized in order to benefit from economies of scale and be able to produce at the lowest possible price. Specialization gives companies an edge over the competition as well as long-lasting control of the market niche they have chosen. Some companies have developed warm forging, at temperatures below the normal 1 250°. More and more companies are using computer-aided design and manufacturing techniques. These methods allow them to optimize their product and maximize the strength/weight ratio.

Geographic features

The Netherlands, Ireland, Denmark, Greece and Portugal, although members of the EC, are not mentioned in this report since they have no forging industry.

In the Federal Republic of Germany, 150 companies produce what amounts to the highest national output level in the western world. Several large companies operate, among them Thyssen, Gerlach and Peddinghaus.

In the United Kingdom, the largest company is United Engineering and Forging (formerly GKN), which accounts for 50% of UK production. The other important groups are: Firth Rixon, INCO Group and Cameron Iron Works.

In Belgium, 10 companies operate in this sector, four of them having forging as their main business. All 10 companies are small or medium-sized businesses. They are spread over the country, but are more clustered in places like Charleroi and Liège, which used to be the centres of heavy industries such as mining and steel. The decline of certain customer sectors (such as coal, steel and railways) and competition from products manufactured differently have led to a substantial reduction in the number of companies operating in this sector. Among those which remain, many are specialized in the production of forged steel for high-potential sectors like mechanical engineering, lorries, and aeronautics.

In Spain, out of the 40 companies that make up the sector, only eight have more than 150 employees, five have between 100 and 150, nine 50 to 100, and 18 less than 50 employees. Most of these companies (30) are located in the Basque country, four in Catalonia, two in Aragon, one in Madrid, one in Galicia and two in other regions. The largest companies are: Patricio Echeveria SA, La Farga Casanova SA, Forgas de Villalba SA (Gekanor Group) and Forgas de Galicia SA.

In France, there are 72 companies operating in this sector. Three groups, one of which was constituted recently, dominate the sector: Ascometal, Forges Stephanoises and Forges de Courcelles. Forging companies can be found in the following regions: Ardennes 25, Loire six, East 14, other regions 27.

In Italy, most companies are located in the north, in Piedmont, around Turin, in Lombardy, in the Como area, in Varese and Brescia, and in Venetia and Emilia (Bologna). The largest companies are Teksid, a subsidiary of Fiat — 90% of whose production goes to the car industry — the Erber Group, Riganti and Casartelli. In Lombardy, 10% of the companies account for 50% of total production and, except for Teksid, they are all family businesses.

Outlook

Most forging companies are caught up in a trend towards specialization that started several years ago for technical and economic reasons. This specialization is based on different factors such as the shape and volume of the piece, the size of the order, the type of customer and the manufacturing methods. In certain applications, alloy steels are replacing lower-quality grades. Also, parts are being given more and more complex shapes and tend to be lighter.

The medium-term prospects will depend directly on the technological options, such as those mentioned in the paragraph on production, adopted by the car industry. Technological changes may well result in new customers opting for forged products, even though other techniques have been used instead elsewhere. If these technological changes fail to occur, the competition between the different manufacturing techniques will go on.

Long-term technical developments and competition from other manufacturing techniques have forced forging firms to introduce still more innovations. While in Germany and Belgium production has remained stable in recent years, elsewhere firms have been fighting to keep production from falling. The forging market is much coveted by promoters of

rival techniques and the struggle that has been going on is far from over. In this subcontracting business, where relations with customers are paramount, a certain geographical proximity has always existed. Imports from distant countries like Brazil for example, are now beginning to surface and other countries may well have plans to enter the European market. The forging industry has, however, taken a number of measures with respect to quality, productivity, service enhancements and cost reduction to meet these challenges.

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CONSTRUCTIONAL STEELWORK

(NACE 314.1)

Summary

The scale of the European structural steelwork industry can be assessed from the total tonnage of steel erected, which is over 4 million tonnes, with an estimated value of between ECU 6 and 8 billion. The industry employs over 200 000 people directly, and up to three times this number indirectly in ancillary activities.

Europe is also a major consumer of constructional steelwork, as indicated by the size of its market (4 million tonnes) compared with that of the USA (5 million tonnes) or Japan (8 million tonnes).

Within Europe, the major consumers of structural steelwork are (by decreasing order of importance) the United Kingdom (1 248 000 tonnes in 1988), the Federal Republic of Germany (921 000 tonnes in 1987), France (700 000 tonnes in 1986) and Italy (610 000 tonnes in 1988).

Current situation

Table 1 describes the market for constructional steelwork for buildings, bridges and hydraulic works of some member States of the European Convention for Constructional Steelwork (ECCS), i.e. all EC countries except the Iberian peninsula.

Offshore structures are not included in the totals.

There are no consistent regularly collected statistics for constructional steelwork for all the ECCS member countries. The table has been prepared from the most recent data in each country.

In nearly all Member States, there has been strong growth in output of non-residential building — the main market for constructional steelwork — during 1988. In this context, the total output shown at 4.2 million tonnes understates the current position.

Output in the United Kingdom grew by 22% in 1988, from a level of 1 040 000 tonnes in 1987. 1988 output growth in the Federal Republic of Germany was relatively modest, so that the United Kingdom is now the largest producer.

Concerning export data, most refer to exports to neighbouring countries, and most of them are not separated from production data by type of work.

The current situation can then be summarized as follows:

- total output is in the range of 4.2 to 4.5 million tonnes;
- industrial building accounts for approximately 55% of the total production;
- commercial and institutional building (offices, shops, schools, hospitals, etc.) accounts for over half the remainder (27%);

Table 1
Output of constructional steelwork by country and type of work (1)

(1 000 tonnes)	B-L	Denmark	FR of Germany	France	Italy	Netherlands	United Kingdom
Year of data	1985	1987	1987	1986	1988	1987	1988
Industrial (2)	157	13	540	370	340	220	645
Commercial	11	2	285	160	35	150	420
Other public	8	0	0	20	25	0	45
Agricultural	8	5	N/A	48	0	30	55
Pylons and towers	13	10	56	86	20	11	3
Bridges and hydraulic	11	7	40	17	40	9	25
Exports (3)	42	4	80	47	150	N/A	55
Total	250	41	921	700	610	420	1 248

(1) Excluding power generation. Use in the domestic sector is negligible.

(2) Including plant support.

(3) Exports for France and Germany are included in other headings as well.

Source: CECM.

- bridgework, despite its high profile, accounts for less than 4% of total production;
- the specialized tower market — mainly electricity transmission — accounts for just under 5%;
- the largest producer in Europe is the United Kingdom. Its 1988 output reached a record level, with growth exceeding anything previously experienced in the British industry. This reflects a combination of a massive expansion in the level of office and retail building and spectacular growth in market share against competing materials.

Position of steel construction in the market

Table 2 describes the market position of steel in the various ECCS member countries.

The general position is clear:

- in industrial and single-storey buildings, the market share of steel is fairly high. It is low only in Italy;
- in commercial building, the market share of steel is significant only in the United Kingdom;
- in bridgework, the market share of steel is high in just one country, France;
- the success in developing the market for multi-storey buildings in the United Kingdom and for bridges in France, indicates that major improvements in the market share of steel can still be achieved elsewhere.

United Kingdom

Following the dramatic downturn in the United Kingdom industry during the 1970s and the early 1980s, recent years have seen a major reversal in several market sectors. There has been a remarkable upsurge in the demand for commercial buildings, and for shop buildings (in association with the reorganization of retail trading towards out of town superstores). Demand for offices has risen very strongly, particularly in the Greater London area. Steel's market share of commercial building rose from 33% in 1980 to 51% in 1987 on a floor area basis.

The industrial building market experiences strong cyclical movement but its trend is static. There has recently been an increased demand for small factory estates and 'high-tech' buildings. Steel continues to have a market share of around 90% in this sector.

One principal reason for the recent successful upturn in steel production seen in the United Kingdom has been the major and sustained market development programmes for steel construction led by British Steel. The volume of exported steelwork was 55 000 tonnes in 1988.

The outlook in volume terms is good for the next couple of years, though production is expected to fall in 1990, following the saturation of demand for offices and retail buildings combined with a downward cyclical movement in industrial building. The main constraint on the market share of steel is certainly its increasing price in the market place.

Federal Republic of Germany

The production of constructional steelwork fell by some 30% between 1980 and 1985. Production recovered just after that and since 1987, mainly as a result

Table 2
Market share of steel

	United Kingdom	FR of Germany	France	Italy	B-L	Netherlands	Denmark
Industrial & single-storey commercial buildings	High	Medium	High	Low	High	High	Medium
Commercial & institutional (more than one storey)	Medium	Low	Low	Low	Low	Low	Low
Bridges	Medium	Low	High	Medium	N/A	Medium	Low

High = 60 % and above.

Medium = 25 to 59 %.

Low = below 25 %.

Source: CECM.

of projects involving flue gas desulphurization of power stations.

Steelwork for bridge structures suffered a major decrease, from 54 000 tonnes (1979) to 21 000 tonnes (1984). However, in the past few years, there has been a modest upturn in this market.

The share of steelwork in single-storey industrial and commercial buildings is only 40%. Whilst it is difficult to understand this low market share, it has to be accepted in the absence of confirmation from other sources. Germany's steelwork industry now has a 20% overcapacity.

The use of composite steel construction especially for commercial buildings is limited, but there is evidence that the market share could increase, if more knowledge on the subject became available.

It is also understood that in the Federal Republic of Germany there has been a significant penetration by Eastern bloc (e.g. East Germany) manufacturers, who are able to offer very low prices for constructional steelwork products.

The Federal Republic of Germany exported 79 000 tonnes of steelwork and imported 87 000 tonnes in 1987.

France

Between 1973 and 1986, there has been a dramatic reduction of roughly 35% in the production of constructional steelwork. This was primarily due to the general economic crisis, the decline in the offshore market, and the lack of major industrial investments.

However, some markets are showing some potential for an increased share of steelwork. Among these, the main one is industrial buildings, where the share of steel remains high (over 75%). An increasing number of bridges are now constructed from steel. A 3 to 5% increase in tonnage per year is expected for non-residential and non-industrial buildings more than one storey high.

Like many other countries, the French steelwork industry has changed considerably over the last 15 years. In 1986, the four largest companies, each producing more than 15 000 tonnes, represented 13.5% of the total steelwork production. On the other hand, some 369 companies, each producing less than 2 000 tonnes, represented 35% of the total. It is currently estimated that the French steelwork industry has a 30% overcapacity.

The main French contractors are concrete specialists. Fire protection and corrosion problems tend to mitigate against the increased use of steel. Despite the poor knowledge about steel, major changes are planned to promote the use of steel in coming years.

Italy

The current Italian market remains fairly static. Two factors influenced this situation in recent years: an increase in the home market of about 10%, and a fall in exported steelwork of about 30%.

The home market increase has been principally in the field of public buildings and light steel-framed structures. A contributory factor is the increased use of steel structures in high-risk earthquake areas.

A continuous decrease in investment for industrial buildings has occurred in recent years in Italy. Although there is still a requirement for small/medium-size works, there is considerable competition from prefabricated concrete structures. The production of transmission towers has also decreased due to the environmental lobby.

Some new investments in public works such as roads and railways have been proposed. These programmes will enable steel to be used increasingly for the construction or rebuilding of bridges along both these new and existing routes.

Ten years ago the Italian export production was almost equal to the home market production. It now represents one quarter of the total steelwork production. This downturn is attributable to steel manufacturing in newly industrialized countries who, formerly importers, have become self-sufficient and are now themselves exporters.

Belgium and Luxembourg

It is difficult to forecast the current situation and future trends in each sector in Belgium and Luxembourg, as the most recent published market information is for the year 1985. Between 1980 and 1985, there has been a dramatic reduction of production, particularly in the residential building market.

However, the market share of structural steel is expected to increase in some sectors: industrial buildings, warehouses and single-storey commercial buildings.

There has been a slight reduction in the market share of steel frames for office buildings, because of,

among other things, the onerous influence of fire protection standards. There is now no market share for steel in multi-storey buildings.

The Netherlands

Consumption of constructional steelwork in the Netherlands is relatively high in terms of population and because of the absence of a domestic supplier of structural sections.

The main market is industrial building, where a substantial market share for steel is evident.

In the non-industrial building sector, steel has a substantial share of the retail and agricultural sectors and is commonly used for extensions. The share of steel frames for office buildings is limited.

There are a number of major steelwork contractors in the Netherlands who have grown with the North-Sea and hydraulic works markets. Recession off-shore has led to a shortage of work. Smaller manufacturers, servicing the building sector, are currently busy.

The main constraints on steel are the existence of a strongly entrenched concrete industry and inertia to change.

Denmark

It is not possible to give a detailed description of the current and projected market for structural steelwork in Denmark. The figures provided have been estimated on the basis of previous experience, because there are no statistical data available in this area.

During the past two years there has been continued investment in Danish industries. Industrial activities are predicted to level out in the immediate future, and thus influence the building sector. Fire protection remains a problem in buildings of two or more storeys. Single-storey steel buildings are also not common in Denmark.

Agricultural investment has diminished recently because of the great uncertainty of future government requirements for environment protection and subsidies. Thanks to these government subsidies, exports of fabricated steel are expected to increase a little.

A marked growth in steel bridge construction is forecast due to developments by the Danish State Railway for railway bridges. The much awaited plans for the Great Belt Crossing are expected to provide work in this sector.

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WINDOW FRAMES

(NACE 314.2)

Summary

The window frames sector includes three types of product, differentiated by the raw material used: metal products, wooden products and uPVC products. As all sectors whose activity is linked with that of the construction sector, the window frames sector has gone through a recession in the early 1980s. The situation has improved recently, both because of the increase in new building construction and because of the greater importance of the renovation sector as an end market for window products. The industry is mainly composed of small and medium-sized enterprises, with a tendency towards increased specialization.

Description of the sector

The sector covers NACE 314.2. But the EC Statistical Office is currently revising some of the NACE codes. This revision includes an important modification for the sector of metal windows, curtain walls and the like.

The EC metal window frames industry includes curtain walling and structural glazing. This industry comprises a number of manufacturers who use and sometimes design mostly aluminium profiles and systems for outdoor construction such as windows and doors.

NACE 314.2 includes three types of products:

- Metal products: windows, doors, curtain walls, structural glazing, cladding, balustrades and hand rails;
- Wooden products: windows, doors, balustrades and hand rails;
- uPVC products: windows, doors and certain forms of cladding.

It should be noted that curtain walls and structural glazing are principally not realized in materials other than aluminium or steel.

Generally speaking, the window frames sector is made up of a large number of small to medium-sized enterprises. They provide the basic materials (metal, wooden or uPVC profiles) which have then to be

transformed into the final product. These small companies then produce windows and doors, built to the customers' requirements.

On the other hand, there are a small number of large enterprises. These large manufacturers put a range of standardized windows and doors on the market, either in wood, uPVC or metal.

There also exists a small number of manufacturers specialized in curtain walls, skylights and structural glazing, and which tend to develop and use their own systems. Their main market are the larger developments which require sophisticated solutions, e.g. the Broadgate development in London, skyscrapers.

Current situation

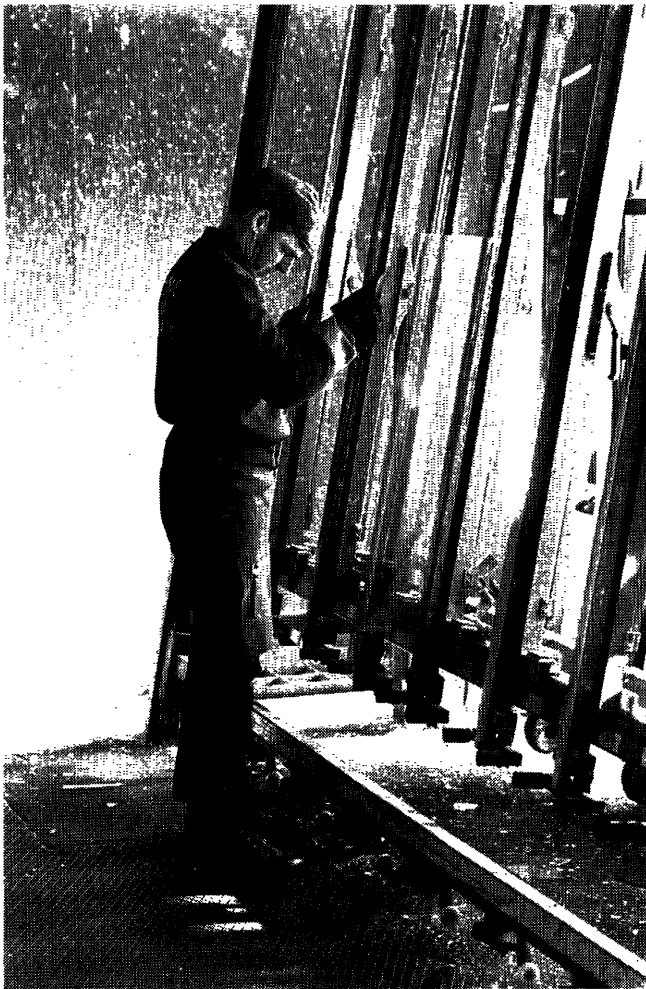
Since doors, windows, etc., are used in buildings, the demand is a derived demand whose evolution is directly related to the evolution in the building sector.

The building sector has gone through a depression from the end of the 1970s to the mid-1980s. This downward trend seems to have ended. The general upturn in construction activity in the EC, first witnessed in 1986, has since continued. The largest increases have been in the non-residential buildings and in the renovation of residential buildings.

Industry structure

Two types of manufacturer/constructor can be distinguished. There are first the smaller constructors who usually employ a limited number of persons, generally less than 10 persons, and often five or six. There are then the larger constructors who could be qualified under the heading of industrial manufacturers. The markets in which these two types of constructor operate are different, but sometimes tend to overlap.

The smaller constructors often manufacture doors and windows destined for relatively small buildings. Their products are mostly destined for private housing and small commercial and industrial buildings. The main advantage for these constructors is



that they build windows and doors in small numbers. This is possible as they employ traditional methods, so that complicated calculations are not always required.

The industrial firms can be classified into two categories. On the one hand, we find those who try to compete with the smaller constructors by offering standardized doors and windows. These are, however, a minority. On the other hand, there are those who work in the field of curtain walling and structural glazing in addition to the supply of windows and doors. These firms often excel in the design and realization of their products.

Design

For each project, the manufacturer has to decide which materials and structural systems to use in order to meet the requirements made by the architect and the standard regulations. Each building has its own characteristics, which have to be taken into account from various points of view: aesthetics, stability, weathertightness, thermal and acoustic insula-

tion, fire resistance, ageing, etc. These points are defined in terms of design criteria which must be met by profile design and the installation criteria. Care must also be taken in selecting adequate infillings.

Most manufacturers buy aluminium profiles from system suppliers, or directly from the extruders who offer their own systems. These companies can be part of the same group (vertically integrated companies) or they can be independent suppliers of the highly competitive open market (non-integrated) companies. On the other hand, large-scale manufacturers usually employ systems developed by themselves and designed for their specific requirements. In such a case, the dies used for extrusion of the profiles remain property of the manufacturers.

The systems used for building projects must meet the design criteria and requirements made. Sometimes standard systems can be used, in other cases specific new systems have to be developed for which the manufacturer must have the know-how required. Introduction of CAD/CAM methods has made design work much easier in this respect.

During the past 20 years, design of outdoor construction has been improved. This led to higher performance levels as well as better quality. Aluminium profile sections were equipped with thermal breaks for reducing the risk of condensation at the inside of the profiles and achieving better thermal insulation. New types of glazing with reflective coatings and better thermal and acoustic insulation were introduced on the market. New surface treatment procedures for clear and coloured aluminium sections give the architect a wider range of possibilities to choose from with regard to the aesthetic aspect of the building. New glazing techniques such as structural glazing were developed where silicone replaced glazing beads for fixing the pane to the window or curtain wall frames.

Manufacturing is mainly based on finished or semi-finished profiles and sheets made of aluminium or mild and stainless steel. Elaboration of statistics on the European window-market requires other materials, i.e. wood and uPVC, to be included also. Steel is becoming less and less important as a frame material, and has thus not been taken into account.

Furthermore, a large number of other materials are used in window, door and curtain wall construction such as glass and insulation panels for infillings, sealants and rubber gaskets for weatherproofing and hardware for opening and fixing. All these materials

are usually subcontracted by the manufacturer, be it in aluminium, uPVC or wood, to specific suppliers.

Manufacturing and installation

Surface treatment, i.e. anodizing or painting of the aluminium is carried out prior to manufacturing and assembly of the joinery product by the company itself or outside the company.

Manufacturing comprises all operations executed on sheet profiles, assembly for window frames, quality control and delivery. Computers have been introduced and equipment and robots can be found in the production lines.

Installation on site comprises transport, fixing and tightening of the metal joinery products. It can be supplemented by insertion of glazing and insulation panels. These steps can be carried out by subcontractors or by the contractor himself.

Due to the ever increasing number of standards and performance levels, design work has become more time-consuming and asks for more qualification.

Handling procedures

Developers, public or private owners, charge architects and consultants to make the design drawings and elaborate the specifications for the works. They will also be the ones responsible for supervising the works on site. The manufacturers receive orders either directly from the owners, or act as subcontractors of the main contractor or have been nominated subcontractors. The manufacturers supply the products and may also be in charge of installation on site, even with glazing included. The procedure differs from one country to the other depending on local customs and dimensions of the project.

Consumption

In 1988 (one of the best years for the producers of raw aluminium), consumption and prices increased (prices increased by 50% between 1987 and 1988). The price increases have mainly benefited the producers of raw aluminium.

The demand for semi-finished products, such as extruded profiles used in the metal window sector, was high in 1988. Most extruders have used their installations to full capacity. An important part of

the extruders' financial gains have been used to finance the raw materials whose price has doubled.

The world primary aluminium capacities will probably increase by 1.29 million tonnes by 1993 (0.5 million tonnes in Latin America, 0.5 in Canada, 0.25 in Asia, 0.04 in Oceania). No changes are expected in the USA, in Africa and in Europe.

The producers of intermediate products such as extruded profiles fear that prices will stay high or increase further, due to rising demand and lack of aluminium.

Production

Generally speaking, metal joinery has enjoyed an expanding market in the non-residential new building construction sector. From around 13.5 million window units in 1984, the market increased to about 16 million units in 1988. However, it should be noted that, in this sector, the use of square metres would be more appropriate, but to make the comparison easier, the window unit was kept.

Wooden joinery, even though decreasing in percentage, keeps its market share stable at around 20 million window units per year. This is mainly new residential construction.

The uPVC joinery has rapidly increased, from 7.5 million units in 1984 to 12 million units in 1988. This increase is mainly achieved in the residential renovation market.

There are two distinct markets for window-products: the new construction and the renovation market. The renovation sector has exceeded the 50% market share since 1987. This trend is expected to continue the following years. As a result, the window sector no longer depends exclusively on new building construction.

It should be noted that regional and climatic differences do explain, to a large extent, differences in materials used in each country.

Employment

The number of persons employed directly by the metal window manufacturers increased by around 4 000 persons between 1987 and 1988. In 1988, 124 000 persons were employed by some 22 000 firms. These figures, nevertheless, underestimate the true number of persons employed in this sector,

Table 1
Sales by type of material used (1)

(1 000)	1984	(%)	1985	(%)	1986	(%)	1987	(%)	1988	(%)
Wood	21 181	49	20 088	47	19 933	44	19 749	42	20 547	41
Index	105		100		99		98		102	
uPVC	13 605	31	13 512	31	14 464	32	14 803	32	16 178	32
Index	101		100		107		110		120	
Aluminium	7 585	17	8 258	19	9 792	22	10 762	23	12 039	24
Index	92		100		119		130		146	
Other	1 171	3	1 096	3	926	2	1 313	3	1 284	3
Index	107		100		84		120		117	
Total market	43 542	100	42 955	100	45 115	100	46 628	100	50 047	100
Index	101		100		105		109		117	

(1) Excluding Greece, Ireland, Luxembourg and Portugal.

Source: FAECF.

Table 2
Sales by country, 1988

(1 000)	Wood	(%)	uPVC	(%)	Aluminium	(%)	Other	(%)	Total	(%)
EC (1)	20 547	41	16 178	32	12 039	24	1 284	3	50 047	100
Belgium	855	61	287	20	252	18	8	1	1 401	100
Denmark	743	69	203	19	110	10	25	2	1 080	100
FR of Germany	4 617	38	2 836	23	4 524	37	228	2	12 205	100
Spain	1 418	21	4 836	72	456	7	0	0	6 710	100
France	3 157	46	1 990	29	1 647	24	0	0	6 795	100
Italy	3 274	52	1 322	21	1 133	18	567	9	6 297	100
Netherlands	2 220	65	684	20	456	13	34	1	3 393	100
United Kingdom	4 263	35	4 019	33	3 461	28	422	3	12 180	100

(1) Excluding Greece, Ireland, Luxembourg and Portugal.

Source: FAECF.

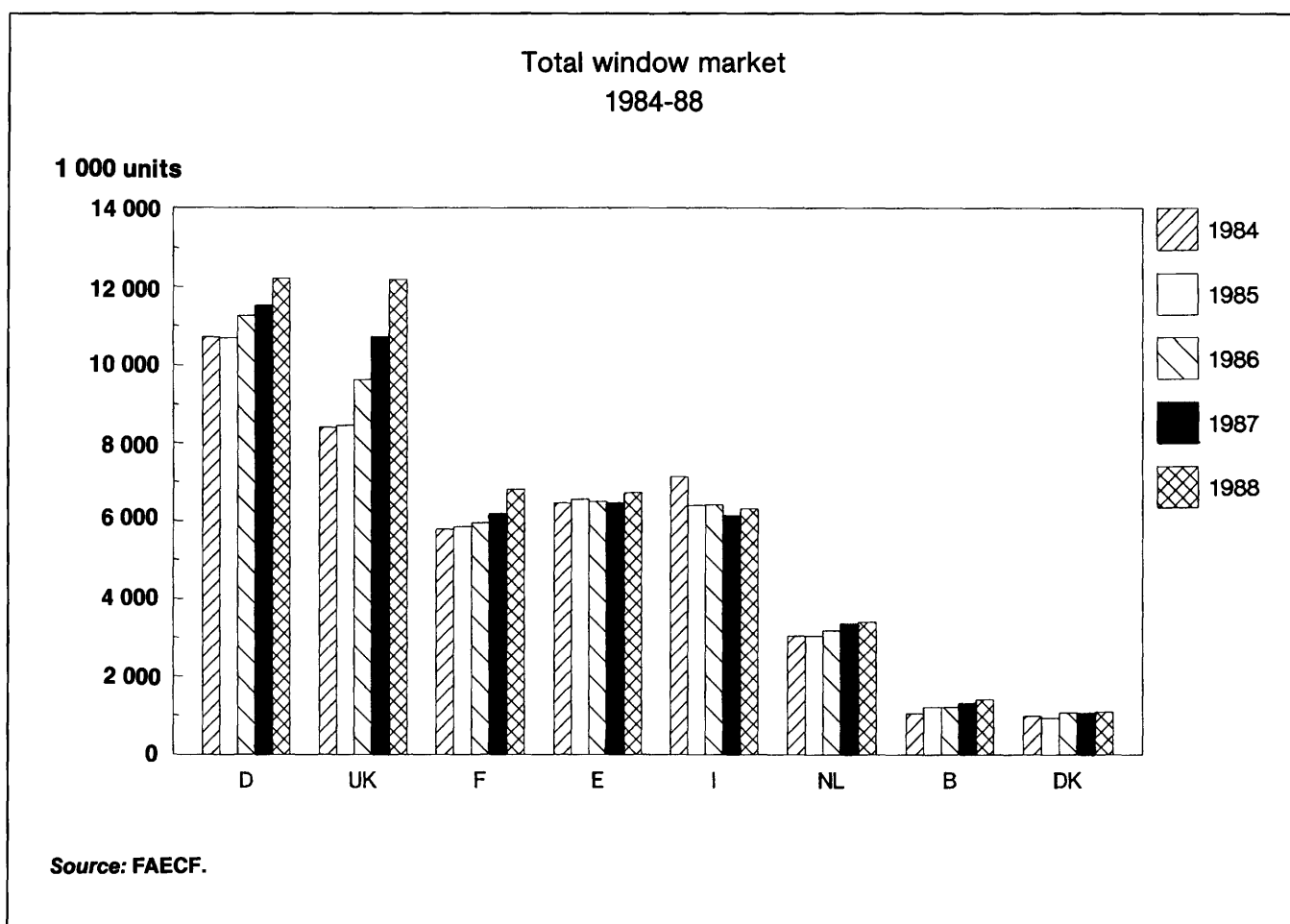
Table 3
Structure of market by construction type (1)

(%)	1984	1985	1986	1987	1988
New construction					
Residential	51.52	49.50	48.11	46.34	44.38
Non-residential	48.48	50.50	51.89	53.66	55.62
Total	100.00	100.00	100.00	100.00	100.00
Renovations					
Residential	74.48	74.46	73.95	73.09	72.97
Non-residential	25.52	25.54	26.05	26.91	27.03
Total	100.00	100.00	100.00	100.00	100.00
All construction					
New construction	56.43	53.74	51.26	49.94	49.93
Renovations	43.57	46.26	48.74	50.06	50.07
Total	100.00	100.00	100.00	100.00	100.00

(1) Excluding Greece, Ireland, Luxembourg and Portugal.

Source: FAECF.

Figure 1



since in many countries, new small constructors have set up a business.

A number of problems are encountered in recruiting personnel, both at workfloor level or in the offices. Few people are now attracted by the construction industry, probably due to the fact that unemployment was so high in this sector in the early 1980s. This has resulted in a lack of skilled workers in metal carpentry. At the office level, the introduction of new techniques, especially in the field of computerization, automatization and management presents a number of difficulties. It could lead to some takeovers in the future.

With the approach of 1992, employment demand in non-technical branches such as translation, law, finance and management techniques will increase, possibly causing a shift in qualification away from technical skills, making it even more difficult to attract the right personnel.

1992 could offer some ways out if it were possible to adopt a uniform or basically uniform approach to schooling in this sector.

Special issues

The EC directives on building products

On 11 February 1989, the EC published its Directive on the approximation of the laws of the Member States relating to products destined for the construction industry (89/106/EEC).

The backgrounds to this so-called 'construction products Directive' are:

- barriers to trade defined by the Treaty of Rome (Article 30 on mutual recognition and Article 36 on harmonization);
- the first construction products Directive abandoned in 1979;
- the 'New approach' Council Resolution of 7 May 1985.

The aim of the Directive is to enable free movement, marketing and use in the internal market of all construction products which comply with the essential requirements laid down in the Directive.

The essential requirements are mechanical resistance and stability, safety in case of fire, hygiene, safety in use, protection against noise, as well as energy, economy and heat retention.

The legislative harmonization is limited to the adoption of the essential safety requirements.

The technical specifications are to be drawn up by the European standardization organization CEN.

The technical specifications would not be mandatory.

National authorities would be obliged to recognize that products manufactured in conformity with harmonized standards are presumed to conform with the essential requirements.

The construction products Directive, while being concerned with products, makes requirements for buildings. This means that the essential requirements laid down in the Directive with which the product are required to comply are formulated in relation to the construction works in which the products are to be incorporated rather than in relation to the products themselves.

The impact of 1992

The essential requirements provide the basis for the preparation of harmonized standards in Europe. The goals of these harmonized standards are fourfold:

- achieve the greatest possible advantage for the single internal market;
- afford access to the single market for as many manufacturers as possible;
- ensure the greatest possible degree of market transparency;
- create the conditions for a harmonized system of general rules in the construction industry.

These standards will be elaborated by CEN, the European committee for standardization. Once elaborated, the standards should then be adopted as national standards in each member country.

In case of products where European standards cannot be realized within a reasonable period of

time, these products may be proved by a European Technical Approval.

Where no harmonized standard nor European Technical Approval exists, recourse may be had to a National Technical Specification.

Implications for manufacturers

The manufacturers should be able to maximize the eventual advantages of the single market.

This will impose at present and for the near future the following demands:

- adapt products to European standards or technical specifications;
- close collaboration with the European organizations which will draw up these standards and specifications; this will encompass a great amount of work as many CEN-commissions are involved;
- adoption of quality control and quality certification procedures; this is deemed to require an investment in time, personnel and cost;
- review of the firms strategy, business plans, commercial contacts in view of the single market.

Environmental protection

Environmental aspects have entered the field of window frames. All materials used in window frames have bad implications for the environment. The use of exotic woods threatens the forests in Brazil, Canada and other places. PVC is held to be hazardous and in some local municipalities in Europe, its use is even forbidden. Aluminium is considered as being too energy-consuming when the raw material bauxite is being transformed to aluminium.

Though these claims are true, it is currently impossible to make windows from materials which have no adverse environmental impact.

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BOILERMAKING

(NACE 315)

Summary

In 1989 boilermaking represented ECU 18.9 thousand million worth of products, a steady trade surplus and 230 000 jobs. Activity is declining slightly (0.3% per year in volume between 1980 and 1986). The industry is also undergoing far-reaching changes as heavy industries (oil, gas, energy, iron and steel) go through an investment crisis and export markets become more competitive and less solvent. There have been heavy job losses since 1980 (2.25% annually on average between 1980 and 1988), however, employment increased by 1.4% in 1989 compared to 1988. Boiler manufacturers need to seek new opportunities in fast-expanding industries and acquire new expertise in line with the demands of new customers and the need to modernize production methods.

Description of the sector

The boilermaking sector equips many branches of industry. Its main outlets, in decreasing order of priority, are:

- the production of thermal and nuclear power
- the oil and gas industry
- the chemical, petrochemical and pharmaceutical industries
- the food and drink industry
- the construction industry
- the iron and steel, and metal-working industries
- the paper industry

- various other industries, including automobiles, textiles, mechanical engineering, cement, rubber and electronics.

Since classifications differ between EC countries, it is difficult to estimate the importance of the industry in each country.

Boilermaking products are divided into the following categories:

- steam generators and boilers
- nuclear boiler construction
- fittings for steam generators and boilers
- plate and tube heat exchangers and condensers for nuclear reactors
- water tanks, reservoirs and vessels
- distillation, refining and similar equipment
- pipework
- various activities including installation and maintenance.

Current situation

Boilermaking production declined slightly since 1980 (2% in six years). Although it increased considerably in the Federal Republic of Germany and slightly in Italy, these developments did not compensate for the decrease in activity in France and the United Kingdom.

Table 1
Main indicators, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption (1) (2)	10 925	11 599	12 332	12 421	12 081	13 391	13 403	14 651	16 459	N/A
Net exports (3)	1 347	1 892	2 201	2 038	1 873	2 103	1 755	1 475	913	N/A
Production (2) (4)	12 266	13 497	14 556	14 487	13 994	154 981	15 171	16 142	17 372	18 982
Employment (1 000) (4)	276	262	262	243	233	239	232	230	227	230

(1) Estimated.

(2) Excluding Greece.

(3) 1980 EC 9; 1981-85 EC 10.

(4) 1987/88 estimated.

Source: Eurostat (Inde, Bise, Comext).

Production in France, the FR of Germany, the UK and Italy represents over 80% of total Community production. These four countries relied on the volume of internal demand to develop strong positions and specific expertise, which they were then able to transfer to major export markets.

Consumption and production

The strong points of French boilermaking are nuclear power (which means looking towards new markets, given French over-capacity in electricity and the weakness of world demand for solvent), oil, the automobile industry and the food and drink industry. There was a drop in production of 1.5% per year by volume between 1980 and 1986.

The powerful chemical, automobile, mechanical engineering and energy industries form the basis of German boilermaking. There is also a growing market specifically in Germany for anti-pollution installations aimed at protecting water and the atmosphere from dangerous pollutants, particularly nitric and sulphurous waste. The extent of this new demand coupled with excellent export results has made Germany the only country to experience any significant growth over the period 1980-86 (1.3% per year by volume).

The UK's economic and geographical characteristics have determined its specializations: the oil industry (particularly high-technology off-shore extraction), energy production, harbour and shipping industries, and iron and steel. Volume in the UK fell slightly, by 0.7% per year between 1980 and 1986.

Italy has major markets in thermal, nuclear and solar energy production, the automobile industry, harbour and shipping activities and ventilation. The gap between small businesses with a flexible work force and large firms supplying high value-added services is wider in Italy than in the rest of the EC. Italian production seems to have grown by 0.6% per year by volume between 1980 and 1986. The importance of the different countries is shown in Table 2.

The clientele of the boilermaking sector has changed profoundly in the recent past. For many years the major customers were nuclear or thermal energy producers and the oil and gas industry. But falling investment in these industries and strong growth in plastics and electronics, together with new outlets in the construction, and food and drink industries has led to a more balanced range of customers.

The EC is a net exporter. The Community boiler-making industry has been able to sell its products in major equipment contracts with industrializing countries. France has sold specific skills in nuclear power stations and Germany has had notable successes in major export markets (particularly in Africa and the Middle East) by implementing dynamic commercial policies and adapting supply to demand.

Four countries contribute to the positive foreign trade balance (10% to 15% of production, depending on the year). Germany alone accounts for more than half of it, Italy about 20% and France and the United Kingdom between 10% and 15%. There is little trade within the Community and imports are negligible.

Table 2
Production by country (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	AAGR
EC (2)	12 266	13 497	14 556	14 487	13 994	15 498	15 171	16 142	17 372	4.4
Belgium	222	192	215	193	242	228	228	227	249	1.5
Denmark	125	70	98	98	104	119	115	175	183	4.9
FR of Germany	3 638	3 805	4 261	4 559	4 327	4 584	4 864	5 119	5 404	5.1
Spain	514	532	573	436	396	534	474	577	662	3.2
France	4 333	4 816	4 819	4 827	4 599	5 460	5 604	5 842	6 269	4.7
Ireland	28	31	30	34	37	33	33	36	39	4.2
Italy	473	510	642	859	1 137	1 249	1 194	1 276	1 419	14.7
Portugal	81	89	97	81	59	64	74	71	76	-0.7
Netherlands	156	170	173	178	192	236	214	210	173	1.3
United Kingdom	2 698	3 282	3 645	3 222	2 903	2 993	2 371	2 609	2 898	.9

(1) 1987/88 estimated.

(2) Excluding Greece.

Source: Eurostat (Inde).

Structural change

There are three types of firms in the boilermaking industry.

- The system integrators are the smallest in number but the most powerful. They are medium-sized firms or divisions of large, diversified industrial groups and have three activities: design and engineering, manufacturing and on-site installation. Turnover depends on export successes and variations in major industrial investment on internal markets. In export markets, they are in competition with the small, local system integrators that are emerging as well as the Republic of Korea, which is capturing an increasingly large share of the market due to highly competitive prices. The principal feature of system integrators' activity is high value-added content. Purchases of raw materials represent only about 20% of turnover, whilst personnel costs run at about 45% due to large design and engineering departments with highly qualified technical staff. As work force services become less competitive, system integrators are tending to turn into 'general enter-

prises', developing know-how in many different areas, particularly in electricity, mechanical and civil engineering. This enables them to preserve a high level of value-added content and remain competitive with a relatively small basic staff. System integrators are now offering more maintenance services. Whereas maintenance work used to be lengthy and infrequent, this situation has altered. This development is due, firstly, to increased concern for the profitability and optimization of installations and, secondly, to ageing equipment, which needs more maintenance. In order to meet these new requirements, maintenance firms are creating small units close to sites, with the necessary structure and skills for rapid intervention when this is called for. Methods for long-distance maintenance are also being developed, which work on a principle similar to that of supervision networks: different sites are connected up to the same agency. System integrators have thus been able to develop such a high level of technical skill that they are increasingly called in to replace internal maintenance departments. In areas demanding high-level qualifications such as nuclear power, the scope of their services is tending to increase.

Table 3
Production and external trade, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC (1)	12 266	13 497	14 556	14 487	13 994	15 498	15 171	16 142	17 372	18 982
Index	79	87	94	93	90	100	98	104	112	122
USA (2)	7 000	8 888	8 396	7 950	8 425	8 913	N/A	N/A	N/A	N/A
Index	78	100	94	89	95	100	N/A	N/A	N/A	N/A
Japan (2)	841	1 584	892	2 689	1 266	1 468	1 428	1 494	1 544	N/A
Index	57	108	61	183	86	100	97	102	105	N/A
Production in constant prices										
EC (1)	16 764	17 370	16 887	16 164	14 534	15 498	15 450	16 531	16 931	17 706
Index	108	112	109	104	94	100	100	107	109	114
EC trade in current prices										
Exports extra-EC (3)	1 542	2 074	2 205	2 178	1 964	2 163	1 887	1 616	956	N/A
Index (4)	70	96	102	101	91	100	92	79	51	N/A
Imports intra-EC (3)	150	113	169	163	133	158	160	182	182	N/A
Index (4)	95	72	107	103	85	100	104	119	119	N/A
X/M	10.26	18.27	13.03	13.38	14.71	13.73	11.81	8.88	5.25	N/A
Imports extra-EC (3)	605	604	542	567	639	724	810	908	974	N/A
Index (4)	84	84	75	78	88	100	109	122	131	N/A

(1) 1987/88 estimated; Greece not available.

(2) Census of manufactures and Eurostat estimates.

(3) 1980 EC 9; 1981-85 EC 10.

(4) Taking into account changes in EC membership.

Source: Eurostat (Inde, Bise, Comext).

- Product specialists supply equipment for heavy industry, manufacturing vessels, exchangers, boilers, etc. which are then integrated into a process. Certain products such as vessels are manufactured in batches. Others such as exchangers are custom-designed and custom-manufactured. Product specialists are generally medium-sized firms which operate nationally, in collaboration with system integrators, world-wide. As far as the rest of the world is concerned, there is not much competition in this area of expertise. If companies are genuinely efficient and have a dynamic commercial activity, they can export successfully. The value-added content in these firms is less than for system integrators; purchases of raw materials represent over a third of total turnover.
- Activity specialists are the most common type of firm and act as sub-contractors for the system integrators. They are small firms, able to manufacture particularly difficult items (in titanium or zirconium, for example) from blueprints supplied by the customer. They do not tend to be diversified, have no contact with the end-user, and 80% of their personnel are blue-collar workers.

Employment

Simultaneously with a very slight fall in production (0.2% per year in constant ECU between 1980 and 1986), there has been a significant fall in employment of 3.2% per year over the period 1980-86. This fall has been regular and fairly evenly spread over each country in the Community except FR of Germany, where, in six years, production has grown almost 10% by volume but with a constant employment level. The decline in employment is partly caused by stagnation in major investment on internal markets and the arrival of more export-efficient competition, particularly from the Republic of Korea. Lastly, as in all established industries, employment levels in boilermaking have been affected by the appearance of new techniques (mechanical, robots, data processing) and higher qualification requirements.

Within the industry, system integrators are concentrating their activities on design, contracting and on-site installation. Most intermediate shop assembly work is sub-contracted to small local firms, which may be foreign or extra-Community, so that management of temporary labour is transferred to an earlier stage in the production process. This has meant fewer shop assembly jobs for systems integra-

tors and more jobs for sub-contractors, although there is less job security overall.

Table 4
Employment by country, 1987

EC	229 779
Belgium	4 176
Denmark	2 937
FR of Germany	64 396
Greece	758
Spain	12 761
France	74 592
Ireland	697
Italy	16 376
Netherlands	3 753
Portugal	4 203
United Kingdom	45 130

Source: Eurostat (Inde).

Personnel training is a major concern of boilermaking firms in the EC, whether they be small-scale or part of a large group. Training also extends to tangential activities, particularly through the recruitment of engineers and executives from outside the industry.

These training requirements correspond to the need for improved productivity brought about by competition and the evolution of demand towards high-technology equipment (special materials, complex equipment, new processes). Many firms have established links with technical institutes or research centres.

Outlook

Boilermaking in the future is unlikely to show change from the situation at present given that key factors show long-term stability. Activity depends on several factors, including investment, technology and competition.

The rate of investment by heavy industry in the various EC countries mirrors generally sluggish economic growth. If growth were to pick up, the first parties to benefit would likely be tertiary industries rather than industrial equipment industries.

Decreased investment by developing countries, extra-Community competition and the solvency of international markets also affect activity. It is increasingly difficult to win profitable export contracts owing to the emergent loss of purchasing power in South-East Asia and in oil-producing countries, debt levels of the developing countries

and a global reduction in investment in industrial equipment (particularly for energy production). This will only change if there is an upturn in world growth or a modification in trading conditions, making them more favourable to industrializing countries.

Another important area is the productivity and technology levels of European boilermakers. Stagnant demand makes it necessary to restructure the industry if Community firms are to preserve their competitiveness inside and outside the EC. Trying to win new markets with particular technical requirements necessarily involves renewing expertise and hence sustained training initiatives.

The ability to choose the appropriate complementary training depends on the ability of industry leaders to choose the right strategic orientations and to integrate new activities corresponding to the requirements of emerging markets without risking

overly dangerous diversification. The markets of the future seem to be electronics, environmental protection, chemical engineering, bio-technologies and food engineering. The activities of the future are likely to be design and engineering, on-site installation and above all maintenance, all in a context of increased structural flexibility.

In general, there should be a slight increase in boiler-making activity, with an increase in turnover from new activities and stability in other sectors more than compensating for a slight fall in electricity-related markets.

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HAND TOOLS

(NACE 316.11)

Summary

The CEO (European Tool Committee) represents the following tool sectors in Europe: hand tools, tools for woodworking machinery, construction fixing tools, saws for metal-cutting.

The European tool industry has undergone significant change since 1980. The first half of the decade was marked by a moderate growth in some countries and a decline in production in others. Since the middle of the decade the trend has been upwards in all Member States. In part, the industry has been affected by imports of low-price products from the developing and third-world countries but, despite this severe competition, European manufacturers retain a leading position in terms of product quality, technical innovation, prompt delivery and after-sales service.

Current situation

The EC is the largest producer of tools in the world. The business is characterized by a long-standing

tradition in production techniques, which explains why advances in production quality and the range of tools manufactured by far outstrips improvements made by the competition outside the EC. Nevertheless, competition in the hand-tool field from imports from the Far East and Eastern Bloc countries remains strong because of the low price of these tools. In addition, some European manufacturers have had the support of subsidies, which lead to a distortion of competition as well as a steeply downward movement of prices. Also, many producers are adversely affected by counterfeit design, brands and packaging. Counterfeiting has grown significantly since 1980 and may become a serious threat to some European companies.

In terms of production, the Federal Republic of Germany is the leading manufacturing country, with a production valued at ECU 686 million in 1988. This represents about one-third of total EC production. The United Kingdom ranks next with a total production of ECU 363 million, followed closely by France, whose production is assessed at ECU 343.5 million.

Table 1
Main indicators, 1980-88 (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	1 101	1 062	1 073	1 161	1 260	1 305	1 340	1 461	1 627
Net exports	136	187	209	176	189	257	180	102	51
Production	1 237	1 249	1 282	1 337	1 449	1 562	1 520	1 563	1 676

(1) Federal Republic of Germany, Spain, France, Italy and the United Kingdom.

Source: GEO.

Table 2
Production and external trade, 1980-88 (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC production in current prices	1 237	1 249	1 282	1 337	1 449	1 562	1 520	1 563	1 676
Index	79	80	82	85	93	100	97	100	107
EC production in constant prices	1 677	1 572	1 487	1 488	1 516	1 562	1 508	1 521	1 552
Index	107	101	95	95	97	100	96	97	99
EC trade in current prices									
Total exports	554	617	659	649	728	842	797	819	834
Index	66	73	78	77	86	100	95	97	99
Total imports	418	431	450	473	540	585	617	717	783
Index	71	73	77	81	92	100	105	122	134
X/M	1.32	1.43	1.46	1.37	1.34	1.43	1.29	1.14	1.06

(1) Federal Republic of Germany, Spain, France, Italy and the United Kingdom.

Source: GEO.

Table 3
Production by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	AAGR
FR of Germany	484	453	456	500	558	604	617	638	686	4.5
Spain	95	108	95	93	109	115	105	113	128	3.8
France	291	300	305	297	309	333	319	329	344	2.1
Italy	97	106	102	105	110	122	129	139	156	6.1
United Kingdom	270	282	324	342	363	389	348	345	363	3.8
Total	1 237	1 249	1 282	1 337	1 449	1 562	1 520	1 563	1 676	3.9

Source: CEO.

Total EC tool production increased by 7.2% in 1988. 1988 was a good business year for all Member States, and no country reported a decrease in turnover. The value of production in nominal terms increased by 7.5% in the Federal Republic of Germany, 13.3% in Spain, 12.6% in Italy, 5.3% in the UK and 4.4% in France. For 1989 the prospects are also encouraging. CEO forecasts an improvement of about 4% throughout the EC in the coming year for all four tool groups.

Major structural and geographical features

In comparison with European industry as a whole, the EC tool industry is small to medium. Of all the manufacturing companies in the EC, 65% employ 20 or fewer persons, whilst the number of firms with more than 500 employees is less than 1%. With regard to the number of manufacturers in the EC, the Federal Republic of Germany is the EC leader with 750 companies. In some Member States, for example the Federal Republic of Germany and Spain, hand-tool manufacturing is geographically concentrated.

Table 4
Size and structure of selected tool industries, 1988

Employees	D	E	F	I	Total
1-19	528	15	59	78	680
20-49	107	7	48	34	196
50-99	57	5	14	11	87
100-199	33	1	7	5	46
200-499	18	4	3	2	27
500 +	6	1	2	0	9
Total	749	33	133	130	1 045

Source: CEO.

Many European tool companies are family-owned and this circumstance is quite often a limiting factor

in the acquisition of capital. It also results in a high degree of specialization among factories.

Demand

The four product groups supply different market areas, have different sales channels, and the demand for these products depends on different factors. For instance, in the case of saws and tools for wood-working machinery, and saws for metal-cutting, demand is almost entirely dependent on the investment decisions of its client industries (such as the furniture manufacturers, sawmill factories, and mechanical engineering in general).

Construction-tool industries producing anchor fixings, masonry drills and powder-actuated tools are influenced by the state of the construction industry, which in turn is affected by the general economic situation.

The construction industry also affects the sale of hand tools, but the key factor affecting sales in this area is the buying power of the private user.

The main sales channels for hand tools are the wholesale hardware trade, specialized retail distributors and the do-it-yourself markets.

Tools for woodworking machinery and saws for metal-cutting are partially distributed through dealers or sold directly to equipment manufacturers.

Trade

After having recorded only moderate increases in exports until 1983-84, the sector enjoyed a big export boom in 1985 which was sustained until 1988. Total EC tool exports during 1988 amounted to roughly ECU 1.1 billion. This includes both intra and extra-EC exports. The Federal Republic of Germany accounts for 35% of the EC's exports, France 19%

and the United Kingdom for 15%. Total intra and extra-EC exports increased by 44% between 1980 and 1988. About 60% of total production was exported in 1988.

Table 5
Exports of the main exporting Member States

(million ECU)	1988	% share
Belgium	150.4	14.6
FR of Germany	362.8	35.1
Spain	52.6	5.1
France	193.0	18.7
Italy	69.0	6.7
Netherlands	49.0	4.7
United Kingdom	156.3	15.1
Total	1 033.1	100.0

Source: CEO.

During the period 1980-88 imports nearly grew faster than exports, imports reaching more than ECU 900 million in 1988. Among the EC countries, the United Kingdom is the largest importer, with imports totalling ECU 238 million, followed by France with ECU 217 million worth of imports. Since joining the EC in 1986, Spain has had the highest rate of growth for imports of tools.

Table 6
Imports of selected Member States

(million ECU)	1988	% share
FR of Germany	190.0	20.9
Spain	45.8	5.0
France	216.6	23.8
Italy	92.4	10.2
Netherlands	127.8	14.0
United Kingdom	237.7	26.1
Total	910.4	100.0

Source: CEO.

Table 7
Wages and salaries

(1985 = 100)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	70	75	80	87	94	100	104	109	N/A
FR of Germany	83	87	89	94	98	100	106	107	110
Spain	62	72	79	86	93	100	107	112	N/A
France	60	69	77	89	95	100	104	107	110
Italy	50	66	81	86	91	100	109	118	126
Netherlands	84	89	92	94	94	100	100	108	N/A
United Kingdom	63	71	79	85	92	100	108	117	128

Source: CEO.

Environmental protection

The effect of different environmental regulations in individual Member States has a tendency to create distortions in competition within the EC. Companies in those countries with relatively strict environmental regulations are forced to allocate a significant proportion of their budget to the control of pollution. This new factor is causing uncertainty among some manufacturers and is leading many companies to procure semi-finished goods such as forged blanks, from other sources. Harmonization of regulations at EC level should be aimed for.

Regulatory environment

Lack of technical harmonization within the EC has also caused a degree of uncertainty because manufacturers find it difficult to decide whether current production processes should be modified to meet national standards or a future — yet undetermined — EC-wide standard.

The increased price competition caused by extensive importing of low-price products in recent years will require many European manufacturers to improve productivity or rationalize further. These factors are particularly important in countries where wages and salaries are comparatively high, such as in the Federal Republic of Germany.

Employment

In almost all Member States, labour costs rose significantly from 1980 to 1988. During this period, wages and salaries increased by one-third in the Netherlands and the Federal Republic of Germany. In the United Kingdom they doubled during the same period, and in Italy in 1988, labour costs were 2.5 times higher than in 1980.

Outlook

Production could increase at an annual rate of 2.5% between 1989 and 1993 if present market conditions continue. Turnover is expected to rise in a similar way, and possibly faster as European integration proceeds.

Table 8
Production forecasts, 1989-91

(million ECU)	1989	1990	1991
FR of Germany	712	741	779
Spain	131	135	139
France	360	366	378
Italy	162	170	175
United Kingdom	378	386	397
Total	1 743	1 798	1 867

Source: CEO.

The healthy outlook for the European construction industry will also have a favourable influence on the economic situation of the tool industry.

However, one question remains unanswered: how must the European tool industry prepare for future market conditions. Further rationalization is expected within the tool industry. This may take the form of takeovers, joint ventures or other combinations. Such changes may affect smaller companies in much the same way as has already occurred in the French tool industry (where some small companies have been taken over by other companies).

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LIGHT METAL PACKAGING

(NACE 316.42)

Summary

The light metal packaging industry has experienced steady growth in recent years. Average annual growth of production of about 2 to 3% a year is anticipated over the medium term. Substantial savings in costs and productivity improvements have been achieved, mainly as a result of technological developments. The industry operates in a strongly competitive environment, since there are a number of possible substitutes in the packaging sector, and new types of packaging materials are being developed. The effect of environmental and recycling regulations is a particularly important factor for this sector.

Description of the industry

'Light metal packaging' products consist of all metal packaging less than 0.49 mm thick, the contents of which do not exceed approximately 40 litres. By contrast, 'heavy metal packaging' refers to packaging made from cold-rolled sheet steel, with a surface thickness equal to or greater than 0.5 mm, and that primarily takes the form of cans, casks and drums with capacities ranging from 30 to 220 litres. This is not an arbitrary distinction; it corresponds to quite distinct usages of raw materials and manufacturing technologies and to quite distinct customer markets.

Within the sector, a distinction is generally made between the following groups of products:

- food packaging, which includes food tins and beverage cans
- various light packaging (known as 'general line'), including tins with removable lids for paints,

varnish; cans for oil, cleaning materials; unsealed tins for food products; decorative boxes; aluminium table dishes; metal containers for specific industrial uses

- aerosol cans intended to contain a gas-liquid mixture and used primarily for cosmetic, pharmaceutical and cleaning products
- closures and caps, including crown corks; other types of metal closures, such as caps, threaded caps and crimped-on closures (especially for glass bottles).

Current situation

The light metal packaging industry has a current turnover of around ECU 6 billion, employs 60 000 people in 400 firms, and has an annual consumption of more than 3.3 million tonnes of tinplate and 250 000 tonnes of aluminium.

Light metal packaging is estimated to represent 16% of all packaging used in Europe, and ranks third in terms of materials used for packaging purposes. By comparison, paper/cardboard accounts for 30%, plastics 30%, glass 7%, heavy metal packaging 4%, and wood 4%.

Consumption and production

Initially intended solely for food products, metal packaging has become increasingly important in common usage, thanks to its unique qualities, relative to other forms of packaging. Food can in this way be preserved over long periods without loss

Table 1
Main indicators, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	4 246	4 633	5 046	5 347	5 777	5 861	5 644	5 693	5 981	N/A
Net exports (1)	136	199	221	238	272	282	230	207	222	N/A
Production (2)	4 382	4 832	5 267	5 585	6 048	6 143	5 874	5 900	6 203	6 794
Employment (1 000) (3)	83.7	80.9	75.9	73.8	69.8	67.9	62.8	60.1	56.8	58.2

(1) 1980: EC 9; 1981-83: EC 10; 1984-88: EC 12.

(2) Ireland not available. Spain estimated for 1980-83, Greece estimated for 1980-84.

(3) Ireland not available. Greece and Portugal estimated. Spain estimated for 1980-83.

Source: Sefel, Eurostat (Comext).

of nutritional value, corrosion and toxicity; thus durability of products is achieved for easy transport and storage.

The economic development of the sector over the past years has been characterized by a relatively weak annual growth of 2 to 3% per year on average. This growth owes much to developments in the preserved food industry, and to the acquisition of new segments of the market through beverage cans. The situation was distinctly less favourable for industrial packaging due to difficulties in some customer sectors (e.g. construction) and increased competition from plastic packaging for certain applications (motor oils, cleaning products).

In the past few years, sector development has been strongly influenced by a number of external factors: modifications in individual consumption habits (leading for instance to an increased demand for products such as packaging for precooked dishes, aerosols); stronger competition from new types of packaging (plastics, compounds based on impregnated cardboard, ultra-light glass) or new preserving techniques (deep freezing, freeze drying); problems of psychological acceptance of certain types of packaging and presentation, particularly for preserved food.

The breakdown of light metal packaging production by product is as follows:

- 60% food packaging; 50% food tins and 10% beverage cans
- 30% general-line packaging
- 10% metal closures and accessories.

Tinplate, tin-free steel and aluminium are the three principal raw materials used in the manufacture of light metal packaging.

Tinplate is cold-rolled steel sheet that is less than 0.5mm thick and is covered with a thin coating of tin of the order of 3g/m² on each side.

Its primary application is in the light metal packaging industry: up to 95% of the annual production of tinplate (around 11 million tonnes in total) is used by this sector. The characteristics that justify its use in packaging are: a high degree of mechanical strength, ease of decoration (it lends itself to printing as easily as does paper), and the wide range of products that can be packaged in this way, including food and chemical or pharmaceutical products.

Tin-free steel (TFS) is made of a steel base coated with a chrome-oxide mixture. Although its technical

Table 2
Production and external trade, 1980-88

(million ECU)	1980	1981	1982	1983	1984 ⁽⁴⁾	1984	1985	1986	1987	1988
Production in current prices										
EC ⁽¹⁾	4 382	4 832	5 267	5 585		6 048	6 143	5 874	5 900	6 203
Index	71	79	86	91		98	100	96	96	101
USA ⁽⁵⁾	N/A	N/A	N/A	N/A		N/A	15 259	11 253	9 930	9 449
Index	N/A	N/A	N/A	N/A		N/A	100	74	65	62
Production in constant prices										
EC ⁽¹⁾	5 827	6 064	6 064	6 161		6 292	6 143	6 026	6 100	6 084
Index	95	99	99	100		102	100	98	99	99
EC trade in current prices										
Exports extra-EC ⁽²⁾	185	256	297	341	357	377	400	345	340	324
Index ⁽³⁾	54	67	78	90		94	100	86	85	81
Imports extra-EC ⁽²⁾	63	70	72	75	76	78	83	77	87	91
Index ⁽³⁾	79	87	89	93		94	100	93	106	113
X/M	3.0	3.6	4.1	4.5	4.7	4.8	4.8	4.5	3.9	3.6
Imports intra-EC ⁽²⁾	389	420	510	566	631	636	682	712	764	741
Index ⁽³⁾	59	62	76	84		93	100	104	112	111

(1) Ireland not available. Spain estimated for 1980-83, Greece estimated for 1980-84.

(2) 1980: EC 9; 1981-85: EC 10; 1986-88: EC 12.

(3) Taking into account changes in EC membership.

(4) EC 10 excluding Spain and Portugal.

(5) Census of Manufactures and Eurostat estimates.

Source: Sefel, Eurostat (Comext).

Table 3
Production by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	AAGR
Total EC (1)	4 382	4 832	5 267	5 585	6 048	6 143	5 874	5 900	6 203	4.4
Belgium	194	228	272	301	322	343	344	349	356	7.9
Denmark	156	168	176	196	224	236	235	232	210	3.8
FR of Germany	749	853	965	1 006	1 105	1 102	1 178	1 164	1 196	6.0
Greece	N/A	N/A	N/A	N/A	N/A	180	166	165	183	.6
Spain	N/A	N/A	N/A	N/A	399	398	430	459	473	4.4
France	802	873	922	931	979	1 036	987	957	977	2.5
Italy	464	420	481	596	694	648	598	655	679	4.9
Netherlands	384	413	475	490	492	494	405	408	408	.8
Portugal	90	100	90	92	98	113	103	103	104	1.8
United Kingdom	1 127	1 316	1 386	1 441	1 559	1 594	1 429	1 408	1 616	4.6

(1) Excluding Ireland; 1980-83 Spain estimated; 1980-84 Greece estimated.

Source: Sefel.

characteristics are less useful than those of tins, it has been widely used in recent years to manufacture less demanding products such as tin bottoms and lids, caps, etc. The main reason for this development is that it is less expensive than tins, the current difference in cost being about 10%.

Aluminium is the next most frequently used material. Approximately 10% of world aluminium production is used for packaging. It is especially used for products such as dishes, receptacles, closures, and beverage cans and in markets in the Anglo-Saxon countries. Indeed, aluminium represents 95% of the beverage can market in the United States (while tins only accounts for around 5% of the market), around 40% in the United Kingdom and 12% in the Federal Republic of Germany.

Changes in relative prices of tins and aluminium will have a preponderant influence on the struggle being waged between these two materials in the market place. The current tendency is to favour tins, owing to the relative stability of tin prices over the past few years, whereas aluminium has registered price increases of up to 50%. In the long term, however, this trend may change.

Structural changes

The light metal packaging sector is relatively concentrated in the EC, with a structure based on two types of firms. Standardized products, with mass production on largely automated equipment, are manufactured by a limited number of sizeable firms in each country. This is true for beverage cans, food tins of standard forms and sizes, crown corks, etc. The reasons for this concentration are as follows: the size of the investments required — a modern line for beverage cans calls for start-up capital of up to ECU

25 million and such sums can be financed only by powerful groups; access to advanced technologies; the concentration of major sector customers such as canneries or breweries; and the advantages of mass production in terms of unit cost. The principal international groups in the sector are listed in Table 4.

Table 4
Principal groups

Principal groups	Principal EC businesses or subsidiaries
Pechiney/American National Can (F)	American/National Can (UK) Nacanco Deutschland (D) National Can Iberica (E) Cebal (F) Cebal Benelux (B) Cebal Italia (I)
CMB Packaging (F-UK)	Carnaud (F) Metal Box (UK) Carnaud Eurocan (B) Schuybroek (B) Colep (P) Envases Carnaud (E) Eurocan GmbH (D) Zuchner (D) Faba (I) Spray Box (I) Superbox (I) Numan (NL) Hellas Can (GR)
Continental Can (USA)	Continental Can Cy UK (UK) De Clerck (B) Schmalbach-Lubeca (D) Sobemi (B) Thomassen & Drijver (NL)
Crown Cork Cy (USA)	Crown Cork Belgium (B) Crown Cork Cy Ltd (UK) Crown Cork Italy (I) Crown Cork Nederland (NL) Crown Cork Scandinavia (DK) Emballages Couronne (F) Productos Corticeiros Port (P)
PLM (S)	PLM-Ball (D) PLM-Haustrop (DK) Gerro Reynolds (D)

Tailor-made products are manufactured in limited quantities for narrower markets. They often have a special form (conical or irregular tins), size (very large or very small capacity tins) or decoration, and are produced by small and medium-sized companies employing 20 to 200 people. Tins, whose product variety and limited volume create maximum flexibility, are largely manufactured by these types of companies.

The geographical distribution of firms is strongly influenced by the nature of the products being manufactured.

Metal packaging combines relatively low unit value (the sales price of a standard food tin is currently about ECU 0.1) and high volume. Transporting metal packaging basically amounts to transporting air, and this obviously limits the possibilities for export or distant delivery. For a standard container, the maximum sales radius which a firm may competitively supply, taking transport costs into consideration, is about 300 km. This explains in particular the geographic dispersion of manufacturers in almost all the European Community regions and the fact that most food-tin manufacturers in the EC are located in predominantly agricultural regions.

The distribution of EC manufacturers by country is indicated in Table 5.

Table 5
Structure of the industry, 1988

	Manufacturers	Employment
Belgium	12	2 440
Denmark	13	2 400
FR of Germany	53	10 743
Greece	2	1 900
Spain	71	6 100
France	44	8 456
Italy	64	5 600
Netherlands	9	3 678
Portugal (1)	10	950
United Kingdom	37	14 471

(1) Estimated.

Source: Sefel.

Environmental issues

As new European and national regulations concerning the environment are introduced, production standards change too. Faced with the continuous development of non-returnable containers, which pose collection, disposal or recycling problems, national and Community authorities have taken on a twofold task:

- increasing the proportion of re-usable packaging by discouraging the marketing of large quantities of non-returnable containers
- encouraging new forms of recycling that are favourable to the environment.

This has led to the form of a number of new regulations, such as the EC directive on packaging for consumable liquids and certain national laws specifying quotas for returnable/non-returnable containers or simply prohibiting certain types of packaging. Denmark, for instance, has prohibited the sale of beer and other cold drinks in metal tins or non-returnable bottles.

Metal packaging represents less than 2% of household refuse by weight, and beverage cans less than 0.5%. However, the situation could be further improved if recycling were stressed, which, in the case of metal containers, is technically feasible once the problem of collecting and sorting cans is solved and improving public awareness as to the necessities of protecting the environment. The current difficulties experienced by the aerosol sector as a result of the destruction of the earth's ozone layer by propellant gas residues further illustrate the problems encountered by packaging manufacturers with regard to environmental protection.

Outlook

The light metal packaging sector is not expected to experience any spectacular growth in production in the next few years: divergent development of demand in various user sectors, together with growing competition from plastics in numerous applications, makes stagnation likely. At best, slight growth can be expected over the medium term. Average annual growth of less than 3% in real terms seems realistic.

Certain market segments will, however, fare better than others: the food-preserving industry is likely to grow, and the conventional food tin will probably not be replaced by alternative packaging for several decades. The animal food segment currently shows an annual growth of 6 to 10% and has a high potential. According to a recent study, the drinks containers market will grow by about 20% until 1995, and metal tins should maintain, if not increase, their current 12% market share. However, some European manufacturers have over-reacted to this potential demand and undertaken major investments which might lead to excess production capacity in certain

regions. Packaging for various uses such as paints and detergents can, at best, maintain its position.

Parallel to these market changes, rather spectacular progress will take place over the coming years with regard to product quality, on the one hand, and assembly-line productivity on the other hand. This prediction is based on the development of new materials, the continuing tendency to reduce thickness and amount of tinning thanks to improved protective coatings, new systems for opening and emptying tins, the adoption of laser soldering, production rationalization through increased standardization, the refinement of printing techniques,

allowing packaging to play a greater 'publicity' role, and to continued increases in productivity.

Finally, the movement towards increased concentration that has been observed in this branch on a European and even world-wide scale during recent years will probably continue and may even accelerate as companies merge to prepare for the single European market.

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DOMESTIC HEATING APPLIANCES

(NACE 316.5)

Summary

Demand for gas water heaters and boilers depends mainly on trends in the building sector, new buildings, renovations and refurbishments. It also depends on the standards in use and the type of the energy available (e.g. town gas networks). About 110 companies are active in this field in the EC. Roughly speaking, about one-sixth of these are responsible for about 90% of total production. The market for these products corresponds to private dwellings and renovation works in areas where a gas network is available, or where access to gas fuel is possible. Four substitutes, all using a different energy source, play a role in this industry: electricity (substitute for water heater and boilers), fuel oil, coal, and urban heating systems (all substitutes for boilers). In the near future, energy prices and environmental awareness are likely to play an important and positive role in demand for these products.

Description of the sector

Due to data availability problems, the information presented below covers instantaneous gas water heaters and wall-hung boilers, which only constitute part of domestic heating appliances (NACE 316.5). These products are in general characterized by a low water capacity. Two main uses can be distinguished: space heating, and instantaneous production of hot water for sanitary uses.

The industry can be described in terms of products, technology and markets in the following way:

Products:

- instantaneous gas water heaters (tankless water heaters)
- wall-hung gas boilers for central heating and/or sanitary hot water.

Technology:

- the products are assembled using a relatively large amount of components made of different materials. As the products are complex and have to satisfy very stringent safety requirements, rigorous control is essential throughout the production cycle.

Market:

- the products are sold via the specialist trade to building contractors and the public at large
- as the installation of these products requires special skills, it is generally firms with specially trained personnel which sell and install these products.

Production and consumption trends

The figures presented below were calculated on the basis of data gathered by the industry association Afeci among its members. Although complete data are not available, these figures represent the best approximation of the national markets in Europe.

The manufacturers' sales value of one appliance can be estimated as follows:

- ECU 150 for instantaneous gas water heaters
- ECU 550 for gas boilers

The total market (i.e. for both products) represents a turnover of ECU 1 065 300.

The main factors affecting demand are:

- the existence or increase in the number of gas networks
- the trends in the building sector
- government intervention, in particular with respect to standards or energy policies

Table 1
National markets by product, 1988

(1 000)	B-L	P	GR	DK	F	D	NL	IRL	I	E	UK	EC
Instantaneous gas water heaters	60	110	2	1	270	50	130	1	240	475	120	1 459
Gas boilers	15	1	1	60	250	150	160	1	560	75	320	1 539

Source: Afeci.

- energy prices
- substitute products
- demographic changes
- the replacement of old-fashioned appliances.

Gas networks

The availability of gas networks largely depends on government policies and those of gas companies.

Building sector

The demand for appliances is directly related to trends in the building industry. This sector went through a depression in the early to mid-1980s. It seems, however, that this trend has come to an end.

The general upturn in construction activity in the EC, first experienced in 1986, continued in 1987 and in 1988. The number of building permits issued can be used as an indicator of potential demand for gas heating appliances, although gas networks are not available everywhere yet.

Government intervention

One of the aims of government energy policy is to ensure rational use of scarce resources. Since the first oil crisis in 1973, most countries have tried to diversify their energy sources, which has led to a wider use of gas heating appliances. This was the case in Belgium, for instance. In other countries the opposite happened, as new taxes on gas were introduced, or old ones increased. The fall in the price of oil since the end of 1985 has not weakened interest in gas boilers. Indeed, many national governments are actually promoting the use of gas as a means of combating the ever increasing pollution of the environment by the combustion of solid or liquid fuels. In the Federal Republic of Germany, standards for CO and NOx percentages have already been introduced.

Energy prices

This consumption determinant is influenced by market forces and by contractual arrangements. At present the price of gas is higher than that of oil, but lower than that of electricity. However, as many experts know, it is extremely difficult to predict future trends in energy prices, and not only because changes may arise as a result of intervention by national governments.

Substitute products

Gas-fired water heaters are competing with electrical and indirect water heaters. Gas boilers are competing with those burning other fuels (electricity, coal, oil), as well as district heating and room-heaters.

As far as industrial competitiveness is concerned, the price of inputs is an important element. The breakdown of component costs can be summarized as follows:

● copper	23%
● steel/cast iron	23%
● brass; aluminium	13%
● plastics	6%
● electrical and electronic parts	15%
● others	20%

Major changes in the price of the metal components will have a considerable effect on the production costs of water and wall-hung boilers. The price of electronic components is continuously decreasing. On the contrary, aluminium prices have started to rise again since mid-1987, but the 1985 level has not yet been reached on the London Metal Exchange.

The structure of the industry

Many firms manufacture cast-iron and higher water capacity appliances, in addition to basically copper low water capacity appliances for space heating. A percentage of the space heating market utilizes cast-iron appliances, and this is likely to continue.

In Europe we find about 25 companies manufacturing about 90% of the production, the remaining 10% being manufactured by some 85 companies. The industry comprises a small number of vertically integrated firms, designing and producing almost all

Table 2
Number of production plants by country

	1987	1988
Total EC	112	128
Belgium	0	0
Denmark	1	1
FR of Germany	2	3
Spain	3	3
France	6	6
Italy	85	100
Netherlands	5	5
Portugal	2	2
United Kingdom	8	8

Source: Afeci.

boiler and water heater appliances. It is estimated that these firms account for around 50% of total production. The remaining 50% of the industry makes use of specialized suppliers and manufacturers, and uses their goods to assemble boilers and gas water heaters.

There are very few American firms on the European market, as other heating and water-heating systems are used in America. We estimate that five Japanese firms and eight Korean firms are active in this field. Taking their home markets as a basis, we believe that the Japanese are strong in the field of instantaneous gas water heaters and the Koreans in wall-hung gas boilers.

The figures below give an indication of the geographical distribution of the industry's structure in the EC. The firms that are considered here are those manufacturers who produce finished products and sell them under their brand name. Firms that only assemble products and sell them under their brand name, but who have no design activities, are also included.

Number of firms:

Belgium	0	Ireland	0
Denmark	1	Italy	85
FR of Germany	2	Luxembourg	0
Greece	0	Netherlands	5
Spain	3	Portugal	2
France	6	United Kingdom	6

Employment

The employment figures given below are estimates only. Indeed it is very hard to collect data, due to the difficulty in distinguishing between the personnel employed for production, induced production, distribution and after-sales service. The task becomes even more difficult when we consider vertically integrated firms.

The data in Table 3 covers the production stage only. A total of 13 610 persons were employed in 1988, an increase of 18% compared to 1987.

Research and development

Current R&D focuses on methods for obtaining better and higher performance in the area of energy consumption and user and installation convenience, while remaining competitive with appliances using other fuels. A second, different field of research is

Table 3
Employment by country

	1987	1988
EC	16 730	17 450
Belgium	400	400
Denmark	150	150
FR of Germany	5 200	5 200
Spain	800	1 500
France	4 600	4 500
Italy	1 800	2 000
Netherlands	480	500
Portugal	180	200
United Kingdom (1)	3 120	3 000

(1) 1987 estimated by Eurostat.

Source: Afeci.

that of safety and control devices. According to observers in the industry, no technological breakthrough is expected, except for the more widespread use of electronic components to control the operation of appliances and to act as a safety device.

The impact of 1992

Will the unification of the European market in 1992 affect the structure of the industry? In order to answer this question we will examine some of the elements which might have an influence:

- Transport costs — will only decrease slightly due to the fact that administrative costs at the border are relatively insignificant compared to total transport costs.
- Non-tariff barriers — such as national standards for safety, insulation, installation, quality control, finishing, etc. have not been removed yet. It is believed that new standards, largely in the field of safety devices, are going to influence the price of future appliances upwards. This could have a negative effect on price competitiveness with substitute products using other energy sources. Furthermore, the influence of EC Directive 786 on gas appliances is difficult to evaluate as one does not know yet whether or which national or local regulations will still be applicable. Some commercial practices are also acting as obstacles to intra-Community trade; gas producers in different countries tend to favour domestic production by granting rebates for specific types of appliances. It is believed that the elimination of non-tariff barriers will not be fully achieved in 1992, therefore the situation will remain at least partly the same.

- Adaptation costs are thus necessary to deal with the differences between countries, which are expected to remain in 1992.

Outlook

The following elements will influence the industry's future:

1. Increased importance of ecological awareness; this is bound to have a favourable impact on the industry, since products using gas as an energy source are very efficient and cause least environmental pollution.

2. The distribution of gas, thanks to national reserves, (about 100 years) and East-West detente, will probably increase in importance. New gas fields

have recently been developed in the North Sea (Troll, etc.).

3. Demographic trends are such that there is a growing number of smaller families, which require smaller appliances. This means that the number of appliances will probably go up.

4. The development in the construction industry.

5. Energy prices.

In general it is felt that energy prices and environmental awareness will play a major role in a positive direction.

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MECHANICAL ENGINEERING

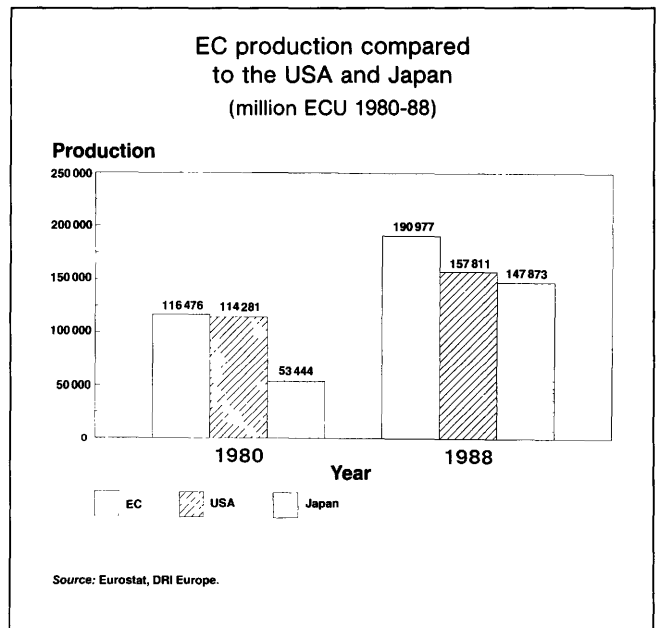
(NACE 32)

Summary

The European Community is by far the world's biggest producer of mechanical engineering products. This sector is at the forefront of European industry in terms of employment and value-added. Being a major supplier of capital goods the mechanical engineering sector was hit by a severe crisis in the first half of the 1980s, that led to a nearly 10% drop in production in real terms between 1980 and 1983. The chief causes of this crisis were weak investment in capital goods in general, and the fact that a large share of this investment was taking place in the services sector. The same two factors explain the upswing in mechanical engineering since 1988. Since then the industry has made a concerted effort to overcome lags in investment that had accumulated in the first half of the 1980s. This boost in investment grew out of a need to step up production capacity and to modernize plant. As a result of modernization, the mechanical engineering sector has a widely varying structure that increasingly supplies electronic and computerized machines tailored to the needs of each client. In the medium term, annual growth in real terms of about 3% is being forecast.

fied workers, the sector enjoys a relatively high level of gross value-added compared with other industrial sectors. Value-added in 1989 reached ECU 85 billion.

Figure 1



The sector's economic weight

Current situation

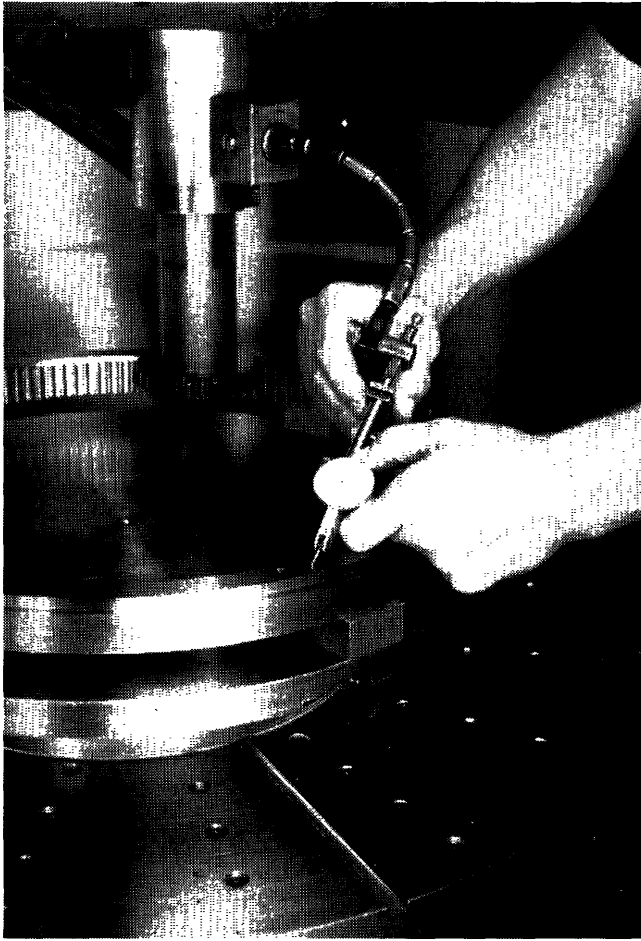
The sector's total production amounted to nearly ECU 210 billion in 1989 and it employed 2.3 million workers. It is one of the largest industrial sectors in the Community. In light of the fact that the manufacture of machines requires a large number of quali-

In recent years, this sector has managed to secure a highly favourable position in terms of its use of high technology compared with non-EC competitors. The sector's success lies in the fact that it combines microelectronics and highly efficient and precise mechanics. A preference for coordinated machine systems and for the use of software and data processing techniques have also contributed significantly to the sector's strength.

Table 1
Main indicators, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	93 021	88 695	97 833	102 854	112 938	125 345	131 327	141 936	159 674	180 118
Net exports	23 455	29 722	30 217	29 593	31 407	35 369	35 127	31 792	31 303	29 569
Production	116 476	118 417	128 050	132 447	144 345	160 714	166 454	173 728	190 977	209 867
Employment (1 000)	2 858	2 725	2 597	2 456	2 379	2 377	2 385	2 341	2 344	2 372

Source: Orgalime, Eurostat (Inde).



From both the quantity and quality standpoints, the EC's mechanical engineering industry is a world-wide leader. A comparison with two other major producers, the United States and Japan, will bear this out. In 1987, production in the Community reached ECU 173 billion; in the United States it amounted to ECU 148 billion; and in Japan, ECU 121 billion. The differences between these numbers are such that the world ranking would have remained the same even when the dollar was high and better reflected purchasing power parities. In 1987 machine production in all other Western industrialized countries amounted to some ECU 50 billion. Production in Western countries as a whole reached nearly ECU 490 billion, of which the Community accounted for 35%.

Net exports of EC mechanical engineering products in 1987 were positive and represented 18% of total production (ECU 32 billion), significantly higher than in Japan (ECU 20 billion) and higher still than in the United States where a deficit of ECU 1 billion was recorded in the wake of a nearly ECU 14 billion surplus in 1980. Moreover, European consumption in 1987 hit ECU 142 billion. By way of comparison, EC consumption at that time was slightly lower than that in the United States (ECU 143 billion), but slightly higher than that in Japan (ECU 102 billion).

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC	116 476	118 417	128 050	132 447	144 345	160 714	166 454	173 728	190 977	209 867
Index	72	74	80	82	90	100	104	108	119	131
USA (1)	114 281	157 284	161 278	162 335	209 492	219 599	166 578	147 693	157 811	172 181
Index	52	72	73	74	95	100	76	67	72	78
Japan (1)	53 444	75 870	79 818	89 633	111 183	127 220	127 707	121 364	147 873	N/A
Index	42	60	63	70	87	100	100	95	116	N/A
Production in constant prices										
EC	160 014	150 012	148 961	146 026	151 002	160 714	159 102	159 858	170 222	180 037
Index	100	93	93	91	94	100	99	99	106	112
EC trade in current prices										
Exports extra-EC	35 308	42 268	44 178	43 937	48 796	54 113	53 292	51 562	53 591	56 864
Index	65	78	82	81	90	100	98	95	99	105
Imports extra-EC	11 145	12 399	13 462	13 963	15 825	17 912	18 250	19 559	22 439	25 529
Index	62	69	75	78	88	100	102	109	125	143
X/M	3.17	3.41	3.28	3.15	3.08	3.02	2.92	2.64	2.39	2.23
Imports intra-EC	23 385	23 501	25 918	26 413	29 449	34 095	37 257	41 323	47 444	54 252
Index	69	69	76	77	86	100	109	121	139	159

(1) Census of Manufactures and Eurostat estimates.

Source: Orgalime, Eurostat (Inde).

Production and consumption

In 1989 EC machine manufacturers enjoyed a highly favourable economic climate. Investment took a turn for the better in almost all the EC Member States, which fuelled demand and led to a boost in real production of as much as 6%. The more than 6% growth registered in 1988 for machine manufacturers, coupled with the new rise in growth for 1989 brought about an increase in capacity utilization in this sector, bringing it close to its top limit.

The boom in production over the past two years has enabled the EC's mechanical engineering sector to surpass real production levels of 1980. Broadly speaking, this trend reflected those observed in investment during the same period. This was, to a lesser degree, a result of an increase in deliveries to the OPEC countries, Latin America and Eastern Europe.

Between 1980 and 1987, investment in the services sector in most industrialized countries was the major driving force behind investment in capital goods. In 1988 and 1989, however, industrial investment staged a major recovery. This explains the recent growth in the mechanical engineering sector whose main outlet is industry.

In 1988 and 1989 the upswing in industrial investment was underpinned by a general economic expansion marked by greater utilization of production capacity and improvements in profitability in most industrial sectors. The need to modernize, that had been building up over a number of years, preparations for the single market and new production technologies have all provided fresh impetus to investment. Automation of the manufacturing process is an obvious example of the use of new technologies. The introduction of high technology systems, robots, new testing equipment and transport systems have ushered in complex, but none the less highly flexible, manufacturing systems.

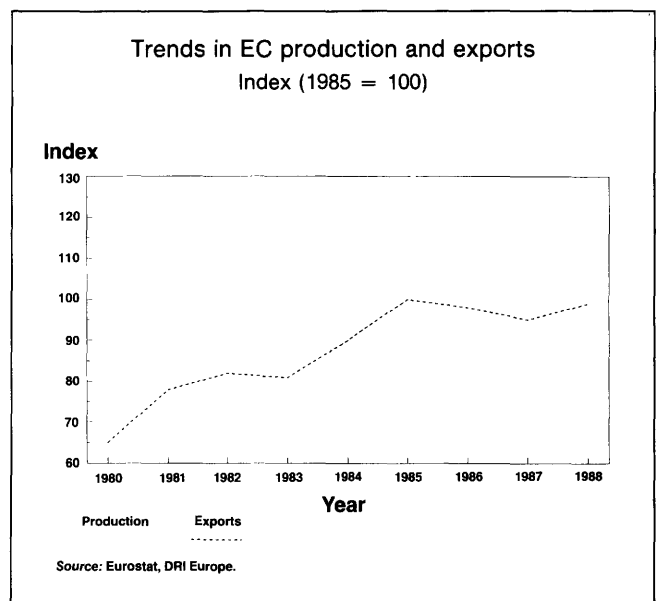
This process was initiated on the basis of the computer-aided manufacturing (CAM) system that has since been given widespread application. It is designed eventually to lead to the universal computer integrated manufacturing (CIM) system. This developing trend will offer fresh opportunities to machine manufacturers and will completely overhaul their traditional image. Today, nearly every machine manufacturing plant has some electronic equipment and most are able to offer their clients high-performance machines and a wide range of services that range from full consulting on systems and program design to personalized client training.

However, this overall trend in the mechanical engineering sector masks, at least in part, widely varying movements. Despite the current upswing, some branches are still grappling with difficulties brought about by restructuring in their client industries. Manufacturers of farm machinery and tractors, mining equipment and motors, for example, fall into this category. Paper and plastics processing machines, assembly and handling units, rubber and plastics moulding machines, industrial robots and roller systems and, more recently, machine tool manufacturers are the sectors currently undergoing expansion.

Foreign trade

Trade among the Member States in the mechanical engineering sector has grown faster than consumption since 1985. As a result, the division of labour among the Member States has intensified. In 1980 imports of machines from EC-trading partners accounted for only 25% of the market's total volume. The 1989 figure is expected to be at least 30%.

Figure 2



Foreign trade in the EC's mechanical engineering sector shows a considerable surplus as net exports represent about 15% of total production. But, the penetration of imports from non-EC countries, although variable, has been growing since the beginning of the 1980s. The market share of non-EC imports reached 12% in 1980 and surpassed 14% in 1989.

In recent years, however, exports of EC-made machines bound for non-EC countries have some-

what hampered growth. The share of exports in production amounted to 33.7% in 1985 but barely reached 27% in 1989. This trend is first of all a reflection of the fall in EC exports to the United States, which is the EC's chief export market, owing to the fall in the dollar. Secondly, European exports were confronted by low demand in the OPEC countries, indebted developing countries and the State-trading countries of Eastern Europe. It was not until 1988 and 1989 that the situation turned around. In addition, it seems that some manufacturers preferred to give priority to EC demand, in light of their limited capacity and the market recovery in 1988-89.

Employment trends

While between 1980 and 1987 more than half a million jobs were shed, the rise in production in the last two years quickly brought about a rise in employment in 1989, a watershed year for the EC's machine production sector. It is also noteworthy that the level of hiring does not generally correspond to the economic climate of the day because adaptation to fluctuations in the capacity utilization rates is ensured by reducing the working week or, if necessary, the amount of overtime.

This is particularly true for the machine production sector which is more reliant on highly-qualified personnel in order to meet production demands. Highly-qualified workers are very sought-after in times of renewed expansion and are increasingly harder to find on the labour market. Today, nearly all machine production firms in the EC are seriously lacking in engineers and qualified personnel. Services are an expanding branch in the machine production sector and the production process is becoming more and more automated. These two phenomena have notably altered the structure of employment in the sector and the number of manual workers is falling, while that of non-manual workers is on the rise. Among the latter group, technicians are playing a more predominant role. Jobs requiring little or no training are the ones most likely to be shed, while the number of highly-qualified jobs is expanding. Technological innovation is creating a demand for specially-trained workers. Machine producers often encounter formidable difficulties on the labour market where there is a clear lack of qualified workers in sufficient numbers.

The only way to bridge the gap in the current transition period would be to organize ongoing training courses. The rise in permanent personnel in the machine manufacturing sector is expected to continue through 1990. All indications suggest that there

will be no new labour-shedding in the medium term and employment will most likely stabilise at current levels. On the other side of the coin, the deterioration in personnel structure will probably continue. In the forthcoming years the number of engineers required by industry will increase. An opinion poll conducted with German firms confirmed this forecast. Nearly 70% of the firms questioned expect a rise in the number of engineers required; 28% of them estimate that demand for engineers will stabilize; and only 1% predict a fall. Those expressing no opinion made up a very small percentage of those queried.

Investment trends

Between 1981 and 1984, when a marked slowdown was registered, the EC's machine industry found itself entrenched behind a cautious attitude as regards investment. The share of gross fixed asset formation amounted to no more than 3.3% of the 1983 turnover.

Table 3
Investment in the EC (1)

(million ECU)	Investment
1980	4 165
1981	4 215
1982	4 184
1983	4 414
1984	4 914
1985	6 067
1986	6 857
1987	7 137

(1) 1987 estimated by Eurostat

Source: Orgalime, Eurostat (Inde).

In the 1985-87 period, the share of gross fixed capital formation advanced from 3.8% to the relatively high level of 4.1%, which should be repeated for 1988 and 1989. This trend reveals that investment in the mechanical engineering sector is mainly dependent on the general business climate and profitability. However, the rise in the rate of investment in the second half of 1980 should not be attributed only to the economic climate of the day. It is also a reflection of the spread of new technology that was fuelled by the need for modernization that had been accumulating in the first half of the 1980s. This in turn accelerated the dissemination of innovative technologies. This trend should be considered in conjunction with the completion of the 1992 single market in preparation for which firms are seeking to step up their competitiveness.

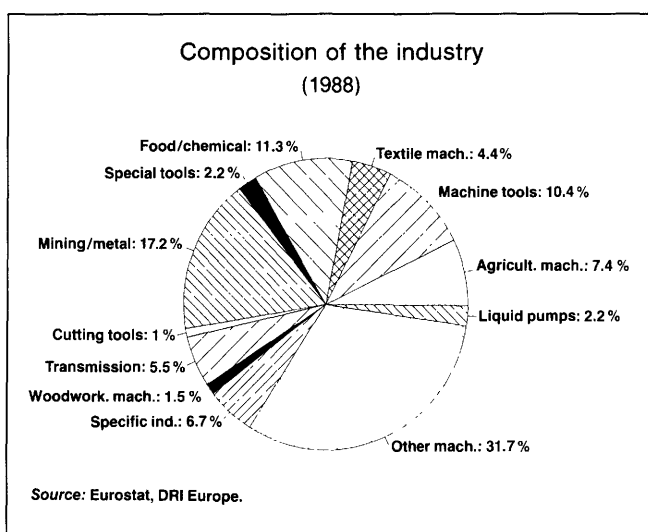
In recent years investment has been consistently dominated by a desire to streamline. It was not until

1989 that the high rate of capacity utilization led to heavy investment. Efforts at rationalization have borne fruit and real productivity advanced by more than one third between 1980 and 1989.

Description of the industry

Mechanical engineering supplies traditional capital goods and related components. Its clients are active in all sectors of the economy ranging from farming, energy, industrial sectors and services to State entities. This requires a broad-based production, able to take on unit manufacture, i.e. ball bearings, as well as a wide variety of machines, such as automatic lathes, robots and hydraulic dredgers. The fitting out of complex industrial installations, such as cement plants, is another area where the mechanical engineering sector is active. It is a very diversified industry, and the traditional view according to which the sector manufactures mechanical devices to transform energy is one of the past. New hydraulic, pneumatic, microelectronic and laser technology has given renewed impetus to mechanical engineering, thereby fostering innovations in production.

Figure 3



Moreover, today there is a beneficial trend to combine machines and processes within increasingly bigger systems. The term mechanical engineering is now being viewed as out-of-date in describing today's machine manufacturing sector.

Broadly speaking, machine firms have extensive expertise in adapting to the specific needs of their clients. For this reason, a number of machines with special capabilities have been developed. Small-scale and single-piece manufacturing are of top concern and large-scale manufacturing is the exception

rather than the rule. As a result, small and medium-sized businesses take up a major share of the mechanical engineering sector, compared with other industrial sectors.

Structure of the industry

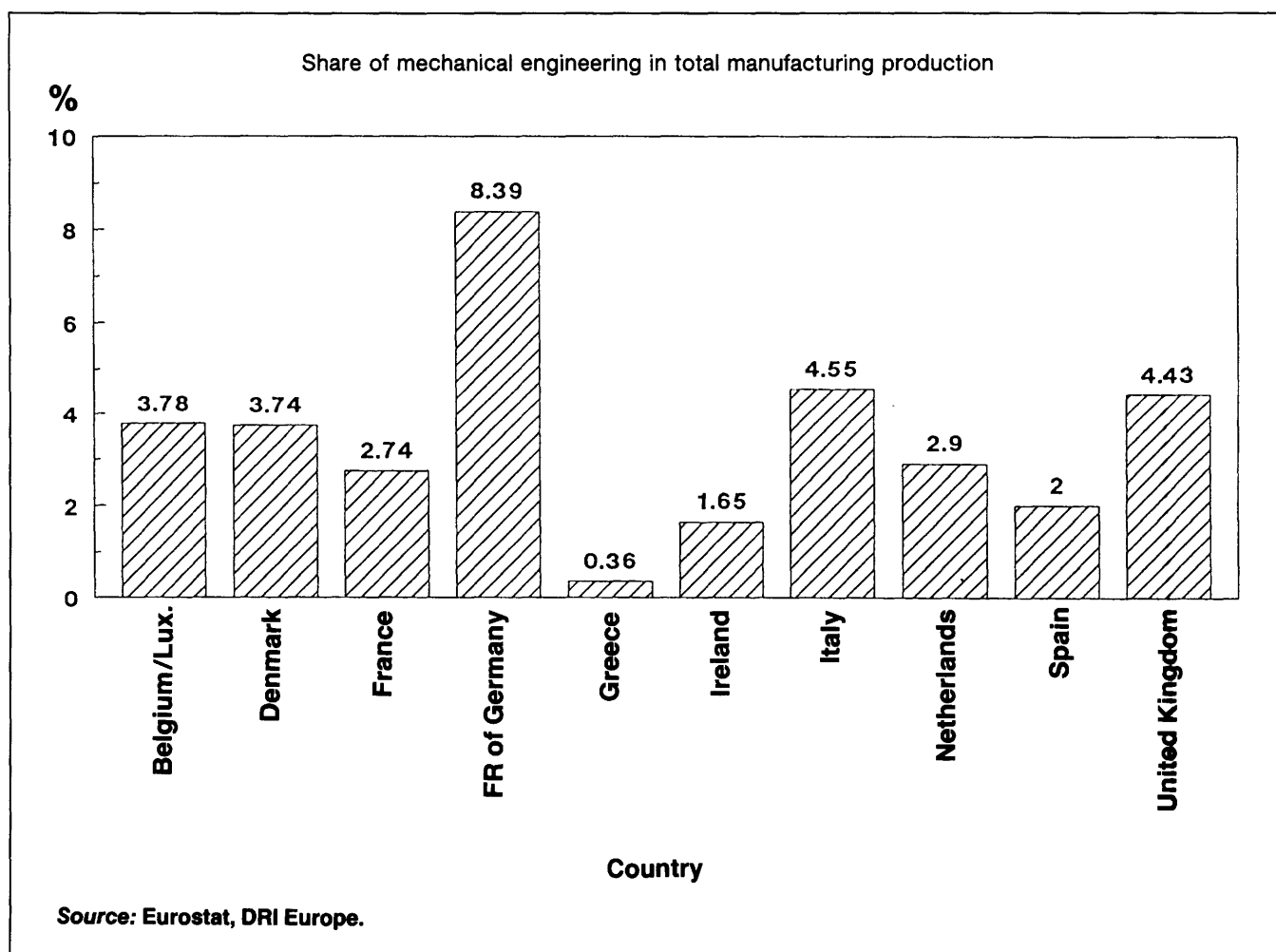
The EC's mechanical engineering industry mainly comprises small and medium-sized businesses. The average size of the sector's firms is 110 employees, similar to the mechanical engineering sector in the United States and Japan. The sector's extensive production diversity and its high degree of specialization in single-piece and small-scale series production give it a competitive advantage. No changes have been observed in recent years and all indications are that the situation will continue, even after the completion of the single market. However, a growing trend has been noticed on the part of non-EC firms to buy a stake in EC firms in order to gain a foothold in post-1992 Europe. To date, no major merger has taken place. According to a survey conducted in the Federal Republic of Germany's mechanical engineering sector, only 5% of businesses planned to strengthen their situation through takeovers with a view to consolidating their position in the single market. On the other hand, 21% of the firms surveyed expressed the desire to set up cooperation agreements in preparation for the single market. This latter strategy would probably best suit the EC's small and medium-sized businesses.

Major geographical features

Since 1980, machine production in the EC has undergone a very distinct cyclical development. Nearly all the Member States took part in the period of expansion between 1988 and 1989 and the geographical breakdown of production underwent no significant changes. However, it should be noted that between 1980 and 1989, growth rates of real production in Ireland and Italy were well above the EC average. On the other side of the coin, Luxembourg, the Netherlands, the United Kingdom and France experienced growth rates that were negative or close to zero.

As regards turnover, the Federal Republic of Germany is indisputably the EC leader, accounting for nearly 45% of EC production in 1988, followed by Italy at 16.8%, the United Kingdom at 16.6% and France at 11.4%. The remaining Member States recorded much lower shares. Spain, for example, accounted for barely 3% of EC production. The

Figure 4



country breakdown obviously reflects, to a certain extent, the size of the individual Member States. However, over and beyond this, relative production capacities can be indicated by figures for machine production (ECU values) per capita of the popula-

tion. In addition, the Member States have a varying degree of specialization which shows up in the per capita figures, which in 1988 were as follows: Germany (1 271), Luxembourg (745), Denmark (678), United Kingdom (544), Italy (529), Belgium (463),

Table 4
Production by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	AAGR (%)
EC	116 476	118 417	128 050	132 447	144 345	160 714	166 454	173 728	190 977	209 867	6.8
Belgium	3 228	3 236	2 676	3 200	3 702	4 187	4 323	4 397	4 857	5 197	5.4
Denmark	2 005	2 051	2 217	2 461	2 755	3 206	3 366	3 178	3 545	3 775	7.3
FR of Germany	47 740	49 942	54 919	56 442	60 787	68 120	75 805	79 850	85 671	92 951	7.7
Greece	114	148	168	184	181	190	165	145	160	180	5.2
Spain	4 333	4 412	4 341	3 953	4 340	4 579	4 829	4 949	5 779	6 529	4.7
France	15 394	16 211	17 069	16 815	18 423	20 419	20 090	20 351	21 918	23 934	5.0
Ireland	224	227	257	278	325	409	403	408	446	501	9.4
Italy	15 639	16 830	16 834	20 811	24 719	26 712	27 427	29 495	31 921	35 347	9.5
Luxembourg	182	192	199	187	205	230	229	205	203	211	1.7
Netherlands	3 869	3 890	4 282	4 528	3 992	4 577	4 862	5 374	5 647	5 901	4.8
Portugal	262	345	386	353	341	366	372	392	433	484	7.1
United Kingdom	23 486	20 934	24 702	23 237	24 575	27 719	24 585	25 084	30 398	34 857	4.5

Source: Orgalime, Eurostat (Inde).

Netherlands (426), France (402), Spain (170), Ireland (108), Portugal (42) and Greece (19).

Within the individual Member States there are again special regional centres for machine production. In Germany, for instance, these are Nord Rhein-Westfalen and Baden-Württemberg; in the UK the South-East region; in Italy, Lombardia; in France, the Bassin Parisien and Centre-Est; and in Spain Catalonia is the leading region.

Risks and opportunities

Environmental protection

Generally speaking, machine production does not seriously threaten the environment. Noise has traditionally been considered the sector's most worrisome problem. Today, thanks to steady improvements in production techniques and processes, noise has been sharply reduced. However, certain processes, such as hardening and galvanizing, can cause serious harm to the environment. In the trend towards lesser vertical integration of production, these processes are increasingly carried out by experts outside the machine production sector. In general, costs arising from environmental protection in this sector are relatively low.

Moreover, there is a strong demand for new capital goods for environmental protection, a trend that offers new possibilities for innovation and boost yield.

The 1992 single market

The 1992 single market will offer many attractive opportunities and businesses hope to secure more

outlets for their products. However, they can also expect stiffer competition. These two considerations should prompt them to invest more in new technologies. Preparations for the single market have already revived investment in recent years.

Spending on research and development in machine production has also been given greater priority in the run-up to 1992. The resulting production innovations are crucial for achieving greater competitiveness in this sector. Microelectronics and automation have radically altered a great many production methods. The machine production sector both supplies and acquires new production technologies that help to step up productivity and strengthen competitiveness. In addition, supplementary investment in new technologies has a beneficial impact on employment. This is especially true for the machine production sector which, after an extended decline, has staged an impressive come-back that will continue in the medium term.

Outlook

Trends emerging in 1989 indicate that production in the EC's machine production sector will enjoy a high rate of expansion that in real terms is being estimated at 6%. This growth is chiefly a result of growing demand from inside the EC which, at current prices, could be as much as 13%. Exports are expected to grow by only 6% and investment in capital goods in 1990 is expected to grow at a slower pace, but will not give rise to a decline in the short term. Recent indices taken into account in evaluating demand for machines reveal that the boom in machine orders is not expected to continue in 1990.

Table 5
Production at constant value by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	AAGR (%)
EC	160 014	150 012	148 961	146 026	151 002	160 714	159 102	159 858	170 222	180 037	1.3
Belgium	3 810	3 651	2 943	3 415	3 838	4 187	4 081	4 079	4 434	4 562	2.0
Denmark	3 053	2 858	2 798	2 849	2 990	3 206	3 234	2 928	3 170	3 246	.7
FR of Germany	66 010	65 421	64 196	61 042	63 194	68 120	70 081	69 810	73 234	76 401	1.6
Greece	152	163	172	184	176	190	169	150	157	170	1.2
Spain	5 593	5 196	4 833	4 635	4 608	4 579	4 849	4 843	5 457	5 928	.7
France	20 455	19 604	19 714	18 741	19 580	20 419	19 321	19 006	19 913	20 908	.2
Ireland	308	290	304	318	352	409	403	421	451	487	5.2
Italy	21 951	22 246	20 769	23 718	25 577	26 712	24 991	25 650	27 894	29 699	3.4
Luxembourg	234	238	237	210	218	230	207	179	177	178	-3.0
Netherlands	5 088	4 930	4 829	4 826	4 140	4 577	4 567	4 832	5 015	5 039	-0.1
Portugal	398	430	448	412	362	366	376	400	422	454	1.5
United Kingdom	32 963	25 075	27 719	25 675	25 968	27 719	26 825	27 559	29 898	32 964	0.0

Source: Orgalime, Eurostat (Inde).

For this reason forecasts on development are limited to medium-term trends.

Table 6
Main indicators, 1989-95

	Share 1989	Percent changes			Com- pound growth 1989-95
		1989	1990	1991	
Europe 4					
Production	100	5.5	3.3	3	3.5
Apparent consumption	100	5.6	4.6	4.2	3.8
FR of Germany					
Production	46.6	6.1	3.2	5	4.5
Apparent consumption	37.2	4.7	3.8	6.2	4.7
France					
Production	17	4.9	3.6	3.6	3.6
Apparent consumption	23.5	7.4	6.3	4.8	4.8
United Kingdom					
Production	22.4	4.4	2.6	-2	0.7
Apparent consumption	28.1	5.5	4.7	1.3	2.3
Italy					
Production	14	6	4.5	3.5	4.3
Apparent consumption	11.2	5	2.8	3.3	2

Source: DRI Europe.

In this connection, several promising factors point to an average real growth of about 3%. These factors include the gradual dissemination of new genera-

tions of machines, the widespread need to make up for past lags in investment and new investment in the run-up to the single market. The social and political situation should remain favourable for investment in most industrialized countries. One could therefore assume that in the forthcoming years machine production in the EC will continue to be competitive on the world market. European machine producers are taking full advantage of the move towards complex machine systems and the broader range of services this trend generates. Moreover, thanks to the vocational training available in all the Member States there is enough trained personnel, and they are thus able to meet the needs of individual clients. In addition, the adoption of solutions tailored to the client's system is less costly in high-wage-cost situations than standard stand-alone machines.

Table 6 shows forecasts for the 1989-95 period for the four biggest producers among EC Member States — Germany, France, the United Kingdom and Italy. In 1989, production in these four countries accounted for nearly 90% of total EC production.

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DRI Europe

AGRICULTURAL MACHINERY

(NACE 321)

Summary

Given the importance of the agricultural sector in the EC, the European agricultural machinery industry has been able to achieve a comfortable leading position in the world. The total dependence of this sector on agriculture, however, hinders it from becoming an industry where rapid growth can be expected. The extreme diversity of equipment offered enables a large number of small and medium-sized companies to exist side by side with a small number of large multinational mechanical engineering firms. As in most sectors of mechanical engineering, there is an increasing tendency to incorporate electronics both in the production process and in the product manufactured.

Description of the sector

NACE 321 is defined as the 'manufacture of agricultural machinery and tractors'. It actually pertains to the design, development and manufacture of agricultural tractors (self-propelled plants) and all machinery necessary for production, harvest, preservation and first processing of animal and vegetable agricultural products.

Considering the diversity of agricultural products and the degree of processing which ranges from

simple washing (vegetables, tubers) to the preparation of the product marketed close to the place of production (wine), agricultural machinery covers a very wide range of equipment. The number of categories of machines produced in Europe alone is estimated at 450.

By way of example, they range from the tractor, to the harvester-thresher, to the vintage machine, shears, electric fencing, via irrigation, crop processing, the preparation and distribution of animal feed, etc.

Current situation

For a number of years now, the European agricultural machinery industry has been one of the most important sectors of mechanical engineering. It is, for instance, 30% greater than the machine-tool industry for metal works.

It is worth reiterating that, despite the fact that Europe only accounts for 6.6% of the world's population and 5% of total arable land, Europe is the most important agricultural area on the globe. The seniority and importance of European agriculture are at the base of the development of the Com-

Table 1
Trends in the EC agricultural machinery industry (1)
Indices at constant value

(1985 = 100)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Turnover									
Tractors	116.5	107.1	108.9	107.6	101.4	100.0	86.4	86.7	94.6
Other machinery	105.4	101.7	100.5	102.7	101.8	100.0	91.6	86.1	91.0
Total	110.8	104.2	104.3	104.2	100.7	100.0	89.4	86.7	93.0
Apparent consumption									
Tractors	121.4	103.5	107.1	113.7	97.1	100.0	91.0	93.2	106.6
Other machinery	112.0	105.8	107.5	111.1	103.9	100.0	95.1	92.2	100.6
Total	116.1	104.6	108.1	112.3	101.0	100.0	94.2	95.1	103.8
Exports									
Tractors (2)	111.8	106.9	111.3	107.8	102.9	100.0	90.1	85.3	95.0
Other machinery (2)	84.3	85.6	87.3	87.8	97.0	100.0	87.5	79.9	86.9
Total	96.4	93.6	96.4	95.1	98.5	100.0	85.0	79.4	87.7

(1) Germany, Spain, France, Italy and United Kingdom; 1988 estimated.

(2) Estimated.

Source: CEMA.



munity's agricultural machinery industry which holds the No 1 position in the world.

In 1987, the major producers of agricultural machinery in terms of turnover ranked as follows:

- European Community: ECU 12 395 million
- United States: ECU 6 104 million
- Japan: ECU 3 550 million.

Though it is common knowledge that the USSR is a large manufacturer of agricultural machinery, especially harvester-threshers and tractors, the exact number of machines produced is not known.

India and the countries of Latin America are developing their production of agricultural equipment, but they are still far behind Japan.

Thus, the EC is the world's No 1 manufacturer of tractors and agricultural machinery, way ahead of its main competitors. It should be pointed out, however, that the four biggest production companies established in Europe are subsidiaries of North American corporations. They are Case IH, John Deere, Ford-Nez Holland, and Massey-Ferguson.

Production and consumption

Production

As we have seen, estimated at ECU 12 395 million for the Community in 1987, production is more or less evenly divided between tractors and machines:

- Tractors: ECU 6 264 million
- Machines: ECU 6 131 million.

Table 2
Turnover by country, 1987

(million ECU)	Tractors	Other machinery	Total
EC (1)	6 263.9	6 130.8	12 394.7
Belgium	223.4	307.9	531.3
Denmark	0.0	569.1	569.1
FR of Germany	1 664.5	1 517.4	3 181.9
Spain	278.1	142.9	421.0
France	715.6	1 132.9	1 848.5
Italy	1 915.3	1 841.3	3 756.6
Netherlands	0.0	224.3	224.3
United Kingdom	1 467.0	395.0	1 862.0
Austria	135.0	171.0	306.0
Finland	120.0	162.0	282.0
Sweden	15.2	195.5	210.7
Switzerland	43.7	65.8	109.5

(1) Excluding Greece, Ireland, Luxembourg and Portugal.

Source: CEMA.

The major tractor manufacturing countries are Italy, the Federal Republic of Germany, the United Kingdom and France; Spain and Belgium also produce considerable quantities. Denmark, the Netherlands and Luxembourg, on the other hand, have no production at all. There are no statistical data currently available for Greece, Ireland and Portugal. It can nevertheless be stated that their production, if any, is low.

On the other hand, all the countries of the Community, except Luxembourg, manufacture agricultural machines.

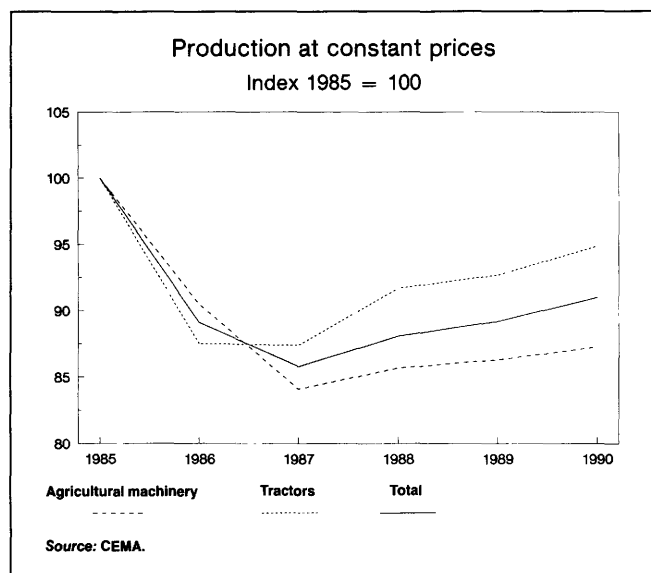
After having improved between 1982-83, activity in this sector suffered severe setbacks. An overall turnaround occurred in 1988, thus making 1987 (year for which the absolute values were given) the low point.

Figure 1 represents the estimated trend for all CEMA countries, i.e.

- the EC, except for Greece, Ireland and Portugal
- Austria, Finland, Norway, Sweden and Switzerland.

This forecast was drawn up in June 1988 by the industrialists themselves.

Figure 1



The deterioration forecast for 1987 did in fact occur. Expected to be a year of stabilization according to forecasts, 1988 was marked by a greater recovery than anticipated in June 1988.

We now know that 1989, if it is ahead of 1988, will none the less bring about a glut, or even a reversal of the trend at the end of the year.

Consumption

Here once again, after a good performance in 1983/84, the trend has deteriorated, the low point in most countries being 1987. A clear recovery appears in 1988, except in the Federal Republic of Germany and Denmark.

Table 3
Apparent consumption, 1987

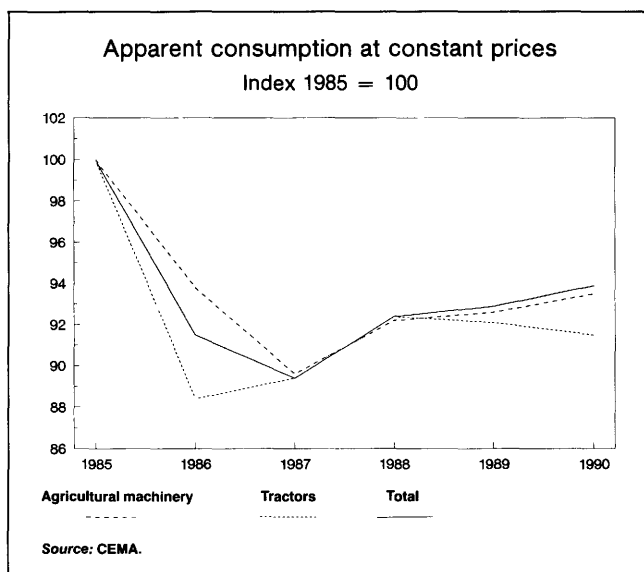
(million ECU)	Tractors	Other machinery	Total
EC (1)	3 010	5 454	8 464
Belgium	65	245	310
Denmark	132	334	466
FR of Germany	719	1 081	1 800
Spain	374	250	624
France	655	1 553	2 208
Italy	546	984	1 530
Netherlands	122	544	666
United Kingdom	397	463	860
Austria	166	200	366
Sweden	99	212	311
Finland	103	177	280
Switzerland	88	185	273

(1) Excluding Greece, Ireland, Luxembourg and Portugal.

Source: CEMA.

Figure 2 represents the apparent consumption trend as estimated by the profession in 1988 (once again, it pertains to all members of CEMA and not only the EC). The indicators available for 1988 and the beginning of 1989 confirm the trend presented.

Figure 2



In all likelihood, 1988 advanced a little more than indicated and the slowdown of 1989 will probably be a little more pronounced.

Foreign trade

Exports in 1987 accounted for 53% of the sales of the European agricultural machinery manufacturers. 58% of these were destined for the intra-Community market and the remaining 42% outside Europe.

Table 4
Exports, 1987

(million ECU)	Total exports	Exports intra-EC	Exports extra-EC
EC (1)	6 614	3 851	2 763
Belgium	457	366	91
Denmark (2)	400	236	164
FR of Germany	1 791	1 093	698
Spain (2)	48	28	20
France	628	408	220
Italy	1 822	1 221	601
Netherlands	127	70	57
United Kingdom	1 341	429	912
Austria	181	112	69
Finland (2)	124	73	51
Sweden (2)	127	75	52
Switzerland	55	37	18

(1) Excluding Greece, Ireland, Luxembourg and Portugal.

(2) Division of total between intra and extra-EC is estimated.

Source: CEMA.

At the national level, the share of exports in production varies widely, from 11% in Spain to 86% in Belgium. But manufacturing companies are behaving as if the 12 markets of the Community were a single market. Furthermore, many companies, especially multinationals, choose their production plants not on the basis of national, but rather economic and financial criteria. Production is going from national to 'European'. Under these conditions, the European agricultural machinery industry exports 22% of its production.

The same trends will be apparent in the development of exports as were noted for production and apparent consumption.

Employment

Direct jobs in agricultural machinery companies of CEMA countries amounted to:

240 000 persons in 1983

234 000 persons in 1984

188 000 persons in 1986.

For 1988, this figure is estimated at 182 000, and forecasts for 1989 and 1990 are of 179 000 and 175 000 respectively.

This means that the number of jobs will have dropped by 25% between 1985 and 1990. The forecasts relative to European activity in the agricultural machinery industry, prepared in 1988 and given above, show a drop of about 9% for the same period. This means a rate of productivity of about 3% per year.

Industrial structures

The extreme diversity of equipment supplied to farmers by the European agricultural machinery industry makes it difficult to give a global view of the structure of the European industry.

The major companies with industrial plants in several European countries and sometimes in several continents, are well known. They specialize in the manufacture of tractors and automotive harvesting equipment for cereals and fodder, as well as in the manufacture of (fodder) tractored collector-presses. There are nine such companies in Europe. In addition to the four American companies already mentioned, there are five European companies: Fiat, Renault, KHD, Fendt and Same. Then come a few companies which specialize in the manufacture of tractors (five or six). Together, these manufacturers generate around 60% of the turnover in the profession.

The rest, i.e. all agricultural equipment, is produced by 3 000 to 4 000 companies which are usually very specialized, either on one type of equipment, or on the equipment of a sector or elements of an agricultural sector (poultry farming, pig breeding, wine production, animal feeding, storage, drying, preservation).

The number of salaried staff in these companies varies from fewer than 10 to 1 000, with even more on exception.

The total number of European companies doing business in the agricultural machinery sector is gradually diminishing.

Nevertheless, the number of industrial sites operated by big companies in Europe was considerably reduced between the mid-1970s and the mid-1980s. Other companies are disappearing every year either through discontinuance of business or bankruptcy, yet others still are being recreated in nearly the same proportion around an idea, a technique or a process.

We should point out especially that recourse to subcontracting, a traditional feature of this industry, is developing constantly, whereas companies which specialize in the design and manufacture of components are becoming more and more numerous, especially due to a general use of hydraulics, electronics, and integrated EDP.

We should finally mention that the consolidation of medium-sized companies is often achieved through the acquisition of holding interests, i.e. control or takeover by bigger groups whether or not linked to the industry. The same was true for a few of the very big companies in the profession.

Technological development

Whereas the structure of the profession is evolving very little, the same cannot be said of the production structures. The notion of industrial flexibility is particularly suitable for a market of very diversified, very seasonal equipment, subject to climatic hazards and the economic contingency of the agricultural world. Industrialists, big and small alike, are investing heavily in robotics, in machining centres, the flexibility of which makes it possible to switch from one product to another while avoiding costly stock piling. This already notable trend can only increase in the years to come.

But there is an area which may develop a great deal in the future, especially after 1992. And that is distribution, the old national characteristics of which are and will to a considerable extent continue to be called into question, both by European regulations and directives and by the free movement of goods.

It is possible, probable even, that this development will have an influence on the production structures and accelerate the changes.

Along with the advancement of the technology of production processes comes that of the equipment produced. The latter are integrating the most

up-to-date technologies. After the use of hydraulics had been generalized, most tractors and agricultural machines now have the advantage of electronic equipment used for the controls, adjustments, automated features, precision of works and power steering.

Every year, European agricultural machinery industrialists invest, on average, 3 to 4% of their turnover in research for the innovation and improvement of quality, and the comfort and safety of users and third parties. They are helped in this task by the farmers themselves and the distributors, whose technical skills are an added guarantee for the quality and productivity of the equipment.

Modern environmental standards and requirements are at the centre of research and development projects. We may cite, by way of example, the rapid drop of the noise level in motorized equipment, the strict control of smoke emissions, the electronically controlled precision of distribution of constantly decreasing volumes of phytosanitary products and fertilizer spreaders, constant, computerized controls of all the necessary functions of breeding.

Outlook

The agricultural machinery industry is very old indeed. Ever since the origin of agriculture itself, it has developed to offer farmers the right means to do their job in the most efficient manner possible. To this end, it uses all resources that knowledge can put at its disposal.

In this sense, its future is secure.

But agronomic, chemical and mechanical progress (in the wide sense of the word) are increasing output, reducing the working time and number of people needed to produce basic food products.

It is and will therefore continue increasingly to be a very specialized industry, of very high technical and scientific levels, producing relatively reduced quantities of equipment.

If considerable developments in industrial structures are not taking place today, this will probably change in the coming years and certain industrial capacities will have to be reduced or used for other purposes.

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MACHINE TOOLS FOR METAL-WORKING

(NACE 322)

Summary

In the early 1980s the EC machine-tool industry went through a harsh crisis, a 25% decrease of its real production between 1980 and 1984. Drastic restructuring took place, in which there was a decrease in the number of companies engaged in the sector as well as an estimated 25% decline in employment. Products themselves also evolved, greater emphasis being placed on electronics. These changes allowed EC companies to take advantage of the recovery which started in 1985 and was sustained in 1988 for the fourth consecutive year. The market's upturn was mainly fostered by the favourable prospects for investment in customer industries. In the medium term, the market is expected to experience a reasonable growth, which should, however, exceed growth in production, which is suffering from intensified global competition.

Description of the sector

A machine tool for metal-working is a device driven by an external energy source, that cannot be hand-held while in operation, and that works metal by cutting or forming by means of physical or chemical processes or a combination of these techniques. The machine tools that operate by cutting metal shavings and by chemical processes account for just under three-quarters of total Community output in terms of value, and machines that operate by changing the shape of the material, for just over one quarter. There are, however, countries (e.g. Belgium) in which the production of machines that operate by changing the shape of the metal largely outstrips the production of those that operate by cutting.

Machine tools may be classified by the type of machining they carry out. The turning lathe category includes all machine tools having a rotating part, the tool itself remaining stationary. In all other cutting machine tools (boring machines, drilling machines, milling machines, grinding machines and screw-cutting machines) and shaping tools (presses, forging machines, shearing tools, stamping machines, tools for machining metal bars, sections, tubes, sheets and strips), the rotating part is held stationary and the tool is mobile.

Current situation

The EC is the largest producer and consumer of machine tools in the world. Because of the technical quality of its machine tools, the EC has a strong export position. Over the past decade, a number of countries (particularly in the Far East), have become aware of the strategic importance of the machine tool industry and have focused their efforts on developing this sector. Between 1983 and 1988, this drive led to a redistribution of markets, the EC output having sustained a positive trend. Extra EC imports and exports experienced continued growth except in 1987. The EC still has a competitive edge as far as innovation potential is concerned, but this can only be maintained if re-investment, which is dependent on profitability and sales, continues.

In 1987 Japan was the principal world producer (20% of total production), ahead of the Federal Republic of Germany (19%), the USSR (12%) and the United States (8%). In the 1980s new Asian producers (namely Taiwan and The Republic of Korea) broke into the market. Their place in world production will tend to become more important as they

Table 1
Main indicators, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	4 891	4 806	4 750	4 541	4 820	5 948	6 979	7 607	8 481	N/A
Net exports (1)	1 877	2 134	1 964	2 064	1 952	2 064	2 063	1 795	2 130	N/A
Production (1)	6 768	6 940	6 714	6 605	6 772	7 900	9 042	9 402	10 611	11 747
Employment (1 000) (2)	215	198	187	167	160	164	168	170	170	173

(1) Excluding Ireland and Greece.

(2) Excluding Ireland, Greece and Denmark.

Source: Cecimo.

acquire greater technical control over local industries and as a result of the relocation policy of American companies.

In 1988 the output of machine tool companies in the Community totalled ECU 10 611 million. However, in real terms, value has remained virtually the same as in 1980.

Between 1980 and 1984, EC machine tool production fell by 25% in constant ECU and by the end of 1988, despite three years of spectacular recovery, had only just managed to regain the value levels recorded in 1980.

Production and consumption

Although machine tools are indispensable capital goods, the sector is almost totally dependent on the investment decisions of its major clients: the metal-working industry, transport industries (cars, aerospace, railways), shipbuilding, the electrical and electronics industry, manufacturers of machinery for textiles, agriculture, the building industry and the machine-tool industry itself. It is therefore difficult to predict how sales in this area will develop. Most machine tools manufactured in Europe are manufactured to order on the basis of customer specifications. This method allows short-term planning but rules out any medium-term forecasting.

Machine-tool consumption is closely related to the characteristics of the new materials requiring

machining (e.g. steels or alloys with specific properties), and the change in shape and design of the constituent parts of metal products to be built.

The EC market is the largest consumer of machine tools in the world; the Federal Republic of Germany alone is the largest consumer of machine tools in the world market economies. Within the Community, German consumption represents an average 41% of the European total (based on the past eight years). Italy is next with 17%, followed by the United Kingdom (16%), France (15%), Spain (5%), Belgium (3%) and the Netherlands (2%). Other countries have a share below 2%.

Trade

Exports to non-Community countries rose slightly until 1984, increased sharply in 1985, and fell off in 1987 as a result of the fall in world demand, to rise again in 1988. It is, however, interesting to note that trade between Community countries has developed since 1984 under the influence of the increasing inter-penetration of the EC economies and the extension of the Community to 12 members. From 1980 to 1988 the increase in trade between Community countries almost paralleled that in consumption, since the internal trade index for the period rose by 70%.

During the same period the index for extra-Community imports rose steadily from 70 in 1980 to 138 in 1988 (a 97% increase). This period, therefore, saw

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production in current prices									
EC (1)	6 768	6 940	6 714	6 605	6 772	7 900	9 042	9 402	10 611
Index	86	88	85	84	86	100	114	119	134
Production in constant prices									
EC (1)	9 503	9 019	8 022	7 449	7 135	7 900	8 441	8 326	9 187
Index	120	114	102	94	90	100	107	111	116
EC trade in current prices									
Exports extra-EC (1)	2 695	2 951	2 824	2 703	2 855	3 243	3 636	3 309	3 842
Index	83	91	87	83	88	100	112	102	118
Imports extra-EC (1)	984	971	971	877	1 066	1 414	1 811	1 670	1 948
Index	70	69	69	62	75	100	128	118	138
X/M	2.74	3.04	2.91	3.08	2.68	2.29	2.01	1.98	1.97
Imports intra-EC (1)	1 112	1 195	1 157	943	1 050	1 259	1 600	1 781	2 044
Index	88	95	92	75	83	100	127	141	162

(1) Excluding Ireland and Greece.

Source: Cecimo.

Table 3
Production by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	AAGR
EC (1)	6 768	6 940	6 714	6 605	6 772	7 900	9 042	9 402	10 611	5.8
Belgium	99	93	103	90	93	116	137	135	148	5.1
Denmark	35	37	36	38	43	52	50	45	50	4.6
FR of Germany	3 390	3 554	3 580	3 950	3 978	4 635	5 501	5 625	5 661	6.6
Spain	254	287	265	207	255	308	342	438	501	8.9
France	687	728	636	600	561	619	613	585	653	-0.6
Italy	1 245	1 385	1 178	1 114	1 196	1 395	1 490	1 698	2 497	9.1
Netherlands	54	54	49	32	41	47	61	59	51	-0.7
Portugal	13	17	16	12	12	13	18	14	13	0.0
United Kingdom	991	785	851	562	593	715	830	803	1 037	.6

(1) Excluding Ireland and Greece.

Source: Cecimo.

a gradual decline in the export/import ratio. However, net export earnings have remained strongly positive, although as a proportion of total production, exports have fallen from 40% in 1980 to nearly 36% in 1988. Export growth remains a volatile indicator; in 1981, 1984, 1985, 1986 and 1988 the value of exports increased while in other years moderate declines were registered. In 1988, the import penetration rate was slightly greater than its 1980 value.

Employment

In 1980, the EC metal-working machine tool industry employed about 215 500 persons. By 1988, the number had fallen to 169 800, an all-time low of 160 000 being recorded in 1984. Staff cuts were introduced when the sector was hit by a slump between 1981 and 1984. A number of job losses have also resulted from both efforts to rationalize equipment and technical developments, which in turn brought about productivity gains. The average number of employees per company (120) is fairly typical in this industry. Very few machine tool manufacturers employ more than 1 000 people and companies with as many as 500 tend to be rare. There are many that employ between 100 and 500 but also a considerable number with fewer than 100.

Industry structure

The machine-tool industry falls into the category of small and medium-scale businesses. The reason for the reduced scale of most businesses is both technical and historical. There are about 30 broad categories of machine tools, widely varying dimensions within each category, and a series of sub-categories related to specific processes. Virtually all machine

tool companies grew up around a single gifted craftsman who developed a specific product to serve an industry in the locality or region.

Table 4
Structure of the industry, 1988

	Employment Manufacturers	
EC (1)	169 850	1 399
Belgium	2 450	29
FR of Germany	94 000	380
Spain	7 850	148
France	9 190	150
Italy	31 000	450
Netherlands	1 060	22
Portugal	1 000	20
United Kingdom	23 300	200

(1) Excluding Ireland, Greece and Denmark.

Source: Cecimo.

In 1988 the industry consisted of 1 399 companies. Italy had the largest number (450), followed by the Federal Republic of Germany (380), which has a greater number of large companies, the United Kingdom (200), France (150) and Spain (148). Although Community production had recovered sufficiently in 1988 to reach 1980 levels, nearly 100 companies had disappeared in the mean time, indicating substantial re-structuring in the industry.

Geographic features

Between 1980 and 1988 the Federal Republic of Germany's production represented an average 54% of Community machine tool output, with Italy accounting for 19%, the United Kingdom 11%, France 8%, Spain 4%, and the other Member States less than 2%.

In 1988 the situation in the EC machine-tool industry was very different from what it was in 1980. The UK and France were most heavily hit by the crisis. However, as a result of restructuring measures and inflows of foreign capital from other European countries, Japan and the USA, the situation has improved in these two countries, which rank respectively third and fourth in the EC in terms of production.

The Federal Republic of Germany has maintained its leading position in the EC. Italy, which is also an active exporter, and Spain have particularly dynamic domestic markets.

Although the value of production in real terms remained nearly stationary for the Community as a whole between 1980 and 1988, it increased in Italy by 14%, in Belgium by 15% and in Spain by 39%. It fell in the United Kingdom by 27%, in France by 35%, in Portugal by 35% and in the Netherlands by 37%. The drop in production did not occur everywhere at the same time. Belgium, Spain, Italy, the Netherlands and the United Kingdom reached their low point in 1983, whereas the Federal Republic of Germany and France did so in 1984.

Apparent consumption trends differed considerably between Member States. Over the 1980s consumption in terms of current prices have risen dramatically in Spain and Denmark, by 90% in the Federal Republic of Germany and 71% in Italy. It remained slightly below the average in Belgium (49%), the Netherlands (49%) and France (48%). In certain Community countries, consumption actually fell as in Portugal (3%) or remained nearly stable as in the United Kingdom.

In all EC countries except Portugal and the Netherlands, the export/import ratios deteriorated from

1980 to 1987. The export-production ratio also fell everywhere except in Belgium, the Netherlands, Portugal and Denmark. The weakening of the Community's export position was particularly marked in France, Spain and the United Kingdom.

Research and development

Technical efforts have always been geared to designing a machine capable of several different operations (turning and screw cutting on turning lathes for example) and reducing transport time and handling operations between machines. Numerical control of machine tools, which has developed over the last 20 years, has provided electronics-based solutions to these two problems. These solutions have changed the whole focus of technical research, which until this breakthrough had concentrated solely on mechanical applications. One electronic development is the numerically controlled machining centre, with automatic changeover of tools for boring, milling, drilling, etc. the tools being kept in a storage area. Numerical control applications are gradually spreading to the whole range of machine tools.

Another key development factor is the introduction almost everywhere of the graphic communication mode, in which the movement of the tool is simulated on a screen. Carbon dioxide laser techniques have also developed extremely rapidly in cutting machines. Microcomputers for steering functions, management of parts, and manufacturing and quality control are now virtually commonplace in the industry.

Outlook

On the basis of investment plans in customer sectors of the machine-tool industry in the EC, Community

Table 5
Production at constant value by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	AAGR
EC (1)	9 503	9 019	8 022	7 449	7 135	7 900	8 441	8 326	9 187	-0.4
Belgium	117	105	113	96	96	116	129	125	135	1.8
Denmark	53	52	45	44	47	52	48	41	45	-2.0
FR of Germany	4 716	4 661	4 203	4 327	4 170	4 635	5 022	4 806	4 718	.0
Spain	336	353	305	250	275	308	341	425	468	4.2
France	913	880	735	669	596	619	590	546	593	-5.3
Italy	1 885	1 939	1 593	1 394	1 269	1 395	1 329	1 432	2 150	1.7
The Netherlands	71	68	55	34	43	47	57	53	45	-5.5
Portugal	20	21	19	14	13	13	18	14	13	-5.2
United Kingdom	1 391	940	955	621	627	715	906	882	1 020	-3.8

(1) Excluding Ireland and Greece.

Source: Cecimo.

production appears to be set to rise in real terms at an annual rate of 2.5% between 1988 and 1993.

Despite a shift in emphasis, the EC market should continue to grow more quickly (3.2% per annum) than production, with continued growth in Community imports.

There is likely to be particularly strong demand in southern Europe (Italy, Spain and Portugal) and from countries in eastern Europe.

World demand (including that in the Community) experienced a recovery in 1988 and this growth

should continue in 1989. In 1990, the level of demand should be more or less the same as in 1989. However the lower US dollar may mean a smaller growth in demand for European and Asian machine tools in the USA. As a result, Japan and other Asian producers may intensify their European export drive to fill the gap.

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CUTTING TOOLS

(NACE 322.2)

Summary

After a marked drop in production in some Member States in the early 1980s, cutting tools' production turned around in 1983 and the sector experienced considerable growth in the period 1983-88. This high growth rate is however not expected to be sustained in 1989.

This sector covers the manufacture of engineers' cutting tools and, as such, includes four generic groups of hard-metal tools and other hard material products, twist drills and reamers, milling and gear cutters, and screwing taps and dies.

Current situation

The engineers' cutting tool industry suffered from the economic recession during the early 1980s, as most industries did. 1980 was the first year of recession for this sector. Production fell in 1981 and there was a further slight reduction in the following year.

A major turnaround was experienced in 1983 when production in value terms returned to a level slightly above the 1980 level. Thereafter, the situation continued to improve; the output rose by an average of around 10% per annum in nominal terms over the period 1983-87. This upturn continued in 1988 but,

Table 1
Production and external trade

(million ECU)	1980	1981	1982	1983	1984 (4)	1984	1985	1986	1987	1988
Production in current prices										
EC (1)	1 243	891	874	1 298		1 436	1 662	1 812	1 852	1 924
Index	75	54	53	78		86	100	109	111	116
Production in constant prices										
EC (1)	1 735	1 142	1 037	1 452		1 513	1 662	1 709	1 663	1 671
Index	104	69	62	87		91	100	103	100	101
EC trade in current prices										
Exports extra-EC (2)	169	198	213	217	272	289	338	330	324	431
Index (3)	53	62	67	68		86	100	98	96	127
Imports extra-EC (2)	239	254	254	245	303	313	338	433	429	448
Index (3)	64	67	67	65		81	100	112	110	116
X/M	.71	.78	.84	.88	.90	.92	.87	.76	.76	.96
Imports intra-EC (2)	221	234	264	247	282	293	349	375	383	482
Index (3)	67	70	79	74		84	100	108	110	139

(1) Estimated by Eurostat.

(2) 1980 EC 9; 1981-83 EC 10; 1984-88 EC 12.

(3) Taking into account changes in EC membership.

(4) Excluding Spain and Portugal.

Source: ECTA, Eurostat (Comext).

Table 2
Production by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	AAGR
EC (1)	1 243	891	874	1 298	1 436	1 662	1 812	1 852	1 924	5.6
FR of Germany	570	319	324	729	828	998	1 109	1 138	1 096	8.5
France	100	104	106	96	98	113	120	117	190	8.4
Italy	166	169	151	130	138	148	162	170	177	.8
United Kingdom	275	139	131	198	220	219	225	240	267	-0.4

(1) Estimated by Eurostat.

Source: ECTA.

Table 3
Production at constant value by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	AAGR
EC (1)	1 735	1 142	1 037	1 452	1 513	1 662	1 709	1 663	1 671	-0.5
FR of Germany	793	418	380	799	868	998	1 013	972	913	1.8
France	133	126	122	107	104	113	115	109	173	3.3
Italy	251	237	204	163	146	148	144	143	147	-6.5
United Kingdom	386	166	147	219	232	219	245	264	262	-4.7

(1) Estimated by Eurostat.

Source: ECTA.

because of changes to the Harmonized Coding System, it is not possible to compare 1988 directly with earlier years.

As Table 2 illustrates, the Federal Republic of Germany was the main producer in 1988 (with 57% of the total EC production) and its output has grown more rapidly since the upturn in the industry in 1983. In the United Kingdom, production dropped by 50% between 1980 and 1981 but has shown a steady recovery since 1983. The recessions in the cutting tools industry in France and Italy came slightly later than in Germany and the United Kingdom and were less severe. Nevertheless, Italy has just returned to the level of production it reached in 1980-81, but France has done much better and production in 1987 was, in constant terms, 18% higher than in 1980.

External trade

Exports and imports have followed the same trend as production.

Exports heavily depend on currency exchange rates; the major fluctuations of the US dollar exchange rate in particular continues to be a source of concern.

Within the EC, imports into Spain have shown a significant increase since it joined the EC in January, 1987. The rate of import penetration is, however, likely to stabilize in 1990.

Imports of cutting tools from industrialized countries could be a major source of concern, both from a low price and a quality viewpoint.

Outlook

The industry has overcome the troublesome period that affected it in the early part of the decade. There has been a constant improvement since 1983 and although the high rate of growth achieved between 1986 and 1988 is not expected to continue, there is still a high degree of confidence and optimism for 1989.

The creation of the single market will be of overall benefit to the industry, but many companies will find trading much more difficult. The combination of increasing investment by non-EC companies within the EC, more internal trade, and fierce price competition will change the structure of the industry, with fewer, but larger and more efficient companies. Expensive labour will probably be replaced by CNC machinery.

The increasing competition will also lead to more efforts for new cutting materials. For instance, 'cermets' and TiN-coated (Titanium nitride) cutting tools will take a greater share of the market.

Engineers' cutting tools are, to a large extent, covered by ISO (International Standards Organization) standards and these are used by most Member States. There are, however, some exceptions which have not yet been resolved. Within the EC, CEN (Comité Européen de Normalisation) will improve the safety standards for tools.

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SPECIAL TOOLS

(NACE 322.2)

Summary

The die, jigs and fixtures, and mould market is considered an intermediary industry sector. According to a 1978 study by the International Special Tooling Association (ISTA), the average company size in this sector is 53 employees. Growth since then has been negligible. In Germany, for example, 63% of the companies employed less than 100 people. That is why the number of production firms is relatively high. Within the EC approximately 10 000 companies are involved in the manufacture of these products. The total employment could reach 83 000 persons. The value of production from these sectors of industry was approximately ECU 4 billion in 1987.

Description of the sector

The manufacturing programme can be subdivided in major groups: Die tools (inclusive of coachwork tools, extruders and plying irons), moulds (for synthetics, plastics or non-ferrous metals), jigs and fixtures, standard tooling components, special machinery (also manufactured by the toolmakers). The tools described here practically represent the basis of assembly-line production.

Dies are used in the manufacture of metal or flattened metal parts. Moulds are used for the manufacture of complex parts made of plastics or other plastic compounds or for the manufacture of non-

Table 1
Main indicators, 1982-88 (1)

(million ECU)	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	2 001	2 030	2 299	2 924	3 418	3 818	4 074
Net exports (2)	138	151	154	214	182	242	288
Production (3)	2 139	2 181	2 453	3 138	3 600	4 060	4 362

(1) 1988 estimated by Eurostat. Portugal not available for 1982/83.

(2) Excluding Greece, Ireland and Luxembourg.

(3) Excluding Greece, Denmark, Ireland and Luxembourg.

Source: ISTA.

Table 2
Production and external trade (1)

(million ECU)	1982	1983	1984	1985	1986	1987	1988
Production in current prices							
EC (2)	2 139	2 181	2 453	3 138	3 600	4 060	4 362
Index	68	70	78	100	115	129	139
Production in constant prices							
EC (2)	2 467	2 485	2 588	3 138	3 474	3 800	3 939
Index	79	79	82	100	111	121	126
EC trade in current prices							
Total exports (3)	690	697	797	991	1 191	1 306	1 460
Index	70	70	80	100	120	132	147
Extra-EC as a % of total (4)	N/A	48	47	46	44	44	40
Total imports (3)	559	546	643	777	1 009	1 064	1 172
Index	72	70	83	100	130	137	151
Extra-EC as a % of total (4)	N/A	30	33	27	26	27	27
X/M	1.23	1.28	1.24	1.28	1.18	1.23	1.25

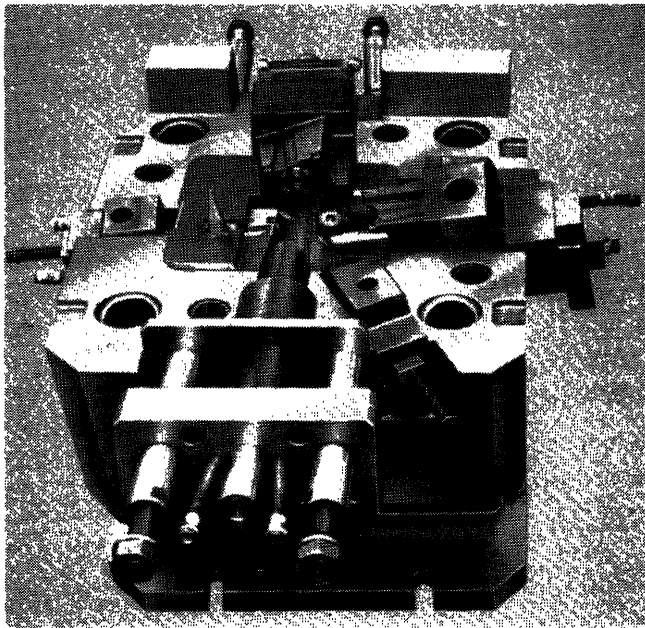
(1) 1988 estimated by Eurostat. Portugal not available for 1982/83.

(2) Excluding Greece, Ireland and Luxembourg.

(3) Excluding Greece, Denmark, Ireland and Luxembourg.

(4) Estimated.

Sources: ISTA, Eurostat (Comext).



ferrous metal parts. Jigs and fixtures are used to clamp and work on parts and to work on machine-tools, soldering apparatus and similar production equipment. Special machines, or so-called 'single-purpose machines', are built by companies specializing in the manufacture of tools for special applications (e.g. for the assembly of incandescent lamps or cathode ray tubes).

The most important client industries include the automobile industry (26%), the electrical industry (25%), iron, sheet and metal goods manufacturers (17%) toys, sport articles and plastics (13%), food industry and the wrapping industry (7%), space and aeronautics industry (4%).

Production and consumption

Most of the following estimates are derived from ISTA statistics. Prices were expected to fall due to increased competition.

Production

Table 2 shows that between 1984 and 1987, production increased by 66% whilst there was a gradual slowdown in the rate of growth (from 28% in 1985 to 13% in 1987).

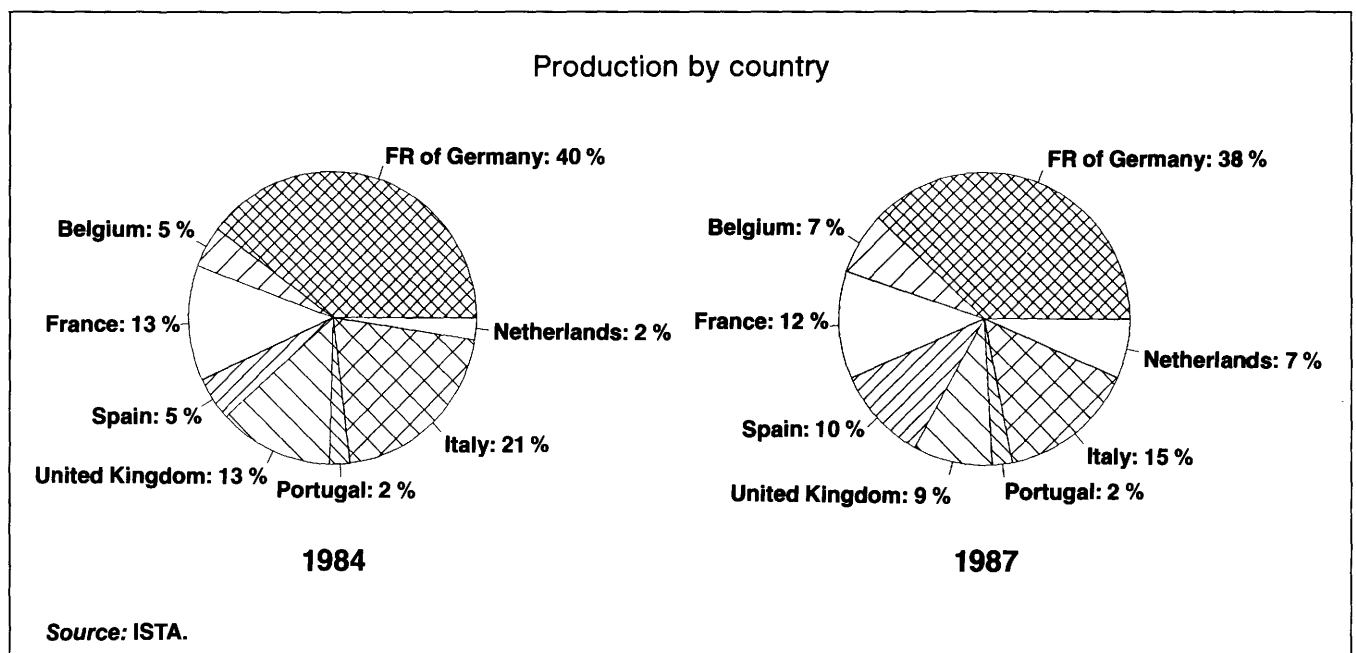
EC country shares of total, turnover 1984 versus 1987

The following pie charts show the respective shares of each EC country in total production (turnover). In 1987 the Federal Republic of Germany was the leading producer with 38%, followed by Italy with 15%, France with 12%, Spain with 10% and the United Kingdom with 9%. Spain showed the most important growth in production from 4.8% to 10.4% (+26% over the four-year period). The Federal Republic of Germany lost some of its share (-2 points), similarly the United Kingdom (-4 points) and Italy (-5 points)

Breakdown by tool type

In 1987, volumes are highest for the production of dies (ECU 1.4 billion), followed by moulds for rubber and plastics (approximately ECU 1.2 billion).

Figure 1



Consumption

Market volume as used here means production minus exports plus imports (i.e. apparent consumption).

Table 3
Internal market

(million ECU)	1985	1986	1987	87/85 (%)
Total	2 907	3 405	3 786	30
Belgium	162	236	261	61
FR of Germany	988	1 160	1 385	40
Spain	294	337	417	42
France	456	493	526	15
Italy	456	470	502	10
Netherlands	N/A	265	318	N/A
United Kingdom	463	444	377	-19

Source: ISTA.

As described above in Table 3, EC market volume has risen about 30% between 1985 and 1987. If one considers that for Belgium and the Netherlands the figures include cross-border deliveries by multinationals, especially in the automobile industry, then the above-average growth rates of Spain (+42%) and of Germany (+40%) and the UK's slump(-19%) are significant.

Trade

Export

In EC countries die, jig and fixture, and mould exports totalled ECU 797 million in 1984 and ECU 1 306 million in 1987, a gain of approximately 64%.

As one can see from the pie chart in Figure 2 Germany lost approximately 4 points in this area. Export shares also have shrunk for the UK (-4 points) and France (-1 point), whilst the Netherlands and Belgium have shown marked growth. Italy has kept its position. The data for Belgium and the Netherlands, however, must be considered in light of the fact that cross-border tool deliveries between domestic and foreign members of groups, especially in the automobile industry, are subject to more or less strong fluctuations, making it difficult to interpret these statistics.

When exports subdivided in product types, we notice that moulds dominate tool types. The strong export orientation of Germany is significant. It is to be noted that the data for Portugal concerns 'moulds' only.

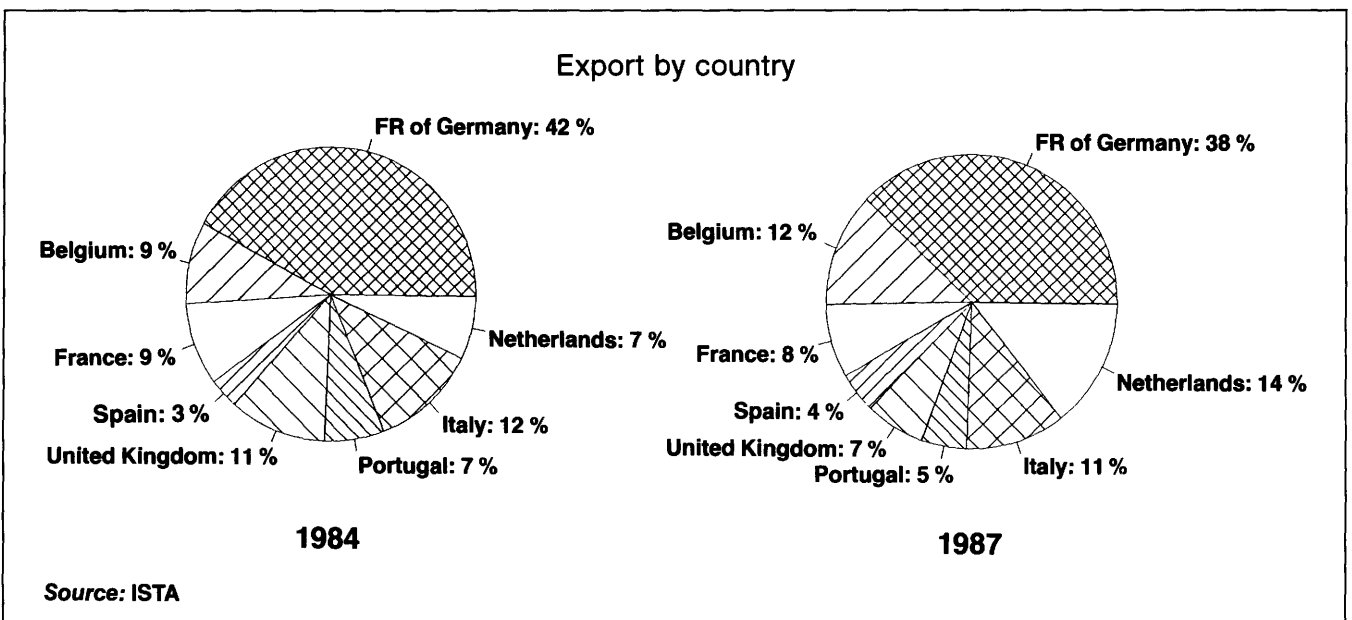
According to the Member States' export statistics, approximately 56% of the EC's total exports were delivered to other EC countries. Countries with particularly high levels of intra-EC exports were Belgium (85%), the Netherlands (75%), Spain (72%) and France (69%). The following countries reported lower intra-EC exports: Germany (54%), Italy (52%) and the UK (48%).

Import

The EC countries' total import of dies, jigs and fixtures and moulds which represented ECU 636 million in 1984 reached ECU 1 056 million in 1987, which implies a growth-rate of 66%.

A country-by-country breakdown shows that Germany has the highest import figures. In the case of

Figure 2



Belgium and the Netherlands, crossborder deliveries within multinational concerns could be involved, particularly as far as the automobile industry is concerned, which would skew the picture. It is important to note a reduction of around 35% in the UK's imports.

According to the Member States' 1987 foreign trade statistics, 65% of the EC Members States' total imports came from other EC countries. That means that the share due to intra-community trade was relatively high. The countries with intra-EC import levels were the Netherlands (92%), Belgium (86%), France (80%), Spain (79%), Italy (74%) and UK (67%). Germany was below average with 41%.

Employment

An important problem in this sector is that its image with clients and the public is not based on its important job-creating potential, its conveyance of the know-how concerning tools and its ability to solve delicate manufacturing problems. It has already been shown that industrial assembly lines could not operate without the high technology and highly specialized knowledge of tool and mould manufacturers. The number and expertise of these tooling specialists are determinants of the degree of technicalization of a national economy. In many cases the still craftlike procedures and preponderantly technical orientation of the manufacturers, coupled with the sector's high proportion of SMEs, make it difficult for the firms to bring their weight to bear, especially *vis-à-vis* large accounts.

Training and further training for the highly qualified workers are becoming more and more important. Both modern digitally controlled machines, and

CAD/CAM or CIM technology call for the best trained personnel and permanent in-house training. The rising need for this kind of helper can be met only by individual further training, with the attendant increase in costs.

The smaller middle-sized companies in the sector are exposed to growing pressure, as far as prices are concerned, from the automobile and electrical industry's large accounts to keep prices down. The propagation of 'global sourcing' of the buyers not only steps up the competition amongst tool suppliers themselves, but also leads to a similar rise in the preparation of tenders and projects, with corresponding increases in cost. Due to the type of manufacturing, this sector of industry has above-average labour costs. The labour costs as percentage of the net turnover in the EC average approximately 46% in 1986. The abovementioned sector leads all manufacturing industries in this respect.

The large increase in costs on the one hand and the price pressure on the other, have led to a permanent erosion of the tool manufacturers' profit margins.

Sectoral conventions inside the EC

Labour costs

The labour costs, (wages, social security, pensions, etc.) summarized in Table 4 underline the sector's sensitivity to such costs. While intensive rationalization over the last few years has reduced the share of labour costs slightly, it nevertheless remains very high. Compared with labour costs, taxes seem relatively low in the UK (23%), Denmark (28%) and Spain (33%), whilst the burden of social costs in Italy is well above average (110% of salaries).

Table 4
Personnel and social costs

	Total personnel cost as a % of net-turnover			Social charges as a % of paid remuneration		
	1982	1984	1986	1982	1984	1986
Total	54.7	51.4	45.8	64.5	61.7	61.2
Belgium	62.0	60.0	43.0	69.1	69.1	83.0
Denmark	65.0	N/A	N/A	25.6	27.7	28.0
FR of Germany	49.9	50.1	43.7	77.9	79.6	83.1
Spain	43.9	46.8	40.1	45.5	40.3	32.6
France	62.9	57.3	50.6	83.7	88.0	88.0
Italy	47.0	42.0	43.0	110.0	110.0	110.0
Netherlands	53.0	54.0	40.0	63.7	63.5	N/A
Portugal	N/A	47.5	50.0	N/A	51.2	41.5
United Kingdom	54.1	53.2	55.6	40.2	25.8	23.0

Source: ISTA.

Salaries and wages

The data in Table 5 below show that nominal wages are very high in Germany and in Denmark. At the opposite end of the scale is Portugal, where skilled workers' salaries are extremely low. Even when accounting for differences in productivity, Germany remains one of the countries with the most expensive workforce in this sector.

Table 5
Salaries and wages, 1987

(ECU)	Tool marker (1)	Mould maker (1)	T/M designer (1)	Foreman (2)
Belgium	8.95	N/A	9.69	1 962
Denmark	12.05	N/A	12.56	N/A
FR of Germany	8.88	8.97	13.49	2 218
Spain	5.56	5.56	6.86	1 397
France	N/A	5.63	5.92	1 623
Portugal (3)	2.38	2.38	2.74	615
United Kingdom	6.67	5.96	7.24	1 677

(1) Effective wages per hour.

(2) Salary per month.

(3) Calculated on basis of 168 working hours per month.

Source: ISTA.

Technological development

The introduction, these last few years, of CAD/CAM technology for the manufacture of tools and moulds has proved to be particularly onerous. The need for this kind of technology has different origins. Some, mainly the buyers of the automobile industry, have closely followed the possibility of including their own data management modules into networks. Others hoped to obtain rationalization effects via the link between CAD (Computer-aided design) and CAM (Computer-aided manufacture). Finally, this would reduce delivery times, which is an additional factor in maintaining the sector's competitive position. This would also bring an improvement in personnel recruiting (specific needs for specialized workers). The large investments necessary for CAD/CAM, which can run into millions,

place a heavy financial burden on the SMEs that make up the bulk of this sector.

Outlook

Because of higher than average labour costs compared with total costs (approximately 46% of turnover), the EC countries which operate with moderate salary costs and longer working hours, such as Portugal and Spain, for example, have a brighter future. Germany could compensate for its high salaries with the high quality of its products and its specialized workers. Like Germany, the UK, France and Italy also benefit from the high technical level reached by their tool-manufacturers.

The competitive pressure of the New industrialized countries with relatively low salary costs (e.g. Korea, Singapore, Taiwan, etc.) could become more important, as the EC countries' technological lead over those potential suppliers has diminished. Loss of more important market shares caused by these countries seems improbable, indeed proximity to the client has always played an important role in the manufacture of tools and moulds.

The manufacture of dies, jigs and fixtures, and moulds depends a lot on the automobile and electrical industries, as well as mechanical engineering and iron, sheet, and metal goods industries. The medium-term outlook is favourable for all these sectors of industry. One can expect the manufacture of tools and moulds to improve in the coming years, although probably with lower growth rates. The limits to this growth may be determined by the replacement of mechanical by electronic parts — for example in the case of office machines, of machine tools, etc. — and by the need for highly qualified manufacturers of tools and moulds. Obviously, future developments in the automobile and electrical industry will have great impact on this branch.

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TEXTILE MACHINERY

(NACE 323.1)

Summary

The EC textile machinery industry is one of the most heavily export-oriented sectors in the Community. Export earnings have grown steadily over the 1980s although the value of output declined, in real terms, during the first half of this period. Demand patterns, especially from developing countries, tend to be relatively volatile, being substantially influenced by exchange-rate movements. In the EC countries as well as in other industrialized textile-producing countries, the emphasis is increasingly on the degree of automation and technological innovation in textile machinery and this trend is likely to continue. In nominal terms, the value of Community exports has grown at an average annual rate of 10% per year over the period 1980-88. Net export earnings of the Community's industry were close to ECU 3.1 billion in 1988. Extra-EC net exports accounted for 83% of total net exports, although the last few years have seen an increasing demand from the EC countries. Although world imports have been decreasing, extra-EC imports have been growing at a rapid rate (annual average of 19% from 1985 to 1988). A major factor accounting for this trend is the strong position of the Swiss textile machinery industry in the EC, which accounts for a major proportion of total textile machinery imports into the Community.

Description of the sector

The major categories of textile machinery are used in the following processes: spinning, weaving, knitting, dyeing, printing, finishing.

No satisfactory unit of measurement can be meaningfully applied to the analysis of textile machinery, ancillary equipment and accessories.

Even within a given class of machines (e.g. weaving machines or looms), the variety of specifications, the diversity of degrees of automation and the range of production capacities are extensive. Moreover, the use of weight as a physical measure is both inaccurate and seriously misleading, since the higher technology, electronically controlled machines are in many instances more compact and lighter. Therefore, it was decided to combine data for different European countries by comparing the actual monetary value of machinery and equipment produced and/or delivered in ecu.

Current situation

The EC is a major producer of textile machinery and accounts for around 55% of the total exports of this product. Substantial restructuring occurred in the 1980s as the industry tried to remain competitive on both domestic and export markets.

The Japanese textile machinery industry is an important competitor in the Far East and South East Asia region. Japan's exports to neighbouring countries in the Far East accounted for around 44.3% of its total exports. Japanese exports to North America increased relatively rapidly over the early part of the 1980s but have since shown a declining trend. However, exports to Europe have recently displayed steady growth, rising by 10.5% in 1984-85 and 13.7% in 1986. Japanese deliveries to Europe accounted for 13.2% of total exports in 1986. Despite isolated 'performances', so far Japanese textile machinery represents a marginal, although fast-growing competition for European manufacturers on the world market. In absolute terms, Japanese exports to the USA and to the EC have been relatively modest during this period, and have mainly depended on

Table 1
Main indicators, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	2 724	2 335	2 536	2 504	3 131	3 624	4 253	4 454	4 877	N/A
Net exports	1 789	1 888	1 795	1 740	2 188	2 683	2 794	2 927	3 074	N/A
Production (1)	4 513	4 223	4 331	4 244	5 319	6 307	7 047	7 381	7 951	8 737
Employment (1 000) (1)	131	118	108	99	98	102	103	102	102	104

(1) 1988 estimated. The Netherlands estimated for all years.

Source: Eurostat (Inde, Bise, Comext).

sales of weaving machines and ancillaries. Except in some smaller sectors, Japanese textile machinery sales represent a minor competitive threat to EC manufacturers in European markets, the main thrust of Japan competition remaining in Asian markets.

Competition from developing countries has been confined to the production of more basic, low-technology machinery, which is often manufactured under licence from EC manufacturers; this mainly represents an import substitution policy. Exports of textile machinery from Third World countries are usually too small to figure in detailed international statistics. Nevertheless, a trend of the past few years has been the emergence of a growing number of indigenous textile machinery makers in the Far East and South East Asian countries. However, as yet their production has been confined to domestic markets or geographically close markets.

The Swiss textile machine industry is a key player in the world market. This highly efficient and technologically advanced producer is able to capture a large share of market demand even in countries with strong indigenous textile-machine-making capacities.

Consumption and production

Demand within the EC accounts for around 30% of total Community production. This percentage has fallen sharply over the 1980s' indicating stagnant demand within the Community at least over the early part of the 1980s. A substantial volume of production has been re-directed to third-country export markets. However, despite relatively strong export growth, the value of production in real terms fell every year until 1984, when some recovery in production began.

The Federal Republic of Germany is by far the largest producer, with a share of 50% of total EC production. In the period 1980-86, output in real terms grew considerably in Belgium (+16%) and in the Netherlands (+7%). In contrast, production in the United Kingdom declined over the same period by 42%.

Export markets include the industrialized countries — the US is an important market — the NICs, and the developing countries. However, by 1987 the proportion of extra-Community exports destined for developing countries had fallen to around 15% in 1987 from 21% in 1981. The importance of the Latin

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC (1)	4 513	4 223	4 331	4 244	5 319	6 307	7 047	7 381	7 951	8 737
Index	72	67	69	67	84	100	112	117	126	139
USA (2)	1 130	1 393	1 387	1 374	1 596	1 569	1 323	1 220	1 301	N/A
Index	72	89	88	88	102	100	84	78	83	N/A
Japan (2)	1 593	2 007	1 889	2 265	2 868	3 281	3 330	4 003	5 095	N/A
Index	49	61	58	69	87	100	101	122	155	N/A
Production in constant prices										
EC (1)	6 334	5 546	5 148	4 745	5 584	6 307	6 517	6 498	6 827	7 183
Index	100	88	82	75	89	100	103	103	108	114
EC trade in current prices										
Exports extra-EC (3)	2 401	2 546	2 482	2 450	3 083	3 736	3 999	4 198	4 454	N/A
Index (4)	63	68	66	66	83	100	110	115	122	N/A
Imports extra-EC (3)	616	663	694	749	891	1 063	1 217	1 336	1 466	N/A
Index (4)	58	62	65	70	84	100	110	121	133	N/A
X/M	3.89	3.84	3.58	3.27	3.46	3.51	3.28	3.14	3.04	N/A
Imports intra-EC (3)	934	868	943	1 010	1 218	1 342	1 946	2 196	2 358	N/A
Index (4)	80	65	70	75	91	100	124	140	150	N/A

(1) 1988 estimated, 1989 forecast. The Netherlands estimated for all years.

(2) Census of manufactures and Eurostat estimates.

(3) 1980 EC 9; 1981-85 EC 10.

(4) Taking into account changes in EC membership.

Source: Eurostat (Inde, Bise, Comext).

American market in 1981 sharply contrasts with its current status, a fall attributable almost entirely to severe liquidity problems and a consequent inability to generate capital investment funds to match the re-equipment needs of the textile industries in the region. Conversely, the picture in the Far East and South East Asia is very different: this region has been a major buyer of EC textile machinery in more recent years, and the emergence of the People's Republic of China in this respect has been a key factor in explaining this trend. In 1987 the PRC alone absorbed about 9% of EC textile machinery exports.

Structural changes

There are more than 1 100 companies in the EC engaged in the manufacture of textile machinery, many of which are either small or medium-sized. Of these companies 400 and 350 are located in the federal Republic of Germany and Italy respectively.

In most of the European textile-machinery-producing countries considered in this report, elements of 'restructuring' — some modest, but others very extensive — tend to make it difficult to describe the industry structure. However, some of the more significant changes are detailed below.

In the spinning sector, the spinning machinery activities of SACM in France have been discontinued, as have the yarn processing and yarn preparation machinery lines of ARCT. Meanwhile, a recently formed group, SAMT, now incorporates some of these 'lost' elements. Rieter of Switzerland has acquired the German spinning-machine maker Schubert and Salzer, whose main competitor in Germany, Schlafhorst (also the world's largest manufacturer of spinning and winding machines) has already

taken a controlling interest in a fellow-German spinning-machine maker, Zinser.

In the UK, major changes have taken place in the spinning, knitting and finishing-machinery fields over the past decade, one notable aspect being the relative proliferation of so-called 'management buy-outs'.

Three main factors determine the overall structural features of the EC textile-machinery industry, as well as where it tends to locate. Firstly, the very high proportion of export sales of European companies outside the EC market area indicate the global — rather than region-specific — nature of the industry; and this is exemplified, for instance, by the fact that most major European textile machinery manufacturers have fully or majority-owned 'daughter companies' in the important United States market. This circumstance enables them to serve the adjacent Canadian and Latin American regions, and some have similar arrangements (or joint-ventures with 'local' companies) in other key regions such as the Far East. Secondly, as already stated, the high degree of specialization refers not merely to broad product categories such as spinning, fabric forming, etc., but also to specialization within these categories. Pressures on order volumes and profit margins and increased local competition in some developing markets has tended to heighten this movement towards greater specialization. For example, some major manufacturers have adopted the strategy significantly reducing the number of variations of machine type within a particular product category or group — which meanwhile has enabled them to optimize the production of machine parts and to match production and orders. Thirdly, the restructuring process involving close-downs, acquisitions, mergers, etc. has affected not only respective machinery sub-sectors within Member States but has

Table 3
Production by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	AAGR
EC (1)	4 513	4 223	4 331	4 244	5 319	6 307	7 047	7 381	7 951	8 737	7.6
Belgium	170	104	194	184	244	217	218	217	238	264	5.0
Denmark	22	22	21	21	26	32	43	39	40	44	7.8
FR of Germany	2 095	1 988	2 029	2 189	2 653	3 207	3 746	3 949	4 237	4 569	9.1
Spain	253	257	264	223	218	268	328	293	330	360	4.0
France	351	340	328	376	456	513	589	614	659	702	8.0
Italy	1 070	1 061	1 018	818	1 178	1 397	1 485	1 587	1 765	2 044	7.4
Portugal	28	31	35	30	29	33	33	35	39	43	5.0
United Kingdom	413	317	338	297	384	406	386	425	472	513	2.5

(1) 1988 estimated. The Netherlands estimated for all years.

Source: Eurostat (Inde).

increased restructuring at the international level (exemplified by the Rieter-Schubert & Salzer merger).

Employment

Cematex figures covering EC 8 put 1987 employment at 102 265 persons. This compares with an employment level of 131 000 persons in 1980. Even in the face of a tendency to 'consolidation' involving mergers and closures, the EC industry has maintained a relatively constant position as a major provider of employment.

Investment

It is a problem common to all European textile machinery manufacturers that 'destructive' price competition, made even more pronounced by sometimes violent currency exchange-rate fluctuations and pressure from many customers for 'soft' credit terms, has made depressed profit margins a permanent fact of life. Furthermore, fixed costs whose relative importance can only be reduced by increasing sales have exacerbated the situation. However, the traditionally high level of investment in research and development activities (often of the order of 5 to 10% of turnover) has been sustained to maximize the return from technical and product innovation. An additional non-negligible cost factor related to technical marketing activity has been the proliferation in recent years of 'international' textile-machinery exhibitions triggered by the growing influence of markets in recently developed and still developing markets for textile machinery.

Geographic features

In the German textile machinery industry, the figures for 1987 show that spinning and finishing machinery accounted for the largest portion of German exports, which amounted to 29 and 18% respectively. Incoming orders are still showing an above-average growth trend. The growth rate of weaving machinery exports was pronounced, whereas in other areas business appeared to have been moderated.

The US market accounted for 21% of Germany's total extra-Community exports. Other main markets include Taiwan (9.1%) and the, People's Republic of China (7.4%). Intra-Community trade absorbed 30% of Germany's total exports. Recent growth of exports to the Latin American market has been much better, rising by 17% over 1987, although from a comparatively low base. The African market has, at best, stagnated, with only marginal nominal growth.

Italy's textile machinery sector is extremely diverse, and highly labour-intensive, with some 350 firms employing over 25 000 persons. Compared with its counterparts in other Member States, the Italian industry has relatively few large companies — a factor that tends to work to the industry's advantage, since in this way maximum specialization and the vitally-important close personal contact with customers can be accommodated.

Unlike most other textile-machinery-producing countries, Italy's total output and export profile is spread much more evenly across all the main sub-sectors. The main priorities of the industry are increased use of advanced textile technology aided by the latest micro-electronics and robotics technology so that greater productivity and efficiency, reduced costs and shorter, more economical manu-

Table 4
Production in constant value by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	AAGR
EC (1)	6 334	5 546	5 148	4 745	5 584	6 307	6 517	6 498	6 827	7 183	1.4
Belgium	200	117	213	196	253	217	206	201	217	230	1.6
Denmark	34	30	27	24	29	32	41	36	36	37	1.0
FR of Germany	2 943	2 660	2 420	2 398	2 778	3 207	3 443	3 441	3 609	3 802	2.9
Spain	336	311	292	263	230	268	326	281	293	306	-1.0
France	467	411	378	419	484	513	567	573	599	624	3.3
Italy	1 632	1 483	1 298	974	1 239	1 397	1 255	1 254	1 403	1 488	-1.0
Portugal	42	39	40	34	31	33	34	36	38	40	-0.5
United Kingdom	511	340	352	318	401	406	418	453	450	465	-1.0

(1) 1988 estimated. The Netherlands estimated for all years.

Source: Eurostat (Inde).

facturing cycle-times can be attained. Equally important is the Italian emphasis on after-sales service, the service does not end when the machine is assembled in the customer's plant but continues throughout the life of the installation.

Exports account for 74.1% of all French textile-machinery output and as much as two-thirds of this total is delivered to industrialized nations. Most exports go to countries that are economically and financially stable and able to maintain regular trade relations. Around 80 companies are involved in the French industry and they employ more than 6 000 persons. This sector is characterized by a preponderance of medium-sized firms, and total production is shared between nine activity areas, led by the primary weaving and spinning machinery manufacturers.

With 'very high' current levels of activity and order books described as 'excellent', the British textile machinery sector is enjoying a booming demand from its home market and strong performance in world markets. The industry can claim world leadership in several areas of technology, notably tufting, yarn spinning and processing and the manufacture of non-wovens. The People's Republic of China for the first time topped the list of export markets for British machinery. The sector employs 8 500 persons in around 180 firms. The number of firms in the different sub-sectors is as follows: spinning and yarn processing 27, fabric producing (knitting, weaving, tufting) 22, dyeing and finishing 38, ancillary equipment and general textile accessories 73.

There is a relatively large number of small companies producing textile machinery in Spain. They cover the production of machinery equipment and accessories for the entire textile manufacturing and processing chain including spinning, weaving, knitting, dyeing, printing, finishing and making-up and laboratory and control devices and apparatus. In 1984-88 export sales increased substantially. Intra-Community trade accounts for around 24% of total sales and 36% of total exports. Of the different sub-sectors, knitting and finishing machines are the most prominent, followed by spinning and — lagging somewhat behind — weaving and making-up machinery. The industry is engaged in marketing efforts to increase its share of the US market.

The Belgian textile machinery manufacturing sector is modest in size by world standards, but in the past five years it has achieved remarkable growth in

terms of both total deliveries and value of export sales. Belgium has 24 textile-machinery manufacturing plants and 12 accessories manufacturers, employing some 5 000 persons. Many of these plants are vertically integrated, producing all components; Belgian textile machinery builders boast two of Europe's most modern factories.

In Belgium, four companies account for 80% of the sector's total activity, and each of these — Picanol, Houget Duesberg Bosson, Van de Wiele and Gilbos — is acknowledged as being in the international forefront of their particular area of specialization.

The textile-machinery-manufacturing sector in the Netherlands has only eight companies employing some 1 500 persons. However, it plays an important part in the overall infrastructure of the European textile machinery industry. The Stork group, an international leader in textile printing technology, is based in the Netherlands.

Table 5
Employment by country, 1987

EC (1)	102 265
Belgium	3 634
Denmark	577
RF of Germany	53 037
Spain	6 239
France	6 934
Italy	17 499
Portugal	2 390
United Kingdom	8 456

(1) The Netherlands estimated.

Source: Eurostat (Inde).

Outlook

The future looks bright for European textile machinery. Overall growth is likely to continue although it will manifest short to medium-term fluctuations. The expansion in demand for textile products owing to world population growth and the increasing prosperity of many regions will ultimately provide a growth market for textile machinery. In addition to the expected gradual rise in demand, the already apparent upward trend in requirements for speciality textiles — high-performance raw materials and end-products — will continue. These trends will bring both opportunities and challenges for textile-machinery makers.

In the textile manufacturing sector the likelihood of significant downward pressure on prices — and, therefore, profit margins — as a result of intensified global competition means that textile producers will tend towards the production of standard items in more economical, cost-effective ways. This will shift demand for textile machinery to maximum automation and robotization moving towards totally automated installations in which all, or most, processes are linked automatically. Meanwhile, other textile manufacturers will opt for greater specialization where much higher value-added potential lies. In both cases, the challenge for the textile-machinery manufacturers will be the incorporation of further technological developments. These overall trends spell out a clear message for the future: the already impressive levels of R&D investment and activity on

the part of the major machinery builders will, in many cases, need to be consolidated and sometimes extended.

It is hoped that the recent strengthening of the European textile machinery industry will prove to be an important contributory factor in maintaining the leading world-wide position of European manufacturers. Moreover, the trend towards increasing high-technology development, in which computer control and electronics-based systems play a vital part, will provide the kind of challenge which will attract a substantial number of highly qualified people whose energy and expertise will be more and more needed in the foreseeable future.

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PLASTICS AND RUBBER MACHINERY

(NACE 324.3)

Summary

The plastics and rubber machinery sector in Europe has a turnover of ECU 6 400 million and employs around 70 000 persons. The technology of this industry is increasingly making use of automation and developing complex systems combining a number of processes. In the medium term, owing to its knowledge and experience, the European industry should be able to face the increasing competition from the USA and Japan.

Description of the sector

The plastics and rubber machinery industry manufactures the following products: extruders, injection

moulding machines, compression/transfer presses, blow moulding machines, foam-manufacturing machines, thermoforming machines, calendering and similar machines.

After minor modifications many of these machines can be used for processing both rubber and plastics.

Current situation

The plastics and rubber machinery manufacturing industry in Europe has a turnover of ECU 6 400 million, involves around 625 companies and employs about 70 000 persons.

In the European Community, the principal countries involved are Germany, Italy, France, United

Table 1
Main indicators, 1983-88 (1)

(million ECU)	1983	1984	1985	1986	1987	1988
Apparent consumption	1 099	1 399	1 632	1 890	2 631	3 166
Net exports	1 062	1 246	1 640	1 868	1 646	2 034
Production	2 161	2 645	3 271	3 758	4 277	5 200

(1) FR of Germany, France, Italy and the United Kingdom.

Source: Euromap, Eurostat (Comext).

Table 2
Production and external trade

(million ECU)	1983	1984	1985	1986	1987	1988
Production in current prices						
EC (1)	2 161	2 645	3 271	3 758	4 277	5 200
Index	66	81	100	115	131	159
Production in constant prices						
Index	2 441	2 760	3 271	3 516	3 793	4 565
Index	75	84	100	107	116	140
EC trade in current prices						
Exports extra-EC (2)	1 165	1 431	1 781	1 965	1 838	2 393
Index	65	80	100	110	103	134
Imports extra-EC (2)	254	322	376	406	504	843
Index	68	86	100	108	134	224
X/M	4.59	4.44	4.74	4.84	3.65	2.84
Imports intra-EC (2)	519	646	751	881	1 025	1 288
Index	69	86	100	117	137	172

(1) FR of Germany, France, Italy and the United Kingdom.

(2) Reporting countries: FR of Germany, France, Italy and the United Kingdom; Partner country is extra-EC 12 or intra-EC 12.

Source: Euromap, Eurostat (Comext).

Kingdom, the Netherlands and Spain. Important producers among EFTA members are Austria and Switzerland.

From the outset, European manufacturers have taken the technological lead and set the pace, thus commanding more than 60% of the world market.

Although competition continues to grow from the USA and Japan, prospects look good for European manufacturers, who can build upon a firm foundation of knowledge and experience.

Consumption and production

In the principal European countries the sales of machinery in 1987 totalled around ECU 4 277 million, an increase of about 14% on the previous year. Growth in the previous years had varied from 24% in 1985 to 15% in 1986. Early indications for 1988 show that total sales figures went up again, this time by 11%.

The main developments in this industry date from the late 1940s. Technological developments over the past 30 years, in particular, have revolutionized the range and performance of plastics products now available. This has resulted in strong growth for the machinery manufacturers, enabling them to keep pace with the rapid expansion in demand.

The main markets for plastics and rubber products are given in Table 3:

Table 3
Market destination, 1987

	%
Plastics	
Packaging	35
Building	22
Electrical/Electronic	10
Transport	5
Toys & leisure	4
Housewares	3
Agriculture	2
Mechanical engineering	2
Clothing & footwear	1
Miscellaneous	11
Rubber	
Tyres	48
Others	52

Source: Euromap.

Product standards

The principal types of processing equipment are:

1. Injection moulding machines — which inject molten plastics at high pressure into a cooled, split mould to produce high-precision, often complex-shaped products ranging from buckets to Hi-fi cabinets, at high outputs.

Table 4
Production by country, 1987

	million ECU
Denmark	49.5
FR of Germany	2 681.3
Spain	82.7
France	199.0
Italy	1 286.5
Netherlands	118.2
United Kingdom	110.6
Total	4 527.8

Source: Euromap.

2. Extruders — which use a revolving screw in a close-fitting cylinder to extrude molten plastics and rubber through a shaped die, producing in this way continuous precision sections such as pipes, sheet and complex profiles.

3. Compression/transfer presses — which compress powder, pellet or dough-moulding compounds between heated dies to produce precision mouldings such as electrical switches and saucepan handles.

4. Blow moulding machines — which extrude, clamp and inflate with compressed air a hot plastic tube into a cooled, split cavity mould to produce a tough hollow moulding in the form of bottles and vehicle fuel tanks for example.

Table 5
Production by type in the EC, 1987 (1)

	million ECU
Extruders	737.5
Injection moulding machines	934.9
Compression transfer presses	138.5
Other presses	66.9
Blow-moulding machines	342.3
Foam machines	112.9
Thermoforming machines	104.2
Other machines	1 196.8
Calendering machines	33.1
Parts	609.5
Total	4 276.6

(1) FR of Germany, France, Italy and the United Kingdom.

Source: Euromap.

5. Thermoforming machines — which heat and form plastic sheet, using vacuum or pressure, in contact with a cooled form-mould to produce simple-shaped mouldings to be used as vending cups, refrigerator linings and point-of-sale displays.

6. Calendering machines — which pass hot plastic or rubber through a series of temperature-controlled rolls with progressively smaller gaps to produce continuous precision thin sheets (also embossed if required) for use in products such as shower curtains and cling film.

7. Foam machines — of various kinds that can produce rigid cellular products widely used for packaging and thermal insulation.

These various types of machines can be made to process a wide range of different types of plastics or rubber materials, according to specifications. Normally only minor changes are required with reference to the temperature control system, or the design and materials used for the construction of the plasticizing system.

These machines are also available in a wide range of sizes depending on the product to be produced. These may range from precision miniature electronic components to large chemical storage tanks.

Technological development

Rubber and in particular plastics products continue to play an increasingly essential role in modern life.

They are made by a still widening variety of manufacturing processes, from simple pressing and extrusions to more sophisticated techniques sometimes combining a number of processes, and increasingly, fully automated.

In recent years a trend towards multi-wall and laminated extrusions and moulded products has necessitated the development of complex multi-feed systems for different combinations of plastics or rubber materials, which usually require sophisticated process-control systems.

The impact of 1992

The increasing emphasis on automation and other modern production technologies has not only spurred the development of ancillary equipment for such processes as raw material feeding, mould changing, product finishing, assembly, handling and packing, but has also put pressure on the standardization of fixings and interconnections. In addition, preparation for the single European market in 1992 has resulted in increased priority being given to machinery-safety standards, which now form part of the emerging legislation.

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INDUSTRIAL TRUCKS

(NACE 325.5)

Summary

The industry experienced a downturn in the early 1980s but real output has been steadily increasing since 1984. Since 1980, the Community's world market share has dropped from about 40 to 25% and imports broadly match exports. Technical change on the demand side has led to more sophisticated equipment for modern warehousing while on the supply side it has resulted in more automated production, leading in turn to a flat demand for labour. While the number of firms has diminished, the number of plants has remained stable.

Description of the sector

According to Council Directive 86/663/EEC of 22 December 1986, self-propelled (powered) industrial trucks are defined as any wheeled vehicles, not running on rails, which are designed to carry, tow, push, lift, stack or tier in racks any kind of load. They are controlled by an operator, who walks with the truck or rides on a specially arranged driving platform which is fixed to the chassis or which can be raised.

To compile statistics on supply and demand is difficult. The Fédération Européenne de la Manutention (FEM) produces statistics (as do JIVA — Japan Industrial Vehicles Association, ITA — Industrial Truck Association, etc.), but they exclude various countries, while not all producers in the Member States are members of the association. In addition, such statistics are only made available to members.

Rather than using the Directive's 18 categories, the following breakdown of the sector is used in this industry profile:

- counterbalanced fork-lift trucks, i.e. battery-powered counterbalanced trucks and diesel/petrol/LPG counterbalanced trucks, rough-terrain (cross country) and side-loading trucks;
- other stacking lift trucks (narrow-aisle), i.e. reach trucks, saddle trucks, pallet stackers, lateral and front-stacking trucks, platform high-lift trucks with elevated operators, high and medium-lift order-pickers;
- low-lift non-stacking lift trucks, i.e. pallet trucks, platform trucks and horizontal order-pickers;
- non-lift trucks (non-lifting platforms), i.e. platform trucks, industrial tractors and shunting tractors.

Production and consumption

Production

The Community's real production fell constantly between 1980 and 1983, and started increasing again only since 1984. In 1987, real production was still 13% lower than in 1980. The slump in European production in the early 1980s was much tougher than the downturn in world consumption. As a matter of fact, the Community's share of world production declined steadily between 1980 and 1986, before increasing again in 1987. The European Community accounts now for about one-quarter of the world production. In 1980, this figure was close to 40%.

1986 was a year of world-wide rationalization. Certain American companies such as Hyster, Clark and Caterpillar, relocated their production to Europe and the Far East. The Japanese self-imposed export

Table 1
Main indicators, 1980-87
Industrial trucks

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
EC market	1 251	926	934	1 029	1 391	1 636	2 021	2 290
Net exports (1)	178	260	236	161	132	175	219	87
Production	1 426	1 181	1 221	1 285	1 505	1 728	1 898	2 047
Share of world production (%)	39.4	31.7	29.4	30.8	25.3	24.8	22.6	25.1
Employment (1 000)	50.6	39.7	35.9	35.5	43.5	45.8	44.5	40.5

(1) 1980 EC 9; 1981-83 EC 10.

Source: Eurostrategies, Eurostat (Comext).

limitations in order to avoid dumping measures being taken against them, with the result that their production decreased. As a result the Community's market share increased again in 1987.

Consumption

Except for a slight downturn in the early 1980s, the world market for industrial trucks has grown fairly consistently over the past 10 years.

Contrary to production, the European Community's consumption has kept a fairly constant share in world consumption over the past six years (about 25%).

Community demand peaked in 1980, when 122 000 units were sold. Subsequently, EC industry underwent a process of restructuring and consolidation which meant that purchases of industrial trucks were deferred where possible. 1986 was again an excellent year for the European industry as a whole, and the truck market grew especially well in Spain, Italy, France and the Federal Republic of Germany (partly due to an accumulated backlog). 1987 saw a stabilization with only marginal growth.

Moderate growth is predicted for the future as the EC countries have already reached saturation, and most trucks sold serve as replacements rather than additional capacity.

As is apparent from Table 2, the EC market is largely dominated by counterbalanced trucks.

The reason for this is that the counterbalanced truck is very flexible and suitable for many different applications. Over 60% of these counterbalanced

trucks are powered by diesel, petrol or liquid petroleum gas and thus may only be used in areas where pollution, exhaust fumes, cleanliness, noise etc. are relatively unimportant, i.e. for external rather than internal use.

However, the trend is away from the all-purpose counterbalanced truck towards a more specialist truck. This is a technical response to the factor of warehousing costs: the universal counterbalanced fork-lift truck requires too much space to be used in narrow aisles. Companies avoid extending or building new warehouses; instead, they try to make much better use of their existing warehouse space. This explains the large increase in narrow-aisle trucks which require less aisle width than conventional trucks. The price of narrow-aisle trucks has risen considerably; this is due to the fact that today's narrow-aisle trucks are so sophisticated that they can be used in aisles only 1.8 to 2 metres wide. This sophistication is due to modern hydraulics, mechanics and electric components, which are inevitably more costly.

Production of platform trucks and tractors has remained stable in absolute terms, but these products' market share has decreased. These trucks have a very long lifespan and therefore replacement demand is low (usual buyers are the railways, post offices, etc.). There is also much product substitution in this area (e.g. the use of small agricultural and road vehicles such as Daimler-Unimok).

Geographic features

As far as consumption is concerned, the overall market share of France, the Federal Republic of Germany, Italy and the United Kingdom has

Table 2
Market structure

(number of trucks)	1980	1981	1982	1983	1984	1985	1986	1987 (1)
Diesel/gas-powered counterbalanced	49 359	35 536	32 993	32 509	34 666	39 595	45 199	45 798
Battery-powered counterbalanced	32 284	22 920	21 279	20 526	21 894	23 797	25 783	27 029
Total counterbalanced	81 643	58 456	54 272	53 035	56 560	63 392	70 982	72 827
Narrow-aisle	20 464	16 858	15 364	14 556	15 660	18 747	20 823	20 335
Low-lift non-stack	17 340	14 761	15 692	15 660	18 225	18 729	20 872	20 958
Non-lift	2 573	1 784	1 756	1 613	1 674	1 316	1 468	1 499
Total	122 020	91 859	87 084	84 864	92 119	102 184	114 145	115 619

(1) Estimated.

Source: Eurostrategies.

Table 3
Market structure by Member State, 1987

(number of trucks)	EC	B-L	DK	D	GR	E	F	IRL	I	NL	P	UK
Diesel/gas-powered counterbalanced	45 798	1 477	1 184	12 305	157	2 909	9 196	231	6 154	3 903	346	7 936
Battery-powered counterbalanced	27 029	791	519	6 284	77	2 079	4 501	78	7 169	1 675	151	3 705
Total counterbalanced	72 827	2 268	1 703	18 589	234	4 988	13 697	309	13 323	5 578	497	11 641
Narrow-aisle	20 335	493	683	7 538	38	1 238	3 397	22	2 651	729	55	3 491
Low-lift non-stack	20 958	765	523	6 052	24	926	6 106	14	2 052	1 101	34	3 361
Non-lift	1 499	41	20	702	11	29	220	0	199	46	16	215
Total	115 619	3 567	2 929	32 881	307	7 181	23 420	345	18 225	7 454	602	18 708

Source: Eurostrategies.

remained relatively constant over the last 10 years, with these four countries together making up 80% of the industrial truck market.

However, a breakdown by Member State shows that Italy, the Federal Republic of Germany and Spain have slightly increased their market share, while the UK share has declined.

The United Kingdom and France started using trucks earlier than the other EC countries and are thus closer to their saturation point than the Federal Republic of Germany and Italy. Thus, the large decrease in the United Kingdom's share from 24% in 1978 to 16% in 1987 can be explained by this factor in conjunction with the evolution of the UK into a more service-oriented economy.

More efficient factories, better space utilization and overall improved cost-control, coupled with greater specialization, has resulted in fewer counterbalanced trucks. The level of technological development in materials handling equipment is higher in countries such as France, the United Kingdom and the Federal Republic of Germany than it is in Ireland, Greece and Portugal (Italy occupies an intermediate position). Germany, Denmark and France have far fewer counterbalanced trucks (as a proportion of their total market) than Ireland, Portugal and Greece. In Spain, Italy and Greece, the narrow-aisle and low-lift trucks have more than doubled their market share at the expense of universal trucks over the past 10 years (this is also true for low-lift trucks in France). The future trend is towards even more sophisticated equipment.

Table 4
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Production in current prices								
EC	1 426	1 181	1 221	1 285	1 505	1 728	1 898	2 047
Index	83	68	71	74	87	100	110	118
Production in constant prices								
EC	2 141	1 597	1 498	1 452	1 594	1 728	1 797	1 866
Index	124	92	87	84	92	100	104	108
EC trade in current prices								
Exports extra-EC (1)	294	374	351	300	375	459	533	406
Index (2)	65	82	77	66	82	100	116	88
Imports extra-EC (1)	158	148	151	159	233	282	310	328
Index (2)	61	56	57	60	83	100	110	116
X/M	1.86	2.53	2.32	1.89	1.61	1.63	1.72	1.24
Imports intra-EC (1)	337	274	287	278	370	443	545	649
Index (2)	83	67	70	68	84	100	123	146

(1) 1980 EC 9; 1981-83 EC 10.

(2) Taking into account changes in EC membership.

Source: Eurostrategies, Eurostat (Comext).

Table 5
Top five EC manufacturers, 1986

Company	Company headquarters (country)	Industrial truck sales (million ECU)	Company turnover (million ECU)	Truck sales/ company turnover (%)	Employees in the whole company	Production/ assembly plants (country)
Linde	D	644.5	1 821.3	35.4	19 252	D, F
Lansing	UK	343.9	350.9	98.0	5 238	D, F, UK
Jungheinrich	D	336.8	448.6	75.1	5 123	D, F
Lancer Bros	UK	114.6	117.0	97.9	1 781	D, E
Fiat	I	91.1	19 852.8	0.5	N/A	I

Sources: : Annual reports, Fördermittel Journal.

Trade

Of the total 115 620 units sold within the EC in 1987, 28 651 were imported from outside the Community. Almost exactly the same number, 29 129, were exported by the Community, a slight decrease compared with 1986.

Table 6
Number of production plants in the EC

	Plants
1980	111
1981	114
1982	112
1983	113
1984	110
1985	112
1986	115
1987	113

Source: Eurostrategies.

Net export earnings dropped markedly from 1986 to 1987 due to the sharp decline in value of exports to countries outside the Community, while the value of imports has remained relatively constant.

Industry structure

Over the 1960s and 1970s the industrial truck industry experienced continuous growth which peaked in 1978 (in terms of the number of employees). Subsequently, in the late 1970s and early 1980s, costs and salaries increased and profits turned into losses. Steinbock nearly went bankrupt, was sold to Lancer Bros and in the process shed two-thirds of its personnel. Fenwick (then the market leader in France), Saxby, Lansing Bagnall, etc., all went through similar processes, resulting in lay-offs.

In the mid-1980s demand rose, and in their desire to the Japanese, many companies moved part-time employees back to full-time employment. Over the last few years improved productivity achieved through highly automated (just-in-time) production lines developed by firms such as Lansing, Still, Linde and Jungheinrich, has meant that no additional labour has been needed to generate increased output.

Although the industry went through a process of concentration (five companies account for three-quarters of the output), the actual number of production plants has remained stable over the past 10 years.

Outlook

Moderate growth is predicted world-wide, with most of the market expansion taking place in Third World countries.

In the future, Far East direct imports will probably slow as Japanese production will most likely relocate to a Community country. This, together with the relocation of US production plants to the EC, will mean some further increase in EC production and exports.

The trend towards increasingly sophisticated and higher value-added equipment will continue.

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WOOD-WORKING MACHINERY

(NACE 327.1)

Summary

Europe's wood-working machinery industry occupies a dominant position, since Europe is at the same time the world's biggest producer and exporter. After a period of recession at the beginning of the 1980s, the sector enjoyed a recovery from 1984. From 1984 to 1987 real production grew on average by 7.5% per year. Medium-term prospects are good and forecasts indicate an annual growth in real production of about 4% in the forthcoming years. This is mainly being attributed to the sound health of the wood industry that has managed to develop products that have revived competition with wood substitutes such as plastic and metal. The wood industry therefore has an interest in pursuing the modernization of its plant.

Description of the sector

The category of 'Wood-working machinery' includes fixed machines used in various tasks for the transformation of wood and other similar material. Machine tools for milling and shaping are classified in this group as well as assembly and veneering machinery.

This machinery is subdivided into two groups:

- The so-called primary transformation machinery for heavy wood-working industry such as saw mills, particle or fibreboard and plywood panelling manufacturers. Manufacturers of pallets and packing crates are also included in this category.
- The so-called secondary transformation machinery used in the manufacture of finished

products such as furniture, chairs, industrial joinery, timber work, construction, the craft industry, wooden dwellings, cabinet making, turned wood, moulding, parquet, toys, etc.

The use of wood-working machinery is tied to the availability of raw material:

- European wood;
- imported wood, either tropical or the so-called northern woods from Scandinavia, USSR and Canada;
- wood-base reconstituted panelling.

Wood falls into one of the following two categories:

- wood from deciduous trees
- resinous wood.

The production process followed in wood-working machinery is very similar to that in machine tools for metalwork. In some countries the term machine tools encompasses machinery for both metal and wood. The definition of Nimex customs nomenclatures and the international harmonized system are based on this principle.

The following observations on statistical data should be noted:

- As far as is known, there are no reliable statistics available concerning production and external trade for the Eastern bloc countries and China. It is common knowledge that some of these countries have a sizeable production, although it is dif-

Table 1
Main indicators, 1980-89 (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption (2)	801	767	764	844	819	1 132	1 175	1 395	N/A	N/A
Net exports (3)	469	565	522	503	642	752	833	766	N/A	N/A
Production (4)	1 268	1 334	1 286	1 346	1 461	1 884	2 008	2 161	2 474	2 763
Employment (1 000) (5)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	41.1	42.7	43.7

(1) Excluding the Netherlands, Ireland, Greece and Luxembourg.

(2) 1980-83 estimated.

(3) 1980-83 excluding Spain and Portugal as well.

(4) 1980-83 Spain estimated; 1983-86 Portugal estimated.

(5) Excluding Ireland, Greece and Luxembourg. 1987 United Kingdom estimated. 1988 Belgium, France and the Netherlands estimated.

Source: Eumabois; Eurostat (Comext).

ficult to estimate the volume, that is largely consumed domestically. Available world statistics fail to account for these countries except as an export market for other producing countries.

- The United States, despite its size, does not compile annual statistics on market trends concerning production and consumption.

Current situation

The EC is both the world's biggest producer and exporter of wood-working machinery.

This fact refers not only to quantity but also to wood working machinery technology, where the EC is in first place.

The European industry's favourable position is in part linked to the EC's relatively high standard of living and its housing sector that ensures a steady demand for transformed wood and helps to sustain the wood-working machinery industry. By contrast, countries with large forests in Africa, Asia, South America, Canada and Northern Europe, have a relatively small wood transformation industry owing to a lack of demand. Consumption and production of wood-working machinery in these countries are consequently low and operators mainly deal with wood before the transformation stage.

Production and consumption

As in most mechanical engineering industries, the wood-working machinery sector underwent a crisis at the beginning of the 1980s. Real production fell by 8% over a three-year period. In 1984 a recovery took place that was followed by strong growth in 1985, during which 1980 real production levels were surpassed. From 1984 to 1987 growth in real production was on average 7.5% annually.

Consumption and production trends are generally similar. Between 1980 and 1987 annual average growth rates in production and consumption were about 8%, in value terms.

The Federal Republic of Germany is beyond a doubt the largest national producer, not only in the EC but in the world as well. In 1987, German production reached ECU 1 134 million. Italian production, which in 1987 amounted to ECU 711 million, is enjoying sustained growth and is slowly catching up with the Federal Republic of Germany.

The United States and Japan are two important world producers. Their outputs are estimated at ECU 690 million and ECU 420 million, respectively. Japan holds a significant position as a supplier in the wood-working machinery sector, but it is not a driving force like it is in the metal machine tools sector.

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Production at current prices								
EC (1)	1 268	1 334	1 286	1 346	1 461	1 884	2 008	2 161
Index	67	71	68	71	78	100	107	115
Production at constant prices								
EC (1)	1 666	1 669	1 490	1 456	1 499	1 884	1 881	1 945
Index	88	88	79	77	80	100	100	103
EC trade at current prices								
Exports extra-EC (2)	494	578	542	535	706	823	901	865
Index (3)	61	72	67	66	86	100	109	105
Imports extra-EC (2)	77	71	77	87	112	115	136	156
Index (3)	69	63	68	77	97	100	118	135
X/M	6.37	8.11	7.04	6.15	6.31	7.14	6.64	5.56
Imports intra-EC (2)	280	246	261	283	349	407	454	590
Index (3)	73	64	68	74	86	100	111	145

(1) Excluding Greece, Ireland, Luxembourg and the Netherlands. 1980-83 Spain estimated; 1983-86 Portugal estimated.

(2) 1980-83 excluding Spain and Portugal as well.

(3) Taking into account changes in EC membership.

Source: Eumabois, Eurostat (Comext).

Table 3
World production, 1987

	million ECU
EC	2 175.1
Belgium	27.5
Denmark	5.8
FR of Germany	1 134.2
Spain	99.4
France	113.6
Italy	710.7
Netherlands	6.9
Portugal	14.8
United Kingdom	55.3
Other EC countries	6.9
EFTA	317.0
North America	779.6
Latin America	52.0
Asia, Oceania	693.0
Africa	8.7
World	4 025.4

Source: Eumabois.

In 1987, Western Europe accounted for 62% of world production and the EC, 54%.

External trade

Exports in 1987 from Western producer countries are estimated at more than ECU 1 800 million, about 45% of world production.

Table 4
Major exporting countries, 1987 (1)

	million ECU
FR of Germany	506.7
Italy	470.2
Japan	131.8
USA	104.5
Austria	86.4
Canada	64.0
Switzerland	62.0
France	45.5
Sweden	42.3
United Kingdom	39.6

(1) Excluding accessories and spare parts.

Source: UNSO (Comtrade).

The EC Member States alone accounted for between 72 and 78% of exports in 1987.

Moreover, the EC Member States met approximately 45% of world demand.

The EC's trade balance in general shows a surplus as net exports represented more than one-third of production in 1987. However, between 1980 and 1987,

imports grew faster than exports (10% compared with 8% on annual average). The result was a fall in the cover rate of imports by exports.

Table 5
Major importing countries, 1987 (1)

	million ECU
USA	257.0
France	122.3
Canada	105.2
FR of Germany	104.6
United Kingdom	92.4
Switzerland	81.0
Spain	72.2
Austria	67.6
BLEU	60.6
Sweden	49.7

(1) Excluding accessories and spare parts

Source: UNSO (Comtrade).

Employment

In the EC, the wood-working machinery sector employs some 40 000 persons, plus a further 20% under subcontracting arrangements.

Industry structure

The wood-working machinery sector mainly consists of small and medium-sized businesses and capital is mainly family-held. However, in the wake of the recession at the beginning of the 1980s, a tendency to create industrial groups emerged, particularly in the Federal Republic of Germany, Italy and the United Kingdom. In addition, manufacturers of heavy materials, i.e. panelling, are often part of groups or factory divisions working in other sectors.

Table 6
Structure of the industry, 1987

	Manufacturers	Employment
EC (1)	767	41 104
Belgium	12	1 266
Denmark	35	650
FR of Germany	240	22 200
Spain	91	1 932
France	47	2 060
Italy	296	9 730
Netherlands	10	295
Portugal	22	1 071
United Kingdom (2)	14	1 900

(1) Excluding Ireland, Greece and Luxembourg.

(2) 1988 figure for employment.

Source: Eumabois.

Technological development

The wood-working machinery sector was in the past closely linked to the rural world but has since integrated into the world of industry. Production by saw mills, furniture and reconstituted panelling plants, cabinet making, etc. requires large investments in high-technology machinery as well as management and production computer systems. This type of production is generally made up of flexible cells able to respond to diverse demand under optimal conditions of profitability.

Nevertheless, in a number of developing countries and some professional strata in the industrialized countries, in particular in the crafts industry, traditional wood-working machinery functioning on the basis of conventional concepts is still viewed as a standard investment that is compatible with market needs.

Outlook

Supply of raw materials raises no particular problem and intermediary and final consumption of wood should remain buoyant in the future.

The emergence of reconstituted wood (particle panelling, etc.) for industrial uses has, owing to its uniformity, helped to revive competition with substitute products such as plastic and metal. Reconstituted wood also has some significant technological advantages such as fire resistance and ease of machining.

Wood's major asset at the final consumption stage is that it is a noble material.

Wood transformation industries in the EC have in general fared well, although a lot remains to be done in the crafts industry.

The wood-working machinery and related sectors, such as seasoning, handling, management, etc. are expanding rapidly in response to needs on the European market, where modernization will be pursued in the forthcoming years. A growth rate in European production of 4% per year in constant terms is certainly possible.

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LIQUID PUMPS

(NACE 328.3)

Summary

EC pump production has shown signs of recovery since 1984 against a background of ongoing technological changes in the industry. Growth in demand has come mainly from within the EC. However, net export earnings have been relatively stable over the 1980s. The fastest growing market segments are reciprocating and rotary pumps.

Description of the sector

The manufacture of liquid pumps comes under the NACE code 328.3. Other items are included in this NACE category but the information and statistics below exclusively cover the manufacture of liquid pumps. This includes the following:

- hand pumps
- reciprocating pumps
- rotary pumps
- centrifugal pumps
- other pumps
- parts for pumps.

Current situation

1988 turned out to be a rather good year for the European liquid pump industry. Production grew by nearly 8% in value (4% in constant prices) and this growth was fed both by an increase in European consumption (more than 14% in value) and by a growth in exports (11% in value). The development of the pump market in 1988 mainly originates in the

outstanding growth in investment particularly in the manufacturing industry.

Production and consumption

The European liquid pump real production decreased continuously between 1981 and 1983, as a result of the general slump in economic activity. 1984 and 1985 experienced a slight recovery, followed by a new two-year slow-down. Despite 1988's upturn, the production level of 1981 has still not been recovered.

In current prices, production in 1988 is superior to production in 1981 reflecting price increases. However, pump prices increased slower than inflation over the 1981-88 period.

Centrifugal pumps represent more than 50% of the sector's turnover. It is not however the most dynamic element of the industry as its real production decreased markedly over the 1981-88 period. Reciprocating and rotary pumps, on the other hand, together account for only 30% of the sector. But, over the 1981-88 period, both managed to post an average annual growth exceeding 6% in real terms.

The Federal Republic of Germany is by far the first European producer, followed by the United Kingdom and Italy. German leadership is mainly explained by a very strong export position. As can be seen in Table 3 the FR of Germany is the market leader in all sorts of pumps, except for the 'other pumps' category for which the leadership goes to the UK.

Table 1
Main indicators, 1981-88 (1)
Liquid pumps

(million ECU)	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	2 498	2 629	2 326	2 588	2 984	2 971	3 132	3 584
Net exports	992	1 039	1 059	1 032	1 101	1 143	992	856
Production	3 490	3 668	3 385	3 620	4 085	4 114	4 124	4 440

(1) Excluding Ireland and Portugal.

Source: Europump.

Table 2
Pump production by country, 1981-88 (1)

(million ECU)	1981	1982	1983	1984	1985	1986	1987	1988
EC (2)	3 490	3 668	3 385	3 620	4 085	4 114	4 124	4 440
Belgium	62	59	57	56	65	60	54	52
Denmark	143	145	153	161	171	182	192	194
FR of Germany	1 306	1 378	1 400	1 510	1 643	1 801	1 834	1 949
Greece	24	31	24	26	29	28	30	28
Spain	54	65	59	67	61	69	67	70
France	412	439	457	484	609	508	497	572
Italy	597	629	432	483	564	597	621	640
The Netherlands	157	163	135	136	125	152	151	155
United Kingdom	734	759	668	697	817	717	678	779

(1) Including parts.

(2) Excluding Ireland and Portugal.

Source: Europump.

Table 3
Pump production by market segment, 1988

(%)	Hand pumps	Reciprocating pumps	Rotary pumps	Centrifugal pumps	Other pumps	Total original equipment	Parts	Total production
Belgium	0.0	.4	.3	.9	2.1	.8	2.3	1.2
Denmark	2.4	1.1	4.1	4.0	1.5	3.3	8.2	4.4
FR of Germany	50.6	83.1	58.8	36.3	22.0	46.1	36.1	43.9
Greece	30.6	0.0	0.0	0.0	2.9	.8	0.0	.6
Spain	.2	.1	.4	2.5	1.1	1.7	1.3	1.6
France	4.5	4.7	11.1	19.4	1.4	13.9	9.3	12.9
Italy	0.0	5.6	15.2	21.7	0.0	15.8	9.8	14.4
The Netherlands	0.0	0.0	0.0	2.1	10.9	2.2	7.9	3.5
United Kingdom	11.8	5.0	10.2	13.0	58.1	15.3	25.3	17.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Production (million ECU)	62.9	579.1	464.6	2 032.7	312.1	3 451.3	988.2	4 439.6
Share	1.4	13.0	10.5	45.8	7.0	77.7	22.3	100.0

Source: Europump.

Table 4
Production and external trade (1)

(million ECU)	1981	1982	1983	1984	1985	1986	1987	1988
Production in current prices								
EC	3 490	3 668	3 385	3 620	4 085	4 114	4 124	4 440
Index	85	89	82	88	99	100	100	108
Production in constant prices								
EC	4 423	4 255	3 714	3 791	4 085	3 951	3 794	3 942
Index	112	108	94	96	103	100	96	100
EC trade in current prices								
Exports extra-EC	1 502	1 588	1 614	1 691	1 882	1 698	1 662	1 849
Index	88	94	95	100	111	100	98	109
Imports extra-EC	399	452	430	493	595	490	552	649
Index	81	92	88	101	121	100	113	132
X/M	3.76	3.51	3.75	3.43	3.16	3.47	3.01	2.85
Imports intra-EC	800	916	915	1 027	1 159	1 211	1 368	1 447
Index	66	76	76	85	96	100	113	119

(1) Excluding Ireland and Portugal.

Source: Europump.

Trade

The European Community is a net exporter of liquid pumps but the trade surplus has been decreasing since 1987. Following the fall in the US dollar, exports, which had been constantly rising in nominal terms since 1981, started decreasing in 1986 and 1987.

Traditional markets have been countries outside the EC. However, since 1981, there has been a shift in trade towards the EC market, as a result of the slower growth in demand elsewhere; trade between Member States grew at an average annual rate of 9% between 1981 and 1988 (against only 3% for extra-EC exports). Exports to the Middle East, where orders have decreased as a result of the slump in oil prices, fell, as did exports to the rest of the third world, where demand has, for the most part, been constrained by foreign exchange difficulties.

Technological development

Reorganization in the industry is continuing, particularly with regard to the following areas:

- (i) the rationalization of the pump industry in terms of labour-saving technology (computer-controlled machine tools) will continue. Moreover, this development has taken place in the face of fierce competition, where the key to market dominance lies in better and more cost-efficient technology. As a result, there will be a steady decline in employment levels;

- (ii) there has also been a change in the types of materials used — more plastics and steel instead of casting;
- (iii) finally, more control pump systems are being developed, which has increased value-added in the sector. Variable speed control is also being introduced; this is still expensive but holds strong growth potential.

There are only a few European company groupings such as KSB or Gunfas. Most manufacturers are small companies serving market niches.

Outlook

The impact of the single market is likely to be particularly felt by the medium-sized companies. To remain competitive, they will need to look for joint ventures in other EC countries.

Despite close coordination among national associations in the European pump-producing countries, certain barriers to intra-trade still persist. It is hoped that such barriers will be removed as a result of the harmonization of trade rules by 1992.

The completion of the internal market should enhance the ability of manufacturers to adjust to an expanded domestic demand base, as well as to compete successfully on world markets.

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ELECTRICAL AND ELECTRONIC ENGINEERING

(NACE 34)

Summary

The dominant position enjoyed by the electrical and electronic engineering sector within European industry as a whole can be traced to the importance of its production and to its position as a key supplier to most other branches of industry. After a period of stagnation in the early 1980s, the sector started recovering in 1984, helped by major cuts in the labour force and resultant productivity gains. Major structural changes have taken place and will continue to occur, with the emergence of microelectronics. This moreover creates considerable growth potential for all information technology related products, but will also alter the nature of production within traditional industries, be they electrical or otherwise. The mounting importance of microelectronics is an asset in the medium and long-term development of the EC electrical industry. However, the latter is still afflicted with certain handicaps, including a cost structure which is less competitive than those of its main rivals, low specialization and a heavy dependence on foreign producers in the area of electronic components.

The importance of the industry for the European economy

The electrical industry (NACE 34) covers all electrical and electronic products, with the exception of computers. Nevertheless, because of its extraordinarily rapid development over the last few years, the

electronics industry will be dealt with in detail in a separate chapter (12) along with computer hardware. For statistical reasons, however, the general description of the sector below covers both the electrical and electronics industries.

Current situation

As supplier to most other branches of industry, and because of the technical and scientific variety of its products, the electrical industry holds a key position in the European economy. Both in terms of its production volume and its labour force, it represents one of the EC's chief industrial sectors. Its development is characterized by a generally above average rate of growth. In 1988, the electrical industry employed over 2.4 million people, producing sales and export volumes of around ECU 190 billion and ECU 37 billion respectively.

When measured by the size of its labour force, the electrical industry in Europe is similar to that of the United States and Japan. However, the level of production in the EC is well below that of Japan. Without doubt, the fundamental reason for this situation is the difference in product specialization. As far as exports are concerned, the electrical industry of the Community comes second behind Japan but ahead of the United States. The EC also takes second place in the area of imports. According to some estimates, the electrical equipment market in the EC, at around ECU 200 billion, corresponds to roughly one fifth of the world market. However, this

Table 1
Main indicators, 1980-89
Electrical and electronic engineering

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	99 857	107 442	116 558	124 231	138 491	152 863	160 822	169 100	185 315	199 094
Net exports	6 305	6 231	6 703	6 680	6 612	6 938	5 683	2 075	-1 642	-3 805
Production	106 596	114 105	123 790	131 509	145 894	160 965	168 264	174 315	187 816	199 876
Employment (1 000)	2 705	2 570	2 472	2 388	2 381	2 396	2 393	2 406	N/A	N/A

Source: ZVEI.

Figure 1

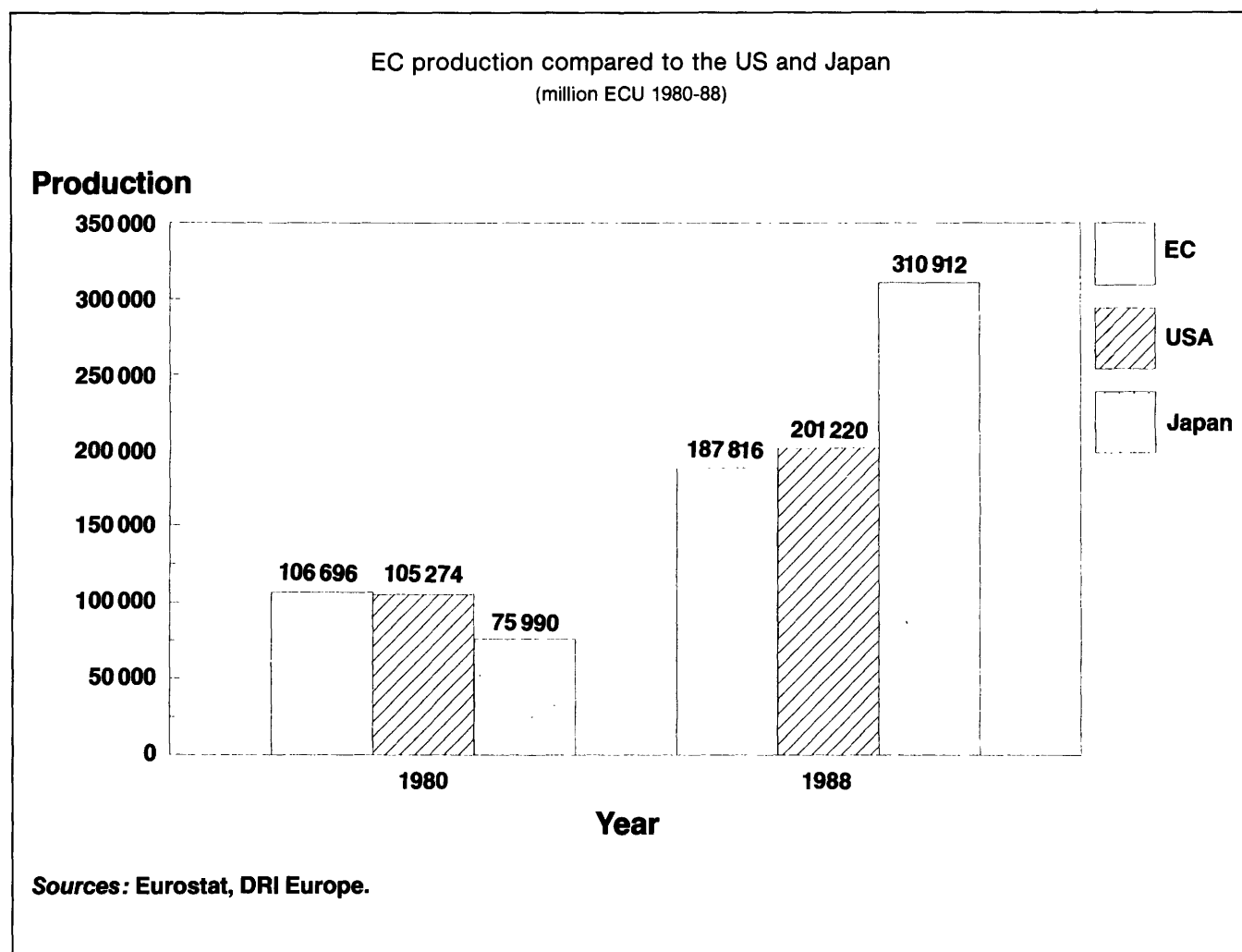


figure conceals a multitude of different products and technologies, as well as isolated regional markets.

Production and consumption

The electrical industry has been an engine of growth within the Community's economy. Like the rest of the economy, it experienced its fastest growth in the 1960s, shortly after the EC came into being. At that time, like today, its growth was higher than the average for the economy, and so was the rise in exports.

The growth of the 1960s gave way to a steep decline in the first half of the 1970s, following the first oil crisis. On the other hand, the second half of the 1970s was marked by sustained growth, though not as fast as in the 1960s. This was followed by severe losses up to 1982, before a recovery occurred between 1982 and 1986 and again in 1988. Over the coming years, the outlook for the electrical industry is one of some prosperity.

During the 1980s, this sector has been the scene of considerable structural changes as a result of the emergence of electronics. Since 1983, in particular, electronic sectors have acquired increasing importance. Expansion in these sectors has been extremely rapid over the last few years, whilst their total production is currently higher than that of conventional electrical engineering, the products of which are, moreover, becoming electronized. Since 1983, the sectors of household appliances and lighting products have also registered significant growth levels, albeit markedly lower than the electronics sector.

The statistical material available does not explain the development of the electrical industry in a satisfactory way. In addition to the industry performance shown in the statistics, the electrical and electronic industry increasingly provides services of which no proper method for statistical coverage exists. These services are partly invoiced to customers as project or engineering work, software development, financial consultancy, maintenance and training, and are included in the total sales volume. Yet a large part of these costs is concealed in plant and equipment prices. Therefore, their volume cannot be precisely

determined and can vary from product to product, often from company to company, and even from one order to another.

Industrial services have taken on considerable importance with the rapid advance of electronics. They are critical to an increasingly high number of engineering growth-intensive areas. What is more, the integration and interaction of different product areas increasingly involve user-specific solutions and therefore service-intensive. Many employees are already responsible for such services, and their contribution to turnover is correspondingly high.

The financial situation of electrical and electronic companies has generally improved due to economic development though starting from a very low level. Nevertheless, the cost structure remains unfavourable compared with that of the main competitors, especially NICs. In particular, the rate of utilization of production capacities in Europe remain relatively low, and this underpins the trend to shift investment to third countries and/or to intensify purchases of intermediate products from third countries. Ultimately, this has negative repercussions on employment.

The wide range of products of the electrical industry reach an equally varied clientele. The products are

used directly in households, meet intermediary demand, or are purchased by industry as supplies or capital goods. A considerable proportion of electrical engineering products is however used by the sector itself, which, to some extent, is its 'best customer'. Thus, most electronic components, for example, are processed in electrical engineering workshops. A considerable share of the production of electric motors, command and measuring devices is also used within the electrical industry itself. Electrical engineering products account for more than one third of overall investments in the electrical industry.

Electrical engineering products notwithstanding, non-ferrous metals and semi-finished steel products top supplies of intermediate goods from other branches of industry. Other chief supplies of the electrical industry are, in descending order of importance: mechanical engineering, the chemical industry and the plastics processing industry.

Employment

Employment in the electrical industry declined steadily from 1980 to 1984. The recovery in the second half of the 1980s meant merely a stabilization of the labour force. Concurrently, the employment

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC	106 696	114 105	123 790	131 509	145 894	160 965	168 264	174 315	187 816	199 876
Index	66.2	70.9	76.9	81.7	90.6	100.0	104.5	108.3	116.7	124.2
USA (1)	105 274	140 316	167 144	197 283	261 730	277 124	217 651	195 973	201 220	249 637
Index	38.0	50.6	60.3	71.2	94.4	100.0	78.5	90.0	72.6	90.1
Japan (1)	75 990	112 268	120 788	157 766	218 304	220 032	237 571	249 232	310 912	N/A
Index	34.2	50.6	54.4	71.1	98.3	100.0	107.0	122.2	140.0	N/A
Production in constant prices										
EC	145 244	142 761	142 467	143 327	152 242	160 965	163 309	164 320	169 536	174 345
Index	90.2	88.7	88.5	89.0	94.6	100.0	101.5	102.1	105.3	108.3
EC trade in current prices										
Exports extra-EC	20 489	23 573	26 729	28 908	33 398	36 416	35 041	35 997	37 211	39 253
Index	56.3	64.7	73.4	79.4	91.7	100.0	96.2	98.9	102.2	107.8
Imports extra-EC	14 184	17 342	20 026	22 228	26 786	29 478	29 358	33 922	38 853	43 058
Index	48.1	58.8	67.9	75.4	90.9	100.0	99.6	115.1	131.8	146.1
X/M	1.44	1.36	1.33	1.30	1.25	1.24	1.19	1.06	0.96	0.91
Imports intra-EC	18 323	19 558	21 966	24 083	28 331	32 079	35 700	36 602	40 525	44 297
Index	57.1	61.0	68.5	75.1	88.3	100.0	111.3	114.1	126.3	138.1

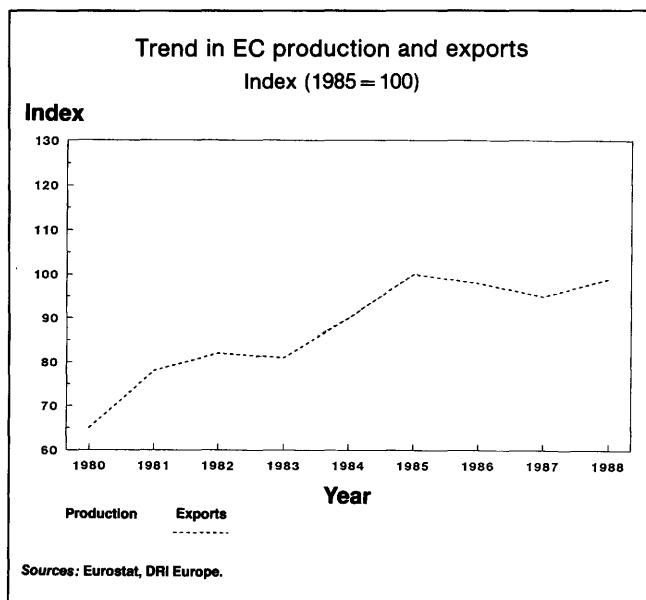
(1) Census of Manufactures and Eurostat estimates.

Source: ZVEI.

structure changed, requiring better qualified employees such as engineers, technicians and software specialists.

Productivity increases registered since the early 1980s, following production and employment developments, have occurred at a very fast pace. This progress is largely due to technical innovations and their impact on products and production processes within the electrical industry.

Figure 2



External trade

Growth in the European market of the electrical industry in the 1980s has been faster than growth in European production. The import penetration ratio continues to rise, climbing from 14.1% in 1980 to

almost 19% in 1988. United States imports show a similar trend, rising from 12.6% in 1986 to 19.4% in 1988. Conversely, Japanese import levels have changed only slightly; indeed, at 3% in 1986, they were even lower than at the beginning of the decade. On the other hand, EC electrical industry exports, which stood at 19.2% in 1980, kept rising slightly up to 1985 before resuming their initial level, while Japanese exports (25.4% in 1980) have remained almost unchanged, dropping 22.2% in 1986. During the same period, US exports fell from 14.1% to 11.3%.

Even though the major fluctuations in exchanges rates between 1980 and 1988 make any comparison between the United States, Europe and Japan virtually impossible, the figures for 1986 nevertheless reveal certain clear differences between the three trading blocs.

With ECU 244 billion, the US market exceeded that of the Community (ECU 160 billion) by nearly a third, while US and Japanese production were relatively close, with ECU 218 and 238 billion respectively. On the other hand, there were enormous differences in foreign trade between these two countries: ECU 49 billion made Japan the largest exporter, followed by the EC (ECU 35 billion) and the United States (ECU 25 billion). At the same time, Japan was also the smallest importer with less than ECU 6 billion; once again, the EC ranked second (ECU 29 billion) ahead of the United States (ECU 47 billion).

Differences in the production structures of the three trading blocs are made evident when exports of principal products are examined. Thus, more than 40% of Japanese exports consist of so-called 'entertainment' electronics. Indeed, the Japanese industry

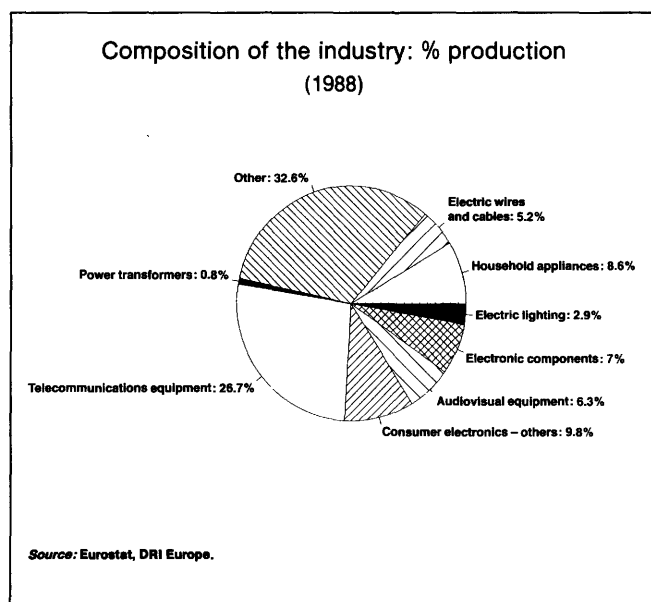
Table 3
Employment

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
EC	2 705	2 570	2 472	2 388	2 381	2 396	2 393	2 406	N/A	N/A
Belgium	74	69	64	62	62	61	61	59	55	54
Denmark	32	29	29	29	31	34	35	36	35	35
FR of Germany	944	918	881	845	855	898	934	942	950	953
France	440	429	427	413	404	389	370	356	340	330
Greece	16	16	16	17	17	17	16	16	15	15
Spain	102	98	95	93	92	92	94	93	93	92
Ireland	13	14	15	14	15	15	16	15	16	15
Italy	268	258	245	229	205	198	198	196	193	192
Luxembourg	1	1	1	1	2	2	2	2	2	2
Netherlands	117	112	112	109	110	116	117	121	N/A	N/A
Portugal	33	32	31	31	31	29	28	28	27	26
United Kingdom	6655	594	556	545	557	545	522	542	540	524

Source: ZVEI.

accounts for two-thirds of world exports in this sector. American exports are also concentrated on the electronics sector. The European electrical industry, on the other hand, does not hold a dominant position in any market segment, being present in virtually every sector. Approximately two-thirds of world exports of electrical engineering exports consist of capital goods, with another quarter of consumer goods and one-tenth of components. The structure of European exports largely corresponds to this distribution pattern.

Figure 3



The volume of intra-Community trade now exceeds trade with third countries. This trend is expected to be bolstered even further by the completion of the single market.

Description of the industry

As already mentioned, the electrical industry encompasses electrical engineering, including electronics. Production covers both capital, consumer and intermediate goods, though capital goods are predominant, accounting for about two-thirds of the total production. They include high power technology products (production, processing and power supply appliances), communication, measuring, command, tuning and automation devices, electro-medical devices and electronics equipment for air and space navigation vehicles. The most dynamic market segments these last few years have been measuring, command, tuning and automation electronics, telecommunications and electronic equipment. Consumer goods — household, electronic entertainment

and lighting appliances — account for about one fifth of production.

Lastly, electronic components, with their all too important role in the technical and economic development process, are the strong point of intermediate products.

Table 4
Production shares by Member States, 1987

(%)	Share
Belgium	2.4
Denmark	1.3
FR of Germany	39.4
Greece	0.4
Spain	5.8
France	15.0
Ireland	0.5
Italy	10.8
Luxembourg	0.1
Netherlands	5.8
Portugal	0.5
United Kingdom	18.1

Source: ZVEI.

In the last few years, the production structure of the electrical industry had to adapt more and more rapidly to the vast array of technological developments and their applications. New markets and technologies have in turn forced major relocation efforts on this sector. Nevertheless, the development of sub-sectors differs greatly, especially in electronics: these products become extremely cost effective within short periods of time. New areas of application are being developed while pressure from third-country imports is becoming more pronounced due to the international division of labour.

Structure of the industry

The image of the electrical industry that the general public has is strongly influenced by the names and services of big corporations which capitalize on their long tradition and early pioneering work. Yet this image is misleading, as there are many companies in this sector which have grown enormously and rapidly in terms of the number and variety of their products, in nearly every country. As a matter of fact, many younger companies have established themselves in this market with recent products, diminishing thus the importance of the major corporations; nevertheless, the latter still account for about one-third of the market in the EC. Companies with 1 000 to 10 000 employees, though only a small part of the total number of companies in the sector, con-

tribute to production and employment in an above-average proportion; whereas companies with less than 200 employees, which represent 90% of the total number of companies in the sector, account for less than one-fifth of total production.

A growing number of company mergers and realignments have taken place in the electrical engineering sector. Direct capital ventures at international level notwithstanding, cooperation and association agreements for research and standardization purposes are gaining currency.

Geographical characteristics

In 1988, current price production among the Member States was as follows:

Within each Member State, production is particularly concentrated in certain regions: the *Länder* (states) of Baden-Wurtemberg, Bavaria and North Rhine-Westphalia in the Federal Republic of Ger-

many, the Paris Basin in France, Northern Italy, and the South-West, West Midlands and North-West regions of the United Kingdom are equally important areas.

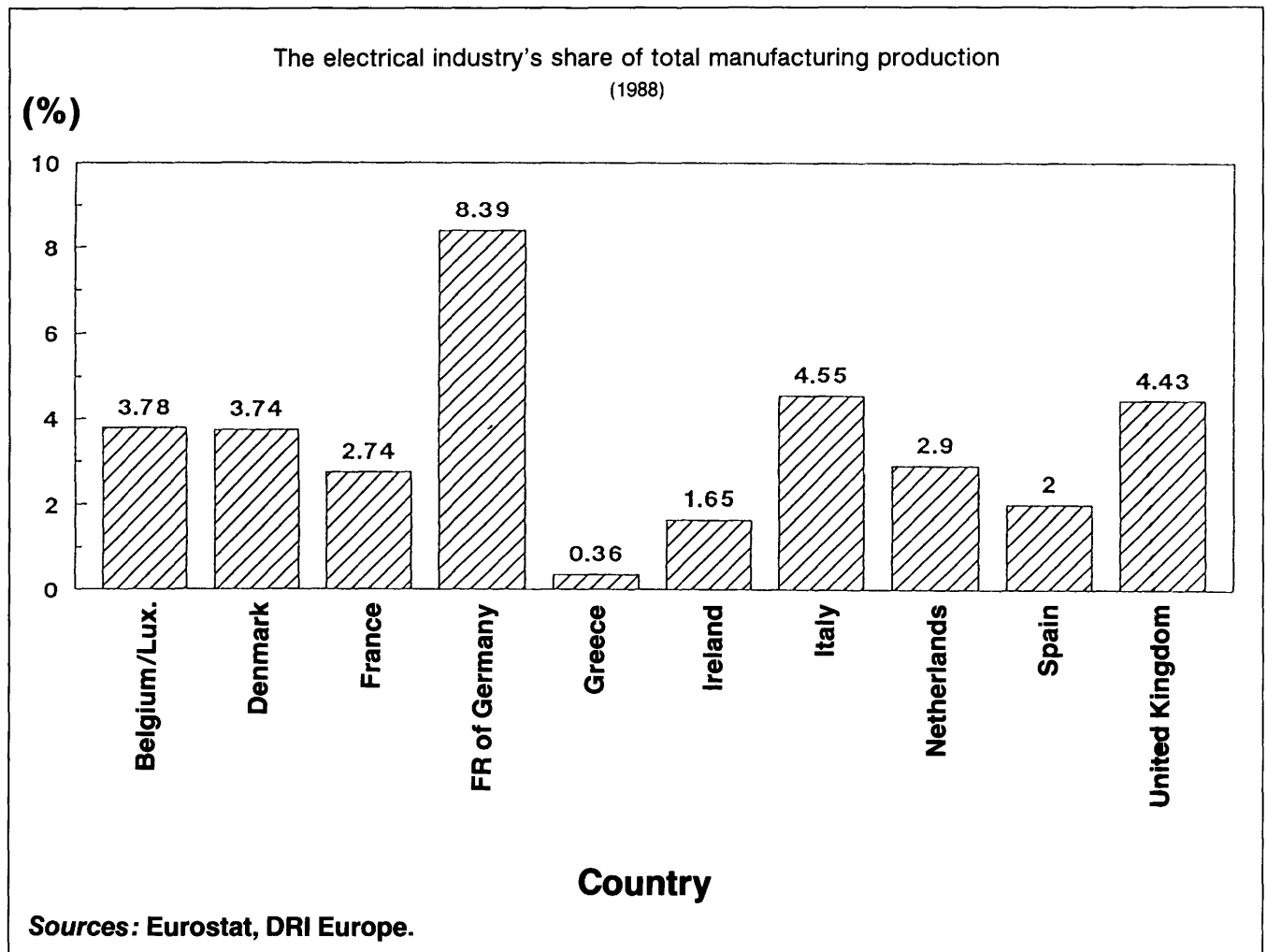
A comparison of the average growth of the electrical industry with GNP shows that Spain has improved its position in a decisive manner, while Ireland, the United Kingdom, the Federal Republic of Germany and the Netherlands have also registered growth rates slightly above the average.

Outlook

The trends which have characterized the electrical industry since the early 1980s will condition future development as well. Structural transfers introduced to improve technological production processes are pointing to relatively favourable prospects for growth.

In microelectronics, which is still in full expansion, the electrical industry has found a technology with

Figure 4



exceptionally vast and innovative applications. By far the leading application of electronics is computing. Microelectronics are used in the production, processing, transport, storage and availability of information. As a result, it is a vital link for information exchanged between people, people and machines and even between machines. The effects of microelectronics on the entire economy attest the fundamental importance of this innovation. There are essentially five industrial sectors which require microelectronics: mechanical engineering, the automobile industry, the electrical industry itself, office automation and information technology, and precision and optical equipment. In the wake of advances made by microelectronics, data processing, telecommunications and automation are entering a new phase.

A great number of problems can only be solved by using microelectronics, a technology that regularly offers altogether original possibilities of application. Nor is its impact simply limited to restructuring our working environment; but it is also creating new, different ways for obtaining and making the most of useful information in our daily lives and in education. The type of configuration of these information systems and their contents require, in addition to appropriate technical conditions, political decisions that will affect the future of society, and must therefore be afforded a reasonable amount of time to be developed fully.

Like new materials, the field electronics and microelectronics, not only occupies a key position for the development and competitiveness of the European economy, but is also a market for new raw materials. In 1987, the world market in semiconductors passed the ECU 26 billion mark. In 1987, the Japanese market ranked first with share of 38%, followed by the United States with 34% and western Europe with 20%.

The share of microelectronics in the industry's overall sales volume is only 0.5%, but this tiny figure has a considerable impact on the economy as a whole. The leverage effect of microelectronics is constantly increasing. Consequently, it is of pivotal importance for Europe to have the latest development, production and application capacities in this sector. The fact of the matter is that Japan has already carved for itself a dominant position on world microelectronic component markets, with shares that at times exceed 90%. In the process, that country has built up advantages in apprenticeship effects and economies of scale which are increasingly difficult to contest. Development and produc-

tion costs are rising sharply as miniaturization and performance are enhanced. The development and production of microelectronics require an enormous industrial infrastructure, from raw materials to microchemistry and on to the means of production. Without sustained, strong expansion of applications, manufacturers and users alike may well suffer regular decline of competitiveness.

Table 5
Main indicators, 1989-95

	Share 1989	% changes			Compound growth 1989-95
		1989	1990	1991	
Europe 4					
Production	100	6.2	4.8	5.5	4.8
Apparent consumption	100	7.3	5.1	5.4	5
FR of Germany					
Production	48.2	6.3	4.1	5.6	4.3
Apparent consumption	42.5	5.8	4.4	6.1	5
France					
Production	18.2	6.6	4.3	5	4.3
Apparent consumption	19.8	5.9	5.1	4.3	4.6
United Kingdom					
Production	18.9	7.5	8.1	6.2	6.3
Apparent consumption	23.3	14.3	6.9	5.4	5.7
Italy					
Production	14.8	3.5	3.2	4.6	4.8
Apparent consumption	14.4	3.1	4.5	4.7	4.4

Source: DRI/Europe.

In Europe, fewer computer products are manufactured than are actually used. Europe accounts for about 30% of the world market in computer products and services. A negative balance of trade of ECU 19 billion in this field makes Europe a net importer of computer products. A considerable part of the demand for microelectronic components is met by imports, chiefly from the Far East, while Americans lead in software technology. Of the 15 most powerful firms in the world market (in terms of sales) today, nine are American. These firms operate on a worldwide scale. The same is true of data processing, where up to 70% of the demand is covered by imports essentially from the United States.

Technical development, which is making rapid headway, is conditioned by a pursuit, an acceleration even, of the current and anticipated growth in the telecommunications market for the next 10 years. The application of research and development results which aimed at improving existing products and systems and developing new ones, opens up a wide spectrum of possibilities for expansion.

- microelectronics;
- opto-electronics;
- light wave guidance;
- storage and laser technology.

The proliferation of new technologies in all areas of modern life and the quality of their growth entail profound structural changes which in turn exert an everincreasing influence on the economy, the State and society. Several important trends can be identified. Thus, the software sector is growing approximately three times faster than the overall demand for electrical engineering and electronic devices. Consequently, the value of this 'knowledge' has already become an indispensable factor in macroeconomics. Economic growth is increasingly determined by the integration of software with hardware, requiring the use of integrated circuits of increasing complexity and for specific purposes. These trends signify a new type of economic growth, with low consumption of raw materials and little environmental damage. At the same time, the rational 'production' of software is becoming more and more important for the competitiveness of the European economy. In conclusion, attention must be paid to the fact that the integration of systems is encountering even greater demands, such as the interconnection of computer and telecommunications systems, for example. Improved numeracy, more and more powerful pro-

cessors, recording densities raised to vast proportions as well as higher transmission speeds — ISDN and wide-band networks for instance — are the driving forces behind this progression. Such integration is facilitating the progressive development of the world telephone network, which at present has some 600 million subscribers, into a universal communications network that will integrate voice, text, data and images. A project of such scope calls for global standards. Nevertheless, these efforts must not be limited to just creating networks with suitable interfaces. The various terminals must also be able to communicate with each other. They should be able to understand each other and thus speak a common language; furthermore, these appliances should be more user-friendly.

The trends outlined clearly show that information technologies play an essential role in the economy. In view of the finite nature of raw material reserves in particular, the pursuit of growth and, consequently, economic well-being are increasingly dependent on this industry and its competitiveness on a world-wide scale.

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INSULATED WIRES AND CABLES

(NACE 341)

Summary

The European Community has a large production capacity in all types of insulated wires and cables, extensively distributed across all Member States. There are over 100 companies making cables in more than 250 manufacturing facilities, with a work-force in 1988 of over 110 000. EC cable-makers are well able to meet domestic requirements both technically and in terms of volume: in a sector characterized by an enhanced commodity in a mature market with well-established local manufacture, there is already a high degree of interaction with a well-developed system of intra EC trading. The EC cable industry uses large quantities of two strategic raw materials: copper and aluminium.

Current situation

Europe is the cradle of the world cable industry: manufacture started here in the nineteenth century and has continued, with European cable-makers still amongst world leaders in innovation, technology and investment, which enables them to maintain a strong base in traditional products and markets. While 1988 was generally a good year on national markets, the outlook in the short and medium-term is for continuing stability with certain newer applications such as information technology demonstrating more dynamic characteristics.

Export prospects are limited by competition and the availability of credit, while imports continue to make substantial inroads (although still constituting less than 10% of domestic demand). European cable-makers expect to maintain their strong position and the trade balance should remain favourable.

The structure of the market, within and outside the Community, continues the process of gradual change, with significant recent moves by major players.

Description of the sector

Markets for insulated wires and cables are extremely diverse: without cables the whole of the modern way of life would be impossible. They have applications in virtually every aspect of modern life, however banal or spectacular; from the winding wire in the electric shaver in the morning to the optical fibre providing the basis of the afternoon telephone call and the computer link for payment of the electricity bill. Behind all this there is the basic infrastructure of energy generation, transmission and distribution. The family of cable products are similar in the manufacturing process but differ in technology, markets and industrial structure.

Electrical energy cables are fundamental to all industrial and commercial activities and to domestic life in all parts of the Community. Wires and cables supply energy from the centres of electricity generation to the individual point of utilization. The markets are generally well developed with cables at a high level of technology. Within the Community the level of demand is highly sensitive to increases in demand for power, requirements of new generating/transmission facilities, demand related to finalization of infrastructure in less-developed areas and the ever-present need for replacement and upgrading.

Winding wires are used in all forms of electrical equipment where a magnet is required. Thus every electric motor, dynamo, etc., requires magnet or winding wire that is enamelled or otherwise insulated. Most products are marketed to OEMs.

Table 1
Main indicators, 1985-91
Insulated wires and cables

(million ECU)	1985	1986	1987	1988	1989	1990	1991
Apparent consumption	7 521	8 395	8 998	10 535	10 998	11 015	10 930
Net exports	816	642	439	308	300	297	295
Production	8 337	9 036	9 427	10 843	11 298	11 311	11 224
Employment (1 000)	116	114	114	111	110	109	108

Source: Europowercab, Eurotelcab and European Enamellers Council.

Information cables have two main outlets: in telecommunications, where current demand is strong, reflecting the massive surge in demand for new telephones as well as the more complex requirements of the new communications systems in commerce and industry; and the multifaceted area of cables for electronic data/control applications and broadcasting, which is experiencing strong growth in response to the increasing demand for I/T systems. Telecommunication cables are crucial to many of the latest developments in information technology. Ranging from simple wires connecting telephone handsets to the wall, to armoured cables, coaxial cables and submarine cables, this group covers a large variety of products.

Production trends

Europe's production capacity is well above current demand. Improvements in technology, better production techniques and diminishing export opportunities have generally led to under-utilization of capacity.

However, European cable manufacturing is a highly dynamic industry:

- Through R&D activity (based on an estimated 5% turnover), Europe has achieved a world lead, drawing from a wide gamut of technology (non-ferrous metallurgy, insulation physics and rubber chemistry, high-tech materials, superconductivity and electrical engineering for power cables with

optical-fibre cables technology for telecommunications cables).

- Optical-fibre cables probably represent about 20% of the output of telephone cable-makers. Manufacture is based on cable-making, not on glass-making or copper-drawing or telecommunications equipment manufacture, all of which require different technologies. All optical-fibre cable-makers in Europe also produce copper telecommunications cables and most also make energy cables.

Figure 1

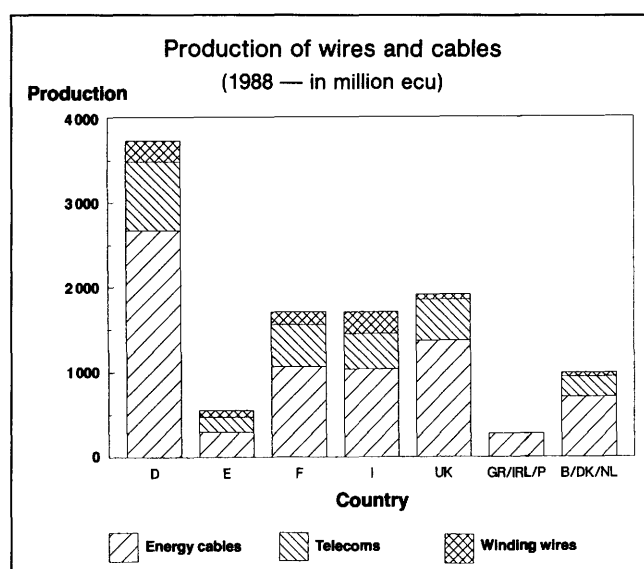


Table 2
Production by type of product

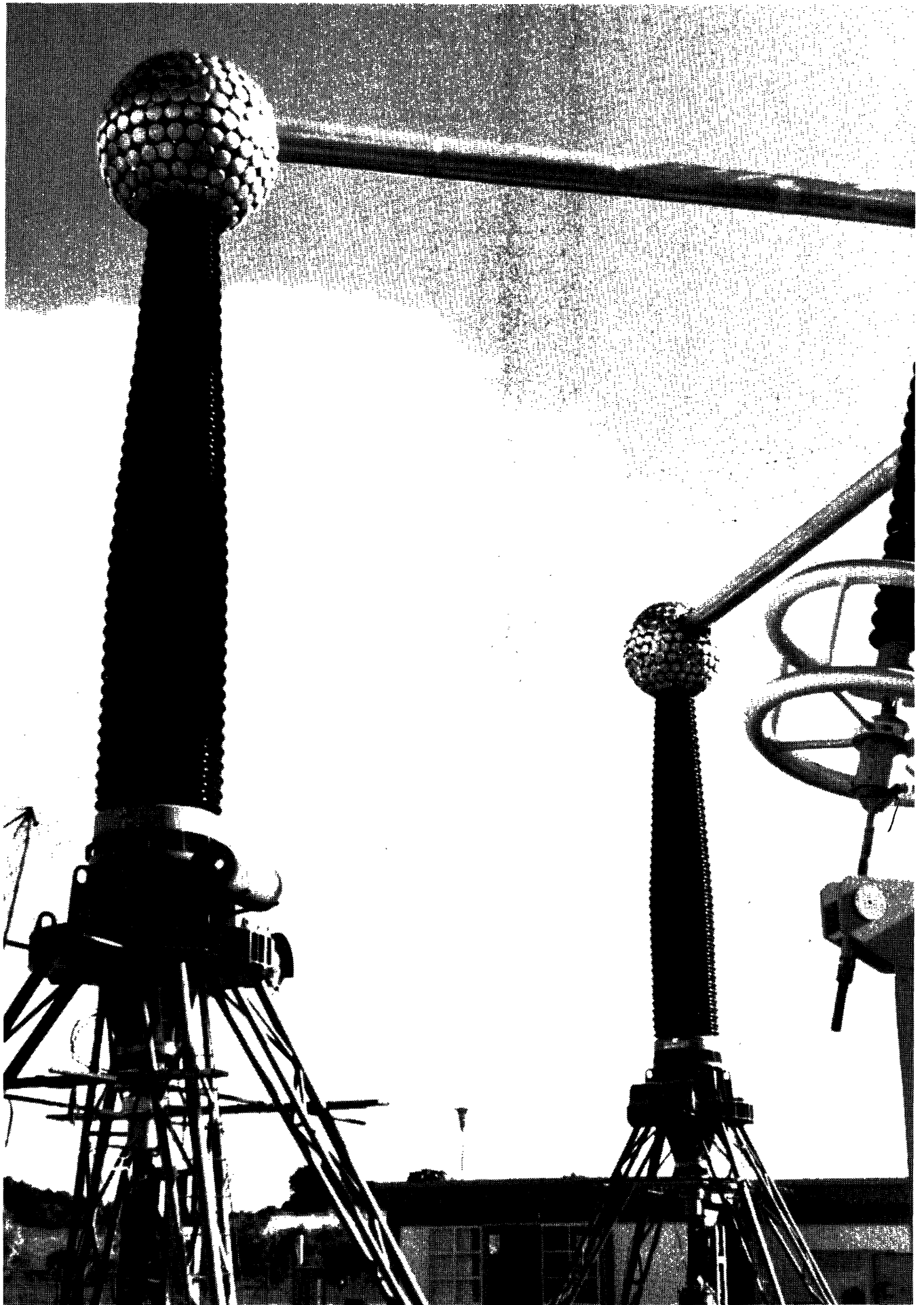
(million ECU)	1986	1987	1988	1989	1990	1991
Energy cables	6 281	6 525	7 405	7 706	7 814	7 876
Telecommunication cables	2 118	2 275	2 606	2 731	2 617	2 465
Winding wires	637	627	832	861	880	885
Total	9 036	9 427	10 843	11 298	11 311	11 224

Source: Europowercab, Eurotelcab and European Enamellers Council.

Table 3
Production by country

(million ECU)	1986	1987	1988	1989	1990	1991
Belgium, Denmark and the Netherlands	854	854	988	987	975	959
FR of Germany	3 055	3 288	3 728	3 808	3 779	3 828
Greece, Ireland and Portugal	252	260	272	283	295	304
Spain	434	440	549	559	581	389
France	1 588	1 494	1 702	1 724	1 710	1 713
Italy	1 300	1 482	1 699	1 924	1 994	2 054
United Kingdom	1 554	1 608	1 906	2 014	1 978	1 978

Source: Europowercab, Eurotelcab and European Enamellers Council.



● Information cables

The introduction and development of optical-fibre technology in the market-place has been rapid and such links are now installed on most of the busy inter-city networks in Europe. A recent estimate indicates that about 70% of all long-distance calls in Europe are now transmitted over optical fibre over a part of their distance. Although predominant in long-distance connections, optical fibres are less viable over short distances despite the continuing decrease in the price of fibre.

● Electrical energy cables

At present the main areas of technical development in cable in Europe are concerned with improving manufacturing techniques, improved insulation (for efficiency/ effectiveness), improved safety in use (fire and fume hazard), better materials utilization, and technology barriers (e.g. superconductivity).

Strategic raw materials

Cables for all outlets require two important raw materials for which there is no European Community source: copper and aluminium. Across all applications, usage of these two strategic metals is as follows: copper — over 1 million tonnes; aluminium — about 150 thousand tonnes. The cable industry and the cable market are, therefore, vulnerable to the availability of these materials and the instabilities created by fluctuating prices.

Insulation materials, plastics and elastomers, as well as aluminium, steel and tin/lead are needed also in substantial quantities to service the cable industry.

● Telecommunications cables

Over the past decade, consumption of telecommunications cables in Europe in money terms has risen from about ECU 1 500 million in 1980 to ECU 2 000 million in 1987, an increase of about 4% per year. This figure does not include Spain, Portugal and Greece, which could add around 15% to the total. The number and length of communication channels provided during the period has increased enormously, but as technological developments have reduced the cost per channel equally dramatically, the total revenue to the cable-makers has remained roughly in line with price inflation.

Most of the market for telecommunications cables is accounted for by the national public telephone network operators (PTTs). The strongest growth is in trunk (long-distance) traffic, where technological developments have substantially reduced cable costs. In local networks, which depend on more conventional cable, the market is static. Given the preceding factors and the reduction in costs due to improved production technology, sales are likely to grow at less than 4% per year over the next few years.

● Data control cables

Demand for electronic data and control cables is expected to continue in line with a steadily rising trend.

● Electrical energy cables

Overall in Europe home demand for energy cables is on a gently rising plateau. Home markets are mature and the current basic infrastructure well established. Basic demand is likely to keep pace with growth in the GDP with occasional boosts from new generating capacity and the extension of the Eurogrid. The rise in the standard of living will increase demand while, simultaneously, installations based on old (insulation) technology will require replacement as they reach the end of their service life.

Table 4
Consumption of strategic materials

(1 000 tonnes)	1985	1986	1987	1988	1989	1990
Copper	993.9	980.8	1 017.3	1 056.6	1 113.4	1 140.2
Aluminium	127.6	137.2	138.4	146.7	150.8	153.9
Copper equivalent	1 249.1	1 211.2	1 294.1	1 350.0	1 415.0	1 448.0

Source: Europowercab, Eurotelcab and European Enamellers Council.

Table 5
Employment

	1985	1986	1987	1988	1989	1990
Belgium, Denmark and the Netherlands	8 904	8 773	8 718	8 212	7 980	7 830
FR of Germany	38 800	39 500	40 700	40 500	40 000	40 000
Greece, Ireland and Portugal	5 103	4 941	4 736	4 569	4 361	4 169
Spain	5 825	5 825	5 850	5 775	5 700	5 700
France	16 700	15 400	14 800	14 000	13 800	13 500
Italy	15 250	14 950	14 300	14 000	13 700	13 400
United Kingdom	25 000	24 750	24 500	24 250	24 150	24 100

Source: Europowercab, Eurotelcab and European Enamellers Council.

Trade trends

Exports

EC cable-makers have always been the world's most important source of cables, with average exports over the past decade topping ECU 1 000 million. The past few years have seen diminishing export opportunities coupled with substantially increased imports. Many former principal export markets are now self-sufficient and sluggish markets in the Middle East oil-producing countries are exacerbated by a tendency to greater home production.

Opportunities still exist for EC cable-makers in countries where the level of technology required is beyond the domestic production capacity. In addition, non-EC cable-makers are in need of capital and technical expertise which the EC is in a position to supply.

The Community remains a net exporter of cables, with an exports-to-imports ratio of 1.8 to 1 expected

in 1990. Nevertheless, overall prospects for European producers in export markets cannot be regarded as encouraging.

World competition

Yugoslavia and Finland are major extra-EC European suppliers, while major producers outside Europe are the USA, Japan, the Republic of Korea and Taiwan, with Australia making significant progress. A number of other countries such as the Gulf States, Turkey, Brazil, Malaysia and India now have their own production units, but they have tended to concentrate on import substitution and so far, have not had a significant impact on export markets.

● Electrical energy cables

Production of cable in major countries in the mid-1980s is estimated as follows: Europe (35%); Japan/Far East (26%); USA/South America (28%); others (11%).

Table 6
EC cross-border investment

	BICC	Cable de Lyon	Draka	NKF	NKT	Pirelli	Siemens
Belgium		x					
Denmark					o		
FR of Germany		x	x	x			o
Greece		x				x	x
Spain	x	x				x	
France		o				x	
Ireland							
Italy	x	x				o	
The Netherlands			o	o			
Portugal	x	x				x	
United Kingdom	o		x		x	x	x

o : Home base.

x : Local manufacturing base.

Source: Europowercab and Eurotelcab.

Table 7
Outward investment

	Area of investment
Belgium	—
Denmark	Norway
FR of Germany	Austria, Turkey, Argentina, Nigeria, Bangladesh, South Africa
Greece	—
Spain	—
France	Argentina, USA, Canada, Norway, Australia, Lebanon, Morocco, Sweden
Ireland	—
Italy	Brazil, USA, Canada, Mexico, Argentina, Peru, Ivory Coast,
Netherlands	USA, Indonesia, Singapore
Portugal	—
United Kingdom	USA, Canada, South Africa, Trinidad, Kenya, Australia, Malaysia, New Zealand, Hong Kong

Source: Europowercab and Eurotelcab.

● Telecommunications cables

There are more copper telecommunications cables made in the EC than in any other area of the world; but while the USA dominates optical-fibre cables, Europe has a powerful position in world markets. The world production of telecoms cables is estimated to be: Europe 33%; Japan/Far East 14%; USA/South America 43%; others 10%.

Employment

The production of cable is essentially capital-intensive; machines run automatically and produce large quantities of one type of cable. Employment in the industry is, therefore, comparatively low. Increased productivity over the past 10 years in particular has been associated with higher turnover and a steady decrease in employment. Technological development in cables and the methods of producing them are such that with the stable market the trend is downward.

Investment

There has been substantial rationalization and cross-fertilization within national boundaries and the last three years have witnessed a substantial increase in cross-border investment within the Community. Large multinational companies with bases in France, Italy and the United Kingdom have developed strong bases in other Member States, while smaller companies have also moved to seek opportunities outside their own boundaries.

- There is a strong presence of European Community cable investment in territories outside the Community; and Europe's major companies are now active on all continents.
- The European Community has also attracted inward investment from other nations, the details of which are illustrated in the following table:

Table 8
Inward investment

	Source of investment	Product area
Belgium	—	—
Denmark	Sweden	Information cables
FR of Germany	Switzerland/Sweden and USA	Energy and information cables
Greece	—	—
Spain	Canada, USA, Sweden and Switzerland	Energy, information, vehicle wiring
France	USA	Information/data cables
Ireland	Japan	Vehicle wires
Italy	Switzerland	Winding wires
Netherlands	—	—
Portugal	Japan	Vehicle wiring
United Kingdom	USA and Japan	Energy, information, winding wires

Source: Europowercab and Eurotelcab.

Environment

Generally speaking, cable-manufacturing does not despoil the environment. The manufacturing process is clean and the materials used are normally non-toxic; those posing potential risks are strictly regulated. The cable-makers have taken a decision to be effective from 1 January 1990 to eliminate the use of the 'drins' (aldrin, dieldrin, lindane) — used up to now for imparting anti-termite properties. Henceforth, in those (mainly tropical) applications where it is required, cable will be protected mechanically.

An important area in which the cable industry has taken a lead in responding to environmental concerns is in looking to the usage of raw materials and in considering the potential hazards of the locations in which cables are installed and used. Specially designed cables with reduced fire propagation properties in case of fire are available, there are already acceptable alternatives to PVC and other compounds in areas with fire risks. Cables can be supplied without halogens, which when subject to fire, emit little smoke, corrosive gases or fumes. These are particularly important in public areas, in transport and warehouses as well as any place frequented by people or housing combustible goods.

Outlook

Short-term outlook

In 1988 and 1989 production will be up 4% per year for both telecommunications cables and electrical-energy cables despite a slight reduction in extra-Community exports. Extra-Community imports may increase slowly each year, and intra-Community trade will continue to grow.

Medium-term outlook

The present trend will continue for another four or five years. The export market is likely to continue to decline slowly as demand is satisfied by local manufacturing. Imports are expected to rise steadily.

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POWER TRANSFORMERS

(NACE 342)

Summary

The European transformer industry was in decline throughout the 1980s. No progress can be expected in the sector, as it is already marked by over-capacity. It thus seems that the chances of this industry surviving will depend on an increasing convergence of sectorial activity and an additional reduction in the number of suppliers.

Description of the sector

Transformers are static electricity machines used to raise or lower the voltage of an AC circuit without lowering the frequency.

They play an essential role in the long-distance transmission of electrical power. More specifically, the operating voltage of generators does not exceed 20 kV of AC. Now, high power can be transmitted economically over considerable distances only if it is done at very high voltage, i.e. several hundreds of kW. It is therefore necessary to install in the immediate vicinity of generator sets, step-up transformers, and at the electrical power supply outlets step-down transformers.

There are also transformers, used mainly to measure electrical variables, the chief function of which is exactly the same as that of power transformers, but with very different orders of magnitude.

Current situation

Considerable changes took place in the European transformer industry between 1980 and 1987. During this period, several factors caused a downward trend

in the demand for liquid dielectric power transformers.

Consumption

Electrical power consumption has decreased in most EC countries. This is due mainly to a temporarily unfavourable development of economic activity in the various Member States as well as to the implementation of energy-saving measures, especially in industry.

Now, as the power industry in most EC countries has invested heavily in infrastructure, considerable network supply reserves are now available. The current trend of electrical power consumption in most EC countries does not call for expanding the capacity of supply networks, nor, consequently, for new transformers. The demand for power supply is still low in the various Member States, which, coupled with the more than adequate capacity of the supply networks, preclude any likelihood of further big investments.

Production

Less than 5 kVA

As regards low-voltage transformers, there is a great concentration in and uncontested domination by the Federal Republic of Germany. With a production of 37 353 000 units in 1985, this country accounts for 86.8% of total world production, while the world's four leading producers (Federal Republic of Germany, Turkey, Syria and the United Kingdom) account for approximately 98% (*Source: UN CFCE*).

Table 1
Main indicators, 1983-87
Power transformers

(million ECU)	1983	1984	1985	1986	1987
Apparent consumption	1 048	1 185	1 402	1 471	1 315
Net exports	489	453	460	446	400
Production	1 538	1 638	1 862	1 917	1 715

Source: Eurostat-Dafsa.

5 kVA and over

Once again, the Federal Republic of Germany occupies the dominant position, with 57% of world production; there is still a great concentration, because the first four producers (the Federal Republic of Germany, Japan, Canada and South Africa) account for 90% of world production. The Federal Republic of Germany aside, Europe is virtually absent from this market, which is in full boom; growth exceeded 50% between 1981 and 1985.

According to the classification in terms of voltage generated, the USSR ranks first with 29% of world production. The first four producers (USSR, Japan, China and France) account for only 60% of the total. This classification suggests that the Soviet Union, China and France specialize particularly in big transformers.

We may also think that more and more low-voltage transformers are being produced, as in terms of voltage, world production went up by close to 8% only between 1981 and 1985, as opposed to 50% in terms of units.

Market trends

The constant drop of demand in national markets has forced the Community transformer industry to intensify its exporting efforts in an attempt to use the existing capacity. Foreign demand has remained stable. Considering that transformer production is in a period of over-capacity nearly everywhere in the world, the transformer industry could only conquer new foreign markets if demand abroad was rising rapidly.

Since 1985, the export trade has been hard hit by the loss of the transformer industry's international competitiveness during the 1980s, especially in relation to Asian and Eastern European suppliers. The chronic currency insolvency of Third-World countries has also been a factor in slowing down demand; yet another handicap is the establishment of local transformer plants aimed at meeting national demand.

This unfavourable development in the export sector has been most devastating for transformer manufacturers in EC countries with relatively narrow national markets, as they rely greatly on exports.

Power transformers

The United States is the world's number one importer of power transformers (16% of world

imports in 1985 and 12.5% in 1986), followed by Singapore (5.3% of world imports in 1986) and the Federal Republic of Germany (5.1%). Moreover, American imports are growing very rapidly (+120% between 1981 and 1985), whereas the other big countries are maintaining theirs at practically the same level, when they are not regressing, as for example the Federal Republic of Germany, whose imports went from USD 82.6 million in 1981 to USD 76.2 million in 1985; imports none the less advanced by nearly 45% in 1986.

World exports are provided mainly by Japan (22% of world exports), followed by the Federal Republic of Germany and France (with 15.1 and 9.1% of world exports respectively); the United States is in fourth place (average over five years) with 9% of the world's exports.

A very considerable overall set-back in exports occurred between 1982 and 1986 (-4% for the Federal Republic of Germany, -23% for the United States, -30% for France), while on the other hand, Korea and Japan registered growth of +51% and +12% respectively.

Overall, the big industrialized countries are net exporters, with the exception of the United Kingdom, and, mainly, the United States. Japan's balance of trade is considerable and in 1986 it exceeded those of the Federal Republic of Germany, France and Italy combined (*Source*: UN CFCE).

Liquid dielectric transformers

Ranked fifth in world imports in 1981, the United States climbed to second place in the world in 1986 (first in 1985), right behind Saudi Arabia and in front of Kuwait and Iran. Most of the main importers reduced their imports considerably: on a scale of 100 in 1982, Saudi Arabian imports dropped to 20 in 1986, those of Brazil to 25, of Iraq to 55 and of Kuwait to 63. American imports on the other hand have continued to advance, reaching an index of 174 in 1985, then falling to 113 in 1986.

Exports are dominated by Japan (30% of world exports), followed by the Federal Republic of Germany, France and the United Kingdom (with 15, 13 and 6% respectively of the world market). On the whole, a considerable set-back in exports has occurred, resulting perhaps from a saturation of the markets.

We can also point to the rising power of the Republic of Korea, which moved from tenth to fifth place by increasing its exports from USD 10.6 mil-

lion in 1981 to USD 38.3 million in 1985, then holding relatively steady at USD 33.4 million in 1986. The same applies to Belgium, whose exports went up by 70% in 1986, to return to their 1983 level.

A classification according to the balance of trade shows Japan way ahead with a surplus which is nearly equal to that of the Federal Republic of Germany, France, the United Kingdom and Italy combined. The balance of trade of the Federal Republic of Germany, the United Kingdom and Korea tended to increase in 1986, in contrast to that of Japan, Italy and France.

For its part, the United States registered a deficit of USD 46.8 million during the period from 1983 to 1985, which seemed to be alleviated in 1986.

Structural changes

The trend of demand described above has entailed structural changes in the past few years. As a result of over-capacity problems, most national transformer industries had to shut down their production plants and even review their lines of products.

Outlook

There is general agreement among industrialists that a recovery in the transformer market will not take

place before 1990. Moreover, a probable increase in the demand of industries and households will not lead to an expansion of the network, given the availability of a reserve capacity. The end of investments for the expansion of power supply network capacity suggests that, in certain countries, sales of transformers will drop significantly. This trend should continue beyond 1990.

Furthermore, the lack of any coherent policy is being felt when the future role of electric power is taken into consideration.

As regards a long-term strategy, the low prices of other sources of primary energy have certainly created a dilemma for the power supply industry. In the event of a high rise in oil prices, the importance of electrical power will have to be reconsidered.

For a clue as to the direction the transformer industry would have to take in order to survive, we may consider the US market. The situation in the United States was marked by a remarkable concentration these last few years. As regards power supply, five companies provide 80% of the demand, whereas in the EC, 50 producers have the same share of the market. This suggests that a reduction in the number of producers will be necessary if the transformer industry is to survive in the EC.

DRI Europe

HIGH-TENSION SWITCHGEAR

(NACE 342)

Summary

The production and trade of high-tension switchgear in the Community cannot yet be slotted in a trading block. They are dominated by the Federal Republic of Germany, France, Italy and the United Kingdom; the other countries do not account for very much.

The European market is to a large extent still a juxtaposition of national markets. Moreover, intra-Community trade, supplied by, inter alia, intra-company trade, appeared to be still relatively weak in 1987 in relation to world trade.

Furthermore, as industry and the electricity networks are already highly developed on national markets and as companies which produce high-tension switchgear cannot rely on alternative energy markets, this sector cannot anticipate growth based on local dynamics. That is why today more than ever before, extra-European exports, which already account for 80% of Community exports, remain the key to success in the electricity industry, an industry which has to rely on solid positions in order to compete with the Americans and the Japanese.

Definition of the sector

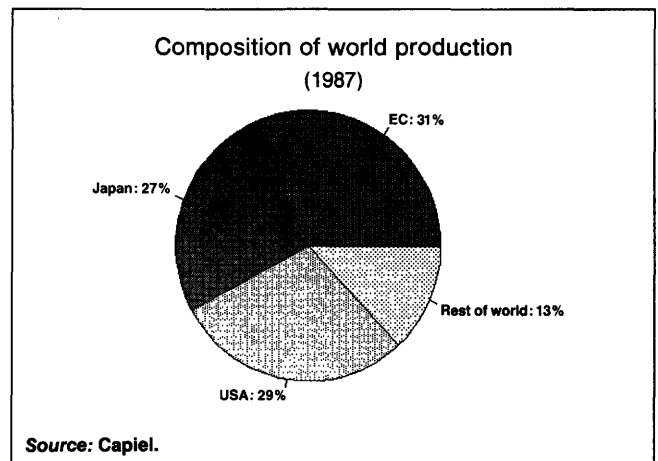
High-tension switchgear belongs to the electricity sector, where it occupies a typical position in all stages of the production-transport-distribution chain. It performs several functions, the main ones being control and protection upstream and downstream in high-tension electrical machinery. In this connection, the most widely known product category is that of high and medium tension circuit breakers.

For practical reasons, 'high tension' will in this study refer to high and medium tension (> 1 kV). In point of fact, there is no homogeneous logic in the Community to distinguish these two categories and thus have them classified and compared coherently. Nevertheless, the use of national distinctions and the detailed specifications they entail are not totally excluded in the analyses on a country-by-country basis.

Production

In 1987 total world production of high-tension switchgear amounted to ECU 5.9 billion, i.e. a level similar to that of 1986, which breaks down as follows:

Figure 1



(Comecon and China are not taken into account in this breakdown).

The USA is the world's number one producing country and has the world's biggest market; energy consumption there is 1.8 times higher than in other OECD countries, and electricity accounts for an increasing percentage.

Japan relies also on a sizeable national market due to the high density of its population which requires a very high level of network protection. In addition, its production is based on a powerful export dynamic.

The other major producers are situated in Europe and make the EC the largest production block, all the more so because European manufacturers tend to specialize in this type of device.

The 'rest of the world' comprises chiefly big producers such as Sweden or Switzerland, but also an increasing percentage of newly industrialized countries, and in particular Brazil, India, and the countries of South-East Asia.

Trends indicate that power relationships between the three big production blocks have remain unchanged and balanced since 1980.

Table 1
Share of production of high-tension switchgear
between the three largest producer zones

(%)	1980	1983	1987
EC	36	36	36
USA	35	34	33
Japan	29	30	31
Total	100	100	100

Source: Capiel.

The slight drop in the US share is linked to a decline of investments in gear for electrical machinery on the national market. Nevertheless, the drop in sales of high-tension switchgear was partly contained by investments for the maintenance and improvement of network efficiency.

Japanese production, on the other hand, was on the rise. In fact, production appears to be consistently more robust since 1983, though this observation should be qualified to take into consideration the effect of the dollar/yen exchange rate.

The Community share has remained stable throughout this period.

This approach in terms of production shares conceals quite a steep rise in world production at a time when most industrialized countries have developed extensive nuclear programmes.

Geographical features

Within Capiel (Coordinating Committee for Common Market Associations of Manufacturers of Industrial Electrical Switchgear and Controlgear), high-tension switchgear manufacturers come from the seven major countries of the Community.

Production statistics made available by Capiel enable us to draw up Figure 2.

The Federal Republic of Germany and France together account for two-thirds of Community production at equivalent levels. The last third is dominated by Italy which doubles the performance of the United Kingdom. Thus, the four dominant countries leave the other three producers with only 9.2% of the offer, and among the latter, only Spain has a production base sufficiently large to stand out.

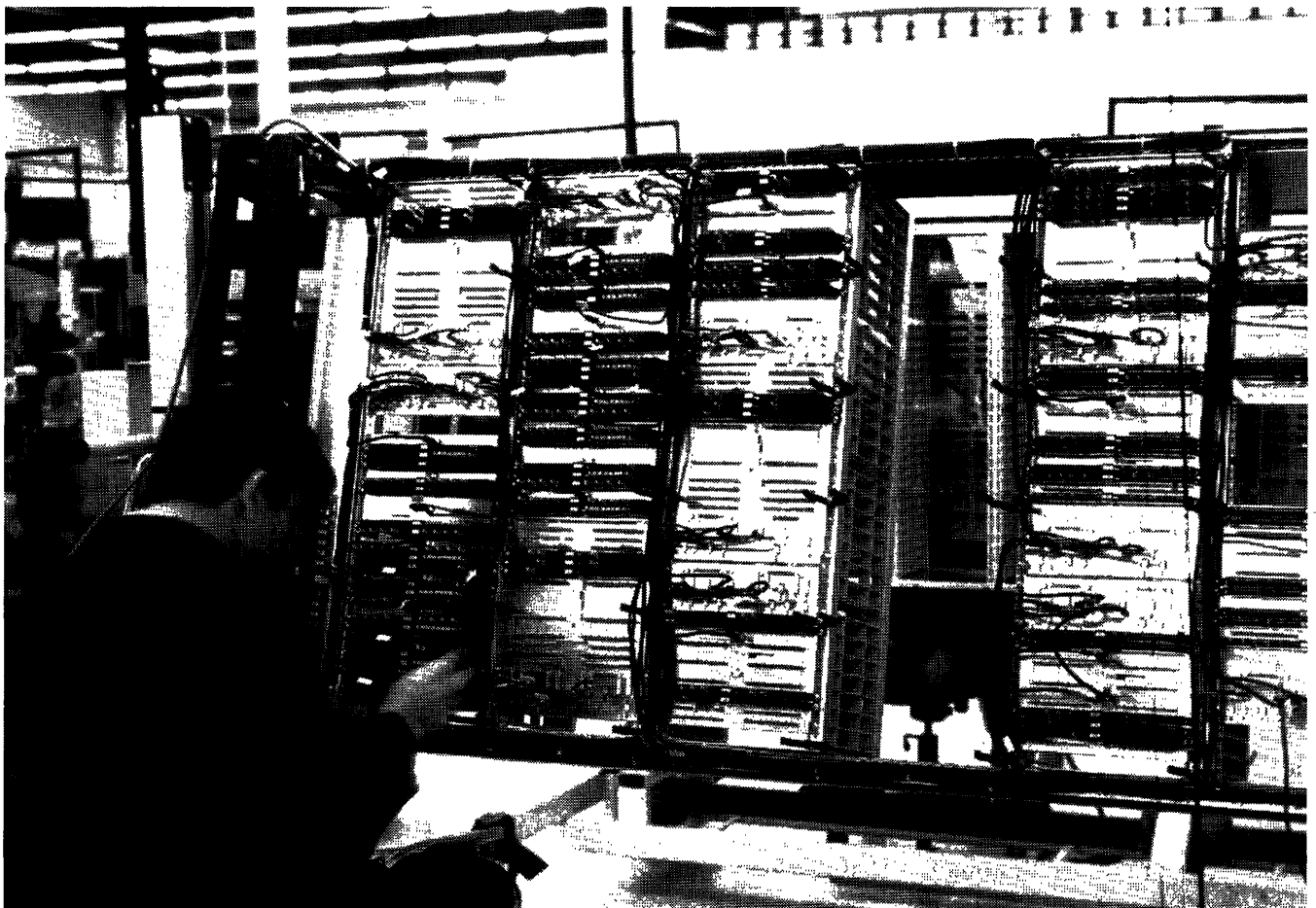
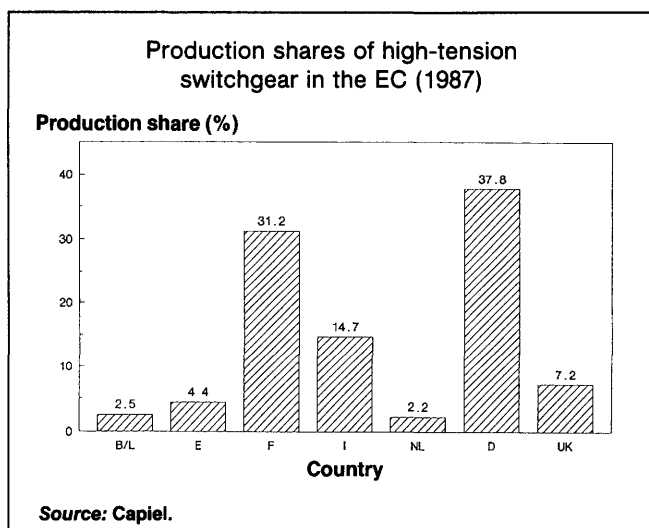


Figure 2

As to development, the lack of complete statistical data for Spain for the 1980s hinders us from including it in the overall study of Capiel. Nevertheless, we are able to determine the variations of other Member States.

Table 2
Share of production by country

(%)	1980	1983	1987
EC	100.0	100.0	100.0
Belgium, Luxembourg	3.7	3.4	2.7
FR of Germany	41.9	50.6	39.6
France	28.0	26.2	32.7
Italy	13.6	9.0	15.4
Netherlands	4.0	2.7	2.2
United Kingdom	8.8	8.1	7.4

Source: Capiel.

The ranking observed in 1986 seems to be still holding without any upheaval in relation to that of 1980, but rather with only minor variations. Only France has pulled ahead of its initial position, with a growth of nearly five points.

In terms of value, the overall production level has also gone up by 10% between 1980 and 1983 and by 30% between 1983 and 1987. This second rise occurred in a period during which European countries developed nuclear programmes for their markets and abroad. France modernized a major part of its circuit breaker population, and Italy and the Federal Republic of Germany endeavoured to expand their world market shares.

Foreign trade

International

In 1987 the value of world trade in high-tension switchgear amounted to ECU 1.2 billion, for 21% of world production. This share may appear low in a positioning conditioned by international specialization coupled with intra-branch trade in gear for electrical machinery. Yet this specialization is less pronounced than in other equipment due mainly to the existence of protected public markets. Consequently, the export share of high-tension switchgear remains relatively low.

The respective shares of the major producers are as follows:

- EC: 55%
- Japan: 29%
- USA: 7%
- Rest of the world: 9%

and should be supplemented by the export rate of each one (export/production):

- EC: 37%
- Japan: 22%
- United States: 5%
- Rest of the world: 14%

The Community holds more than half the world market shares, with an export rate which appears to be relatively high and greater than the world average. Furthermore, as we shall see in the country-by-country analysis, this 55% covers to a large extent industrializing countries, the solvency of which is often precarious. In addition, EC export efforts concentrate on improving the Community's export rate, but with an orientation towards dynamic, financially viable markets.

This qualitative effort is waged more successfully by Japan, thanks to its ability to position itself on foreign markets with integrated products in industrial units. In this way, capitalizing on geographic proximity, Japan was first on Asian markets in full boom.

The United States have a rather low export rate but this combined with their number one position in world production enables them to cover 7% of the market nonetheless and they have established a trading presence in Latin America and South-East Asia (and to a lesser extent, in Japan).

Finally, given the degree of industrialization required for this type of gear, the performance of the 'rest of the world' is actually concentrated in a few industrialized countries like Sweden, Switzerland, Canada, etc.

Intra-Community

Intra-Community exports amount to only 20% of the EC's total exports. The Community is now only a maintenance, modernization and quality improvement market, due to the fact that no major expansion of the network is possible any longer.

The breakdown of Community market shares among the Member States is as follows:

Table 3
Share of extra-EC exports by country

(%)	1987
EC	100.0
Belgium, Luxembourg	4.0
FR of Germany	44.3
Spain	1.0
France	22.5
Italy	12.5
Netherlands	2.3
United Kingdom	13.4

Source: Capiel.

The EC has a 55% share of the total world exports, which breaks down as follows among the Member States:

Table 4
Extra-EC exports by country
as a percentage of world exports

(%)	1987
EC	55.0
Belgium, Luxembourg	2.2
FR of Germany	24.4
Spain	.5
France	12.3
Italy	6.9
Netherlands	1.3
United Kingdom	7.4

Source: Capiel.

The Federal Republic of Germany's foreign trade performance thus appears quantitatively close to that of Japan (29% of international trade). As to France, its share is greater than that of the United States (7% of international trade), although its production is three times less that of America.

The other two Community countries with a consequential performance on the world market are, as was the case in production, the United Kingdom and Italy. The United Kingdom maintains its fifth place in world commerce, despite the fact that today it produces half as much as Italy. In point of fact, British exports continue to find outlets in certain Commonwealth countries.

Even though intra-Community trade is not very considerable when compared with the total world trade, it is worth noting the main import-export patterns in Europe.

Table 5
Share of intra-EC trade by country, 1987

(%)	Exports	Imports
EC	100.0	100.0
Belgium, Luxembourg	10.3	24.5
Denmark	0.0	9.2
FR of Germany	44.0	17.4
Greece	0.0	6.1
Spain	3.1	6.3
France	15.2	9.5
Ireland	0.0	2.3
Italy	12.1	10.2
Netherlands	3.3	6.2
Portugal	0.0	2.5
United Kingdom	12.0	5.8

Source: Capiel.

This breakdown comes as no surprise, as the four major suppliers of intra-EC trade are also the major producers. Nevertheless, this observation should be qualified by the fact that power relationships between these four countries differ from those noted in production.

In terms of exports, the Federal Republic of Germany is the sole dominant power, with a clearly greater share than that it enjoyed in production. France is the second intra-Community supplier, but with a lower level, less than half in fact that of the Federal Republic of Germany. Italy and Great Britain have market shares relatively close to those of French manufacturers.

These four countries moreover have a positive intra-Community balance of trade.

BLEU is the fifth country with a sizeable export share, but its position in trade is especially characterized by the volume of its imports, which is the highest in Europe.

Given the structure of production, the fact that import shares are more balanced among the different European countries is not surprising.

Considered globally, these observations on the Community market should be supplemented by an analysis which takes into account the characteristics of each national market.

Structural changes

Today, the European industrial fabric of electrical machinery is being restructured by a movement of international alliances. The underlying purpose of these consolidations is to take advantage of an economy of scale on basic products and to meet better national specifications by getting closer to the users. In so doing, companies can increase profitability and become more competitive.

What is more, the prospective opening of the intra-Community market is promoting and accelerating industrial concentration movements launched by European enterprises.

Country-by-country analysis

The Federal Republic of Germany

The national market is typified by regionalization. Demand is decentralized and diversified by the numerous producers and distributors of electricity (about 600 companies) divided between the public and private sectors.

The fine export performance is due to the traditional outward oriented dynamism which has been a long-standing feature due chiefly to the absence of captive colonial markets.

German exports are widely dispersed. Nevertheless, the main customers are industrialized countries, including the United States and EFTA countries, especially Switzerland, as well as countries of the Middle East. Furthermore, though to a lesser degree, the Federal Republic of Germany exports to Eastern European countries, especially to Yugoslavia (its number one partner in this block).

In 1987 Germany's strong exporting position generated a trade surplus of ECU 229 million, 35 million of which in the EC.

The sector employs about 12 000 people in some 40 companies, though there is a noticeable downward trend in the long run.

Investments relative to added value are below the European average of around 10%, but nevertheless remain the highest in terms of absolute value.

France

France produces mainly metal-clad items, high-tension circuit breakers (> 72.5 kV), medium-tension circuit breakers (1 to 72.5 kV), and high and medium-tension distribution and connection equipment.

The national market is characterized by the sizeable influence of EDF (Electricité de France), and is today affected by the declining investments in nuclear power generation; having receded up to 1983, the market then advanced thanks to the start-up of power plants, but also on account of programmes for modernizing circuit breakers and due to the reinforcement of transport and distribution infrastructures. Since 1986, however, EDF investments have been declining again.

French exports are often directed to the 'rest of the world', and particularly to newly industrialized countries and OPEC members. That said, the increase in total French exports of the share of industrialized countries must be mentioned.

Exports fell between 1983 and 1986 due to the financial difficulties of their consignees who were faced with drops in oil prices and by austerity programmes imposed by the IMF (Latin American countries). Since 1986 the prospective demand of these countries has been more favourable, while the potential demand remains strong.

In 1987 France was the second EC Member State to achieve a trade surplus, with ECU 121 million, 7.3 million from inside the Community.

There are only two main high-tension switchgear manufacturers left in France, which employ 7 500 people. These companies have an investment rate (GFCF/VA) that is clearly above Community average thanks to a high level of automation which was made necessary by the rapid modernization of the EDF high-tension electrical gear.

Finally, research and development outlays amount to 4 to 5% of the annual turnover.

Italy

The breakdown of the turnover between medium and high-tension (medium tension from 1 to 52 kV and high tension > 52 kV) shows the former to be dominant (66% of Italian production), with circuit breakers as the number one item. In high tension, metal-clad components and circuit breakers are the two top items.

We should however note the growth registered by high tension between 1985 and 1987, from 29 to 34%.

The national market is largely dominated by ENEL (Enternazionale per l'Energia Elettrica, a centralized public institution), which does not enjoy exclusive influence, although it is by far the most dynamic, both in medium and high tension. Investments are not earmarked merely for modernization, but also for new installations.

The new establishments of electromechanical groups on Italian territory strengthen the country's export activity, especially to France and the Federal Republic of Germany, its top trading partners. Except for these two countries, Europe is virtually absent from Italy's market shares.

Italian foreign trade in high-tension switchgear generated a trade surplus of ECU 64.1 million, 2.7 million of which came from intra-Community trade.

The high-tension switchgear industry in Italy employs about 3 500 people, whose productivity is equivalent to the Community average.

Finally, the rate of investment is slightly lower than the Community average, though with an upward trend.

The United Kingdom

The production breakdown between medium and high tension (before 1987: medium tension from 1 to 52 kV and high tension > 52 kV; since 1987: medium tension from 1 to 70 kV and high tension > 70 kV) gives an increasingly greater share to the former since the beginning of the 1980s. Today it represents nearly three-quarters.

Up to now national demand has come from several public bodies, the main one being the CEGB (Central Electricity Generating Board), responsible for generation and transmission and thus leaving distribution to 12 other companies (the Area Boards). Privatizations are going to bring about a change in the structure of the production-transport-distribution chain.

This sector employs 6 500 persons, or 15% fewer than in previous years. This drop is expected to continue, though at a slower pace.

Productivity is slightly lower than the European average and should improve with the resumption of investment since 1988.

Spain

Spanish production comes largely from foreign multinational firms. The national market is typified by an electricity network owned by numerous private or semi-private companies whose propensity to invest could be maintained at a high level, given the industrial take-off in progress these last few years, mainly since the country's adhesion to the EC.

BLEU

BLEU has a network managed mainly by three private companies through semi-private companies. The major part of recent investments has been allocated to nuclear generation to the detriment of distribution. Despite sharp reduction of public expenditure, revitalized growth is creating a need for expansion and modernization.

Equipment production has, as a matter of tradition, always been directed to exports, given the narrow confines of the national market and the policy of free trade.

At present, the change of the world market and the progressive opening of the European market are directing exports increasingly towards the European Community, and more specifically to the small markets which do not have their own producers.

The Netherlands

The Netherlands maintains very close economic relations with the Federal Republic of Germany. On the national market, companies which produce high tension switchgear are facing competition from companies which operate in the electricity generation-transport-distribution chain.

The other four Member States

The other four Member States share similar characteristics on the Community high-tension switchgear markets, and will consequently be dealt with jointly below.

Their first common characteristic is their absence from or insignificant share in Community production, making them essentially buyers on the market.

These countries are supplied from outside the EC in the same proportion as producing countries, i.e. for about a third of their total imports.

These major common characteristics notwithstanding, each country differs from the others on its own market:

Denmark relies especially on the Federal Republic of Germany and the Netherlands for its imports. Its electricity network is managed by numerous companies.

In Greece, the electricity network is held exclusively by a public company: the DEH (the Electricity Company of Greece).

In Portugal, the electricity generation-transport-distribution chain is handled almost exclusively by a State-controlled company, the EDP (Electricidade de Portugal).

Ireland is distinguished from the rest of Europe by the trade relations it maintains with the United States, which account for 22% of its imports.

No sharp increase can be anticipated for the world as a whole:

- Industrialized countries are satisfied with improving and maintaining their networks.

- OPEC countries are going to stay at a limited plant level.
- The least-advanced countries will not be able to invest.

Only NICs have development potential, but only in the short term, as some of them may become competitors as soon as they reach a certain industrial maturity. For the time being, they need products, capital and training.

Along with the development of production structure and markets, the nature of the products is changing as well. There are more and more integrated systems with monitoring, control and new operating and protection devices which enable 'strong current' to coexist with 'weak current'.

The new products will rekindle demand by offering better quality in the transmission and distribution of electrical power, and thus opening the way to new exports.

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LOW-TENSION SWITCHGEAR

(NACE 342)

Summary

The European Community is the world's number one producer of low-tension switchgear. Inside the Community itself, the production and trade is regularly dominated by four countries, namely The Federal Republic of Germany, France, the United Kingdom and Italy, with the notable dominance of Germany.

The other European countries are in a marginal position in relation to the four leaders, both in terms of their respective markets and their foreign trade relations.

This structure may well be consolidated even further with the opening of the single European market, though one should also take into account the increased presence of the United States and Japan through their multinational firms, especially on medium-sized markets.

Definition of the sector

Low-tension switchgear refers to all control and protection gear related to machinery within the overall electricity chain.

Used in very large numbers and manufactured by numerous companies, this basic gear is used to activate industrial processes ranging from the simplest to the most complex.

A major part of the production is exported, though as it is integrated in big machinery or factories, the actual exports are difficult to assess.

Moreover, NACE does not have a sufficiently detailed breakdown level wherein this equipment could be identified under position 342, or the 'manufacture of electrical machinery'. We may nevertheless estimate that low tension switchgear represents around 20% of the entire 342 class.

Current situation

Trade between Europe and the other two dominant blocks is not very significant. The Community exports a mere 7 and 1.3% of its production to the United States and Japan respectively; and these countries account for 10 and 7% (respectively) of its

imports. The EC is therefore relatively independent of the two other blocks in this sector.

The European market is not really homogeneous; on the contrary, it is typified by a great diversity in the distribution networks, customs, etc.

As a matter of fact, the block is divided into two sub-markets: the first in northern Europe, chiefly around Germany, and the second in southern Europe, i.e. mainly in France and Italy.

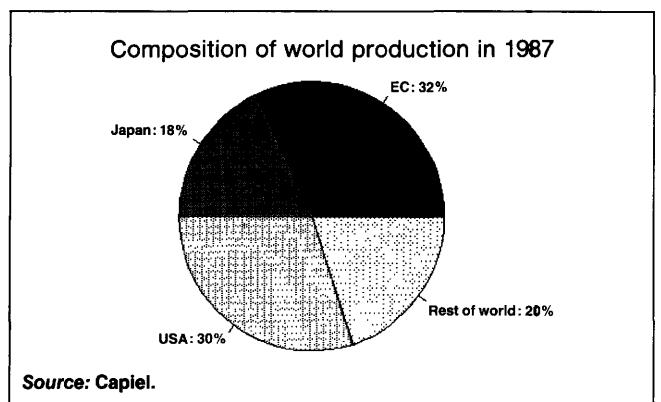
Furthermore, the block is divided between widely different and very powerful producers and users.

These partitions are not permanent; indeed they are changing, and a certain number of industrial alignments today tend to redistribute the production potential of tomorrow.

Structural changes

In the 10 years to come, the analytical approach is going to change concurrently with the production structure: the movement of industrial concentration which got under way a few years ago in Europe and entailed the dislocation of production sites, is going to continue, thereby leading to analyses no longer on the basis of countries, but rather by big firms.

Figure 1



Production

The total world production of low tension switchgear in 1987 amounted to ECU 15.9 billion and breaks down as indicated in figure 1.

This breakdown clearly shows the current importance of 'the rest of the world' in the production of this type of equipment. Nevertheless, most of this 20% is produced chiefly by newly industrialized countries such as Brazil, India and the four 'dragons' of South-East Asia (The Republic of Korea, Taiwan, Hong Kong and Singapore), and by industrialized countries such as Sweden, Switzerland, Canada, etc.

It is moreover worth underscoring the relative weakness of Japan. Even though its production share has not ceased to go up these last 10 years, it continues to be specialized chiefly in high-tension and in industrial electrical gear, content to subcontract the manufacture of low-tension switchgear to its Asian partners.

For its part, though concentrating chiefly on rotating machines and industrial equipment, the United States nevertheless accounts for more than a quarter of worldwide production, and thus ranks right behind the EC.

Finally, low-tension switchgear is a strong point of the Community, which specializes in this type of products. The EC's leading position in the world should therefore come as no surprise.

The development of production shares by the three big industrialized blocks reveals that the power relationships have not changed at all since 1980 and that the European specialization has been relatively maintained during this period.

Table 1
Share of production of low-tension switchgear between the three largest producer zones

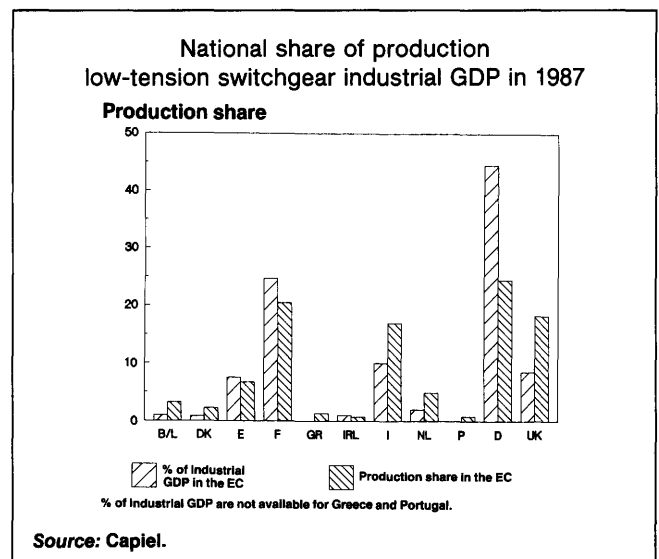
(%)	1980	1983	1987
EC	48.0	40.0	40.0
USA	38.6	44.0	37.5
Japan	13.4	16.0	22.5
Total	100.0	100.0	100.0

Source: Capiel.

The performance of the United States in 1983 is linked to the modernization of the electricity distribution network which entailed heavy investments in order to meet the high rise in the demand for electrical power.

As to Japan, its orientation to the growth markets of the Pacific region, coupled with an increasing degree of sophistication in the products themselves, go far in explaining their increasing share of world production.

Figure 2



Geographical features

The comparison between national shares in the production of low tension switchgear and in the industrial GDP in the Community show a certain correlation inside the EC and in the world as a whole. Moreover, there are no big surprises in the power relationships between European countries.

The dominant position of Germany is confirmed in the production of low tension switchgear. France's performance amounts to around 50% of the German figure. Italy and the United Kingdom have equivalent shares, more than twice as low as that of France.

Table 2
Share of production by country

(%)	1980	1983	1986	1987
EC (1)	100.0	100.0	100.0	100.0
Belgium, Luxembourg	3.4	2.9	2.8	1.0
Denmark	1.2	.9	1.1	.8
FR of Germany	40.3	40.1	41.2	44.5
Spain	4.4	4.2	5.6	7.5
France	21.0	21.7	22.6	24.7
Ireland	.8	.9	1.2	1.0
Italy	11.6	11.5	11.3	10.0
Netherlands	1.5	1.7	2.3	2.0
United Kingdom	15.8	16.1	11.9	8.5

(1) Excluding Greece and Portugal.

Source: Capiel

The other eight countries account for the remaining 13% of the Community output. Of these, only Spain has a significant, growing position. The shares of Greece and Portugal are apparently the weakest in the block and will not change these rankings.

No upheaval has upset the hierarchy established long ago, and the trends observed are of minor scope.

The dominant position of Germany has been reinforced these last few years and is faced with its exporting dynamism which maintained growth throughout the period.

France has a similar profile and Italy maintained a stable position up to 1986.

The decline of Britain is corroborated by a slow-down in industrial activity up to 1988.

Foreign trade

International

Overall exports of low tension switchgear throughout the world amounted to ECU 4.4 billion in 1987, i.e. 28% of the production. The respective shares of the big producers are as follows:

- EC: 46%
- USA: 16%
- Japan: 24%
- Rest of the world: 14%;

and should be supplemented by the export rate of each (export/production):

- EC: 40.2%
- USA: 14.9%
- Japan: 37.3%
- Rest of the world: 19.6%.

Discounting intra-Community trade, the share of the EC in the world amounted to only 20%. In view of its share of the world production, Europe should have to increase its international performance.

Even more so than the EC, the United States focuses particularly on its national market, with only a relatively weak market share in relation to their position in world production. Japan, on the other hand, has a larger market share than its production share and exports more than a third of its output.

Intra-Community

Whereas the EC holds the dominant position both in terms of production and market shares, this statement should nonetheless be qualified in so far as the Community continues to be virtually absent in South-East Asia, where Japan, and to a lesser extent, the United States, are holding sway (with around 75% and 15% respectively of the local markets).

These markets are not totally inaccessible to Europeans, especially since the countries in question are looking for ways to diminish the clout of Japan and the United States. They are therefore open to European goods in part, provided Community companies can use global strategies to adapt to local demand and secure a permanent presence in that part of the world.

Furthermore, an important part of EC exports is directed to developing countries which constitute an important potential market in so far as industrialization requires heavy investments in electrical equipment, though insolvency tends to jeopardize the proper performance of contracts.

Table 3
Share of extra-EC exports by country

(%)	1986
EC 10	100.0
Belgium, Luxembourg	2.1
Denmark	.6
FR of Germany	43.9
Greece	.1
France	24.5
Ireland	1.8
Italy	8.2
Netherlands	5.2
United Kingdom	13.6

Source: Capiel.

The share of the EC in world trade amounts to 46%, and breaks down per country as follows:

Table 4
Extra-EC exports by country
as a percentage of world exports

(%)	1986
EC 10	46.0
Belgium, Luxembourg	1.0
Denmark	.3
FR of Germany	20.1
Greece	0.0
France	11.3
Ireland	.8
Italy	3.8
Netherlands	2.4
United Kingdom	6.3

Source: Capiel.

Germany is in second place behind Japan (24%) and France is in fourth place right behind the United States (16%). These two positions reflect the good performance of European firms considering their size.

The breakdown of intra-Community trade reveals the following features:

Table 5
Share of intra-EC trade by country, 1987

(%)	Exports	Imports
Belgium, Luxembourg	2.6	7.1
Denmark	.4	2.8
FR of Germany	40.6	17.8
Greece	.1	.7
Spain	3.1	7.2
France	25.9	14.1
Ireland	1.8	2.9
Italy	8.1	21.1
Netherlands	6.1	8.9
Portugal	1.1	2.1
United Kingdom	10.2	15.3
EC	100.0	100.0

Source: Capiel.

In the above table, which lists the respective shares of each Member State in the total of intra-EC imports and exports, three groups of countries emerge:

- The two leaders are Germany and France, accounting for two-thirds of the intra-Community trade. Germany retains its dominant position for exports, and is number two (behind Italy) in imports.

Italy and the United Kingdom are the two other countries with a sufficiently large electrical equipment industry to play a relatively important role in intra-Community trade. Nevertheless, their imports, which amount to more than a third, are not offset entirely by their exports.

As to the other partners, their different structures and levels of industrial development are such that their trading capacities are relatively more limited than Europe as a whole.

In general, all Member States are both exporters and importers, but a major part of the trade is concentrated in the four large countries of the Community, namely Germany, France, the United Kingdom and Italy.

In addition to a global analysis, the Community market is worth analysing on a country-by-country basis.

Country-by-country analysis

The Federal Republic of Germany

The top items in the German turnover for low-tension switchgear in 1987 are, in order of importance, contactors, control switches and relays.

This production relies on a very dense industrial fabric, with a particularly powerful mechanical engineering sector which requires sustained levels of investment. In addition, the low-tension switchgear industry relies on a very big national market.

Its three main partners (Italy, France and the United Kingdom) notwithstanding, Germany's great spheres of influence include the United States, the world's biggest market, and the countries of northern Europe, where the Federal Republic extends its basic market.

Furthermore, Germany is the leading western partner of eastern European countries with planned economies, where it finds openings for its exports.

As to imports, France is Germany's number one supplier, followed by neighbouring countries, the United States and Japan.

With 47 500 people employed, the German low-tension switchgear industry has the largest workforce in Europe.

This figure may seem high, but is explained by the fact that the production structure consists of a few big corporations and about a 100 medium-sized companies. The latter generate 95% of the turnover and manage to keep their market shares very stable.

Moreover, at 30% higher than the average, their productivity is the highest in the Community.

Finally, German companies are also the most dynamic in research and development, allocating 6 to 7% of their annual turnover for this purpose.

France

The two main production items, with, incidentally, parallel growth cycles, are contactors and circuit breakers.

Relays, the third important item in the turnover, have held a stable position since 1985.

This production cannot rely on a mechanical industry that is losing ground. Thus, despite a rate of investment relatively higher than its first partner, France is investing less than the latter in value.

On the other hand, the steady performance of the modernization market has partially offset the lack of a real recovery in the new construction sector.

The main trading partners are for the most part other EC countries, with Germany at the top; though the United States plays a considerable role too, especially as a supplier.

For its part, France tries to orient its market to Southern Europe, and to north and sub-Saharan Africa.

The French low tension switchgear industry employs some 20 500 people in some 30 or so companies which generate 95% of the turnover and include five or six which play a leading role.

Productivity in France is slightly above the European average.

The production/productivity/number-of-jobs ratio may appear surprising when compared with that of Germany, because with half as few employees and lower productivity, French production amounts to 50% of German production. This is due to the fact that the census of the number of people working in the (French) low-tension switchgear industry reflects essentially figures in big groups, whereas it represents all those employed in (the very numerous) small and medium-sized companies in Germany.

The United Kingdom

The shrinkage of the national market should not continue, as estimated productive investments in 1987 and 1987, as well as forecasts for 1989 are more favourable. With profits higher than at any other time since 1973, industrialists declared at the end of 1987 that they wanted to increase their investment by more than 15% in value in 1988.

The oil sector is in the midst of recovery and investment prospects are positive in the construction industry as well.

An analysis of production shows no specialization particular to the United Kingdom. The main production items over the entire period have been fuses and contactors.

Despite being the fifth biggest exporter (with a nearly 6.5% share of world exports), the United Kingdom has a trade deficit due partly to a certain loss of market independence.

In fact, big American and Japanese companies have chosen Britain as point of entry for their industrial establishment in the Community.

Consequently, it should come as no surprise that the United States is Britain's number one customer and number two supplier.

UK exports appear somewhat dispersed, but this is due to close trade links with Commonwealth countries. Nevertheless, the main European manufacturers have turned out to be leading customers. Conversely, Western European countries are, together with the United States, the main importers of British goods. To a lesser degree, Japan is also one of the main suppliers and could increase its market shares in the years to come.

The British low-tension switchgear industry employs between 9 000 and 10 000 people, whose productivity almost reaches Community average.

Italy

As in Germany, the Italian low-tension switchgear industry can rely on quite a powerful mechanical engineering sector.

Nevertheless, this market cannot be qualified as a 'leader' because it has lost part of its decision-making autonomy to big foreign companies established on national territory.

The Italian production is typified by a large concentration on circuit breakers, followed by relays and then contactors.

This concentration of production on a few items in Italy is atypical behaviour for the Community. Though its own exports constitute an appreciable share of overall EC exports, they are largely offset by big imports. Its main partners are western European countries and the United States.

Italy plays an important role in intra-Community trade, while apparently attempting to expand its world market share in the Middle East.

The Italian low tension switchgear industry employs about 8 000 people, whose productivity is slightly lower than their German counterparts but higher than the Community average.

The Netherlands, BLEU and Denmark

The privileged links these countries maintain with Germany make the latter their main partner in intra-Community trade of low-tension switchgear, the other European partner of consequence being France.

Finally, with the exception of the Netherlands, these countries have relatively little trade with the United States in this sector.

Ireland

Ireland is characterized by an essentially subcontracting industry, partly controlled by American and Japanese groups. The latter are endeavouring to penetrate the Community market via their direct establishments in countries like Ireland or Spain where they enjoy substantial tax benefits.

Since 1980, there has been a trend reversal of Irish trade with the EC and the USA.

Within the EC, Ireland's two main customers are Germany and the United Kingdom, the latter being its number one supplier.

Greece

Greece has a modest electrical equipment industry, concentrated chiefly in the production of low tension switchgear. Though production statistics are not available, we may attribute a low production level to Greece in comparison with the EC as a whole. This weakness makes the country very dependent on imports from abroad.

An analysis of its international trade relations based on imports shows the European Community to be by far the dominant partner (over 75%), and in particular Germany, Italy and France.

Spain

As was the case in Italy and the United Kingdom, numerous Spanish companies are part of European, Japanese or American transnational firms.

On the domestic market, despite high increases in investments (investments in equipment have risen by 46% in volume during the last three years), the production capacity utilisation rate remains high. As domestic demand continues to be high, and with export opportunities increasing with the modernisation of the production apparatus, investments in production and thus the demand for low tension switchgear should also continue to grow rapidly.

Within the EC, the country's main partners are Germany, France, and Italy.

Germany is by far its number one European partner, though Spain is not completely dependent because it was able to diversify its big partners through foreign companies established on its territory.

Moreover, with the opening of the single market and the growth of its industrial activity, trade in low-tension switchgear with EC countries can only increase.

Forecast trends do not point to a recovery of the market on a grand scale as was the case in the 1970s, but rather a growth rate no higher than 4 or 5% a year. In fact, with an already highly developed industry and fewer and fewer alternative energy markets, this sector will have to rely on a rather slow revitalization of production capacities in Europe.

On the other hand, product changes may occur, dictated by other activities whereby low-tension switchgear would be increasingly subjected to electronic requirements.

Thus demand is in a period of radical change, the magnitude and speed of which is not yet clearly known.

Capiel: Comité de coordination des associations de constructeurs d'appareillage industriel électrique du marché commun

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WELDING EQUIPMENT

(NACE 343.1)

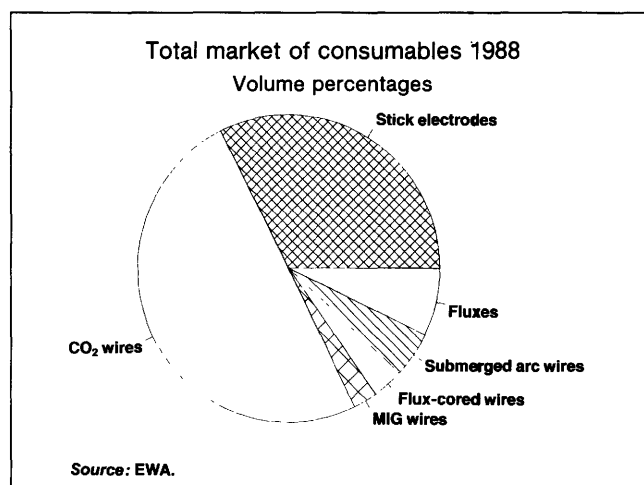
Summary

The market for industrial welding equipment is heavily dependent on activities in shipbuilding, off-shore construction, pipelines and electrical power plants, all of which fared badly in the 1980s. The raw steel production for EC 12 rose by more than 8% in 1988, which, in turn, had a positive impact on the welding sector.

Description of the sector

The industry under consideration forms part of a subgroup which includes units exclusively or primarily engaged in the production of electrical accessories for motor vehicles, industrial electrical furnaces, electrical tools, electric trucks, electroplating equipment, and electrical welding apparatus for the welding industry. However, developments in this field cannot be seen apart from the developments in the field of welding filler materials since the two markets are closely linked to one another. For this reason some statistical information has been included on the consumables as well.

Figure 1



Current situation

World steel production increased again considerably in 1988 and this had a positive influence on the

Table 1
Raw steel production

(million tonnes)	1984	1985	1986	1987	1988 (1)
Industrialized countries	376	374	352	361	393
Western Europe	157	159	150	151	165
EC	134	136	126	126	137
Benelux	21	20	19	18	20
FR of Germany	39	40	37	36	41
Spain	13	14	12	12	12
France	19	19	18	18	19
Italy	24	24	23	23	24
United Kingdom	15	16	15	17	19
Rest of Western Europe	23	23	24	25	27
USA	84	80	74	82	91
Japan	106	105	98	99	106
Comecon	214	214	222	225	232
USSR	154	155	161	162	165
Developing/Third world countries	121	131	139	150	165
China	43	47	52	56	58
Republic of Korea	13	14	15	17	19
India	11	12	12	13	14
Democratic People's Republic of Korea	7	7	7	7	8
Taiwan	5	5	6	6	8
Brazil	18	20	21	22	25
World	711	719	713	739	779

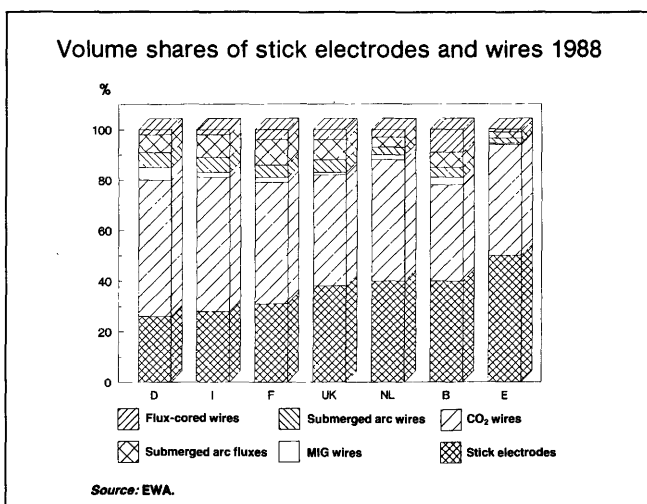
(1) Estimated.

Source: European Welding Association.



European welding market. On the consumables side, the market went up by about 5%. Some stagnation was still apparent in Belgium and in the Netherlands. The fastest growing countries were the United Kingdom, Italy and Spain.

Figure 2



As to the type of consumables, it should be noted that the market for stick electrodes is still on the decline whereas markets for other products, such as MIG/MAG wires, flux-cored wires and wires for submerged arc welding, are on the rise. This development is attributable to advances in automatic welding. For instance, the number of automatic arc-welding plants in which robots are used grew by more than 11% in 1988. The total electric welding equipment market is estimated to be worth between ECU 600 and 800 million.

The present situation with regard to external trade and employment is linked to present production and sales. Although these are at a very low level after the steep decline in the early 1980s, they have improved as was forecasted last year.

Structural change

The US market is dominated by a few large companies, while the European market consists of a very large number of small manufacturers in addition to a few larger ones.

Over the 1980s the welding sector has undergone substantial restructuring, leading to a reduction in the number of production units. One reason is the merger of producers, which has improved both the market and the financial situation. This trend is anticipated to continue but to a lesser extent.

Further restructuring in the industry is expected in view of strong competition from the east European and east Asian countries. However, west European producers are still in the lead as to product quality and technical innovation.

As far as the principal technological innovations are concerned, it can be said that robots play an important role, e.g. the automotive industry and spot welding. The use of semi-automatic welding equipment and the complexity of mechanization are still growing every year.

Geographic features

Production units can be found in the larger countries of Western Europe, e.g. France, Italy, Sweden, the United Kingdom and the Federal Republic of Germany. They do not only supply the domestic market, but also the markets of other countries. The large number of small manufacturing companies makes it very difficult to specify these markets.

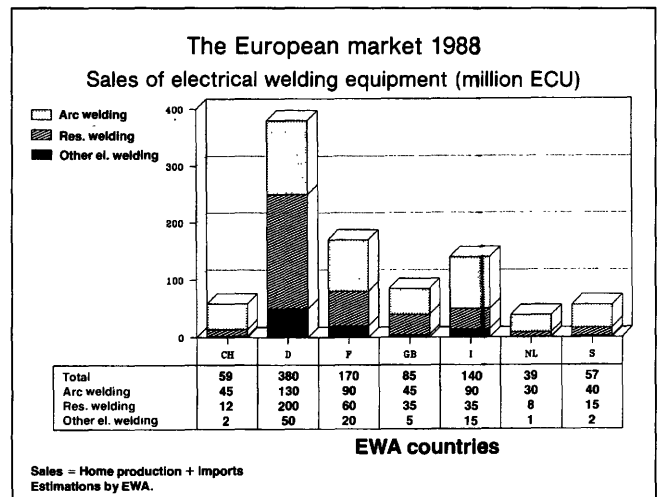
It can be roughly stated that by 1990 the period 1986-90 will emerge as one of growth for Germany, stability for France and shrinkage for the United Kingdom.

Outlook

Most of the institutes doing research on business outlook are of the opinion that the deceleration of development does not indicate the end of the economic revival. Rather, what is involved is a pause upturn in business.

The consumption of filler materials and sales of equipment in the EC will stabilize and probably increase due to improved demand in user sectors. Export market orientation and the ability of EC welding manufacturers to adjust to changing structures will decide the industry's future.

Figure 3



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CONSUMER BATTERIES

(NACE 343.2)

Summary

The primary dry-cell battery market is not expected to grow much anymore in volume terms. Within this market the emphasis is changing from zinc-carbon batteries to alkaline-manganese. The consumer market for rechargeable batteries will grow.

New technologies are being developed to extend the life of primary batteries and to reduce their mercury and cadmium content.

The main consumer application areas for dry-cell batteries at this moment are electronic audio equipment, toys, torches, and photo equipment. This is not expected to change very fast.

Product definition

In this report, batteries are defined as primary dry-cell batteries (mostly based on the alkaline-manganese or the zinc-carbon principle) and rechargeable batteries (mostly based on a nickel cadmium principle), and having a volume of less than 300 cm³.

The EC battery industry can be subdivided into two main sectors:

- primary batteries
- rechargeable batteries.

In both systems the production of electrical energy is based on an electro-chemical reaction. In primary batteries the alkaline-manganese and zinc-carbon systems are the most widespread. In small consumer rechargeable batteries, the reversible nickel cadmium system is mostly used.

Current situation

In Europe there are around 15 dry-cell battery companies with factories all around Europe. In the last 10 years there has been a tendency for concentration of the battery industry.

Most battery firms only have strong local brands but Duracell, Philips, Ucar, and Varta have brand representation throughout Europe.

Primary batteries

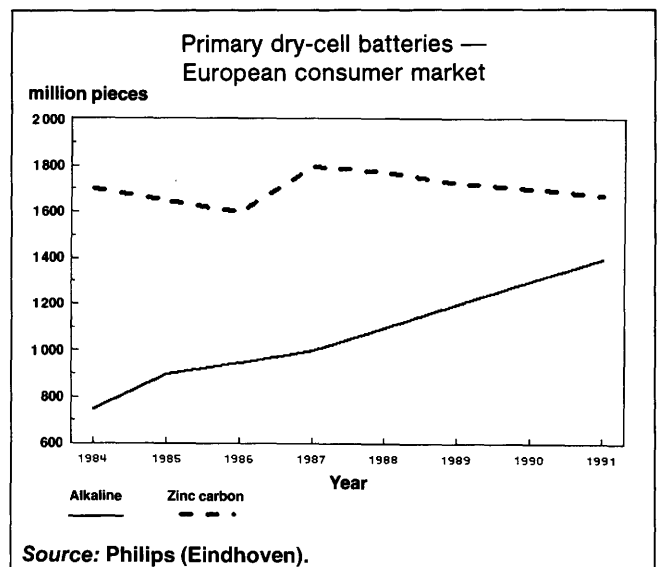
The main consumer application areas of primary batteries in Europe are: electronic audio equipment (walkmans, radios and cassette recorders); photo and film cameras; clocks and watches; pocket calculators; toys; and portable lights (torches). Electronic audio equipment is an important application area.

Different systems are used in primary batteries. The most widespread systems are zinc-carbon and alkaline-manganese batteries, an alkaline-manganese battery lasting longer than a zinc-carbon one. Button cells mostly function on a silver-oxide principle. Lithium and zinc-air are becoming more important.

The total European production of zinc-carbon and alkaline-manganese was around 3.3 billion pieces in 1988. A little less than 60% of this total production is zinc-carbon and a little more than 40% alkaline-manganese.

The main size in alkaline as well as zinc-carbon is the R6 penlight. In zinc-carbon the R6 penlight accounts for around 60% of the total sales.

Figure 1



Rechargeable batteries

Especially in heavy user areas, mainly electronic audio equipment and toys, the rechargeable battery is becoming more and more important.

The main system used for the small consumer rechargeable battery is the nickel cadmium system.

The total nickel cadmium market in the consumer version is estimated around 50 million pieces in Europe (in 1988). Just like the zinc-carbon and alkaline, the main size in this changeable nickel cadmium market is the R6 penlight, which accounts for around two-thirds of the total consumer market.

Starters

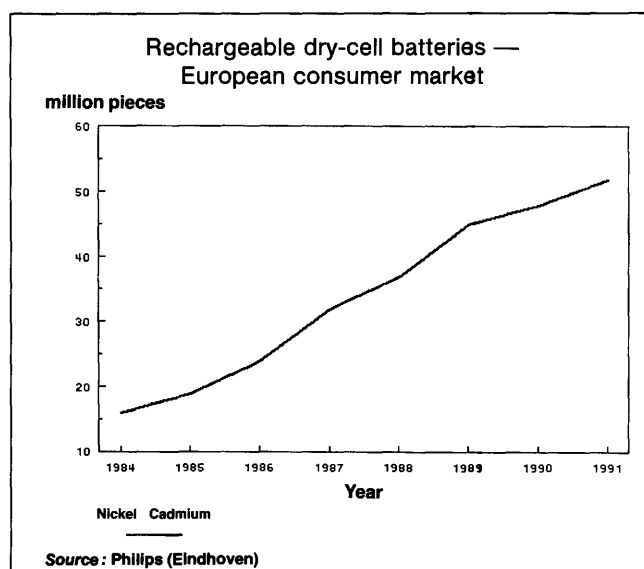
Starter batteries for motor vehicles are manufactured by 70 factories in the EC. However, at present only 75% of production capacity is being utilized. The most important manufacturing countries are the Federal Republic of Germany, Spain, France, Italy and the United Kingdom. Some large companies, such as Bosch and GM, specialize in the production of starter batteries. Most other large corporations, for example Chloride, Ceac and Varta, manufacture drive batteries and stationary batteries alongside starter batteries. The same is true for the majority of medium-sized companies. Some smaller companies in Germany and the UK also specialize in the production of starter batteries which are marketed on a more regional level (replacement batteries). Over the next few years, the market is expected to grow faster in Greece, Spain and Portugal than in the rest of the Community, due to the higher degree of motorization expected to take place in these countries.

The total home market sales increased by 16.8% during the 1980s. This was mainly due to the rising imports (from 6 335 units in 1980 to 12 880 units in 1988). In 1988, a slight fall-back can be seen.

The home market offer saw a similar evolution, the number of starter batteries increasing from 38 775 units in 1980 to 45 042 units in 1988.

Apparently, intra-Community trade improved since exports to Western Europe rose by 200%.

Figure 2



Environmental issues

Until now, it is neither economically viable nor technically feasible to recycle primary batteries containing low amounts of mercury. Only the silver-oxide batteries are from an economical point of view interesting for recycling the silver content. The mercury-oxide batteries can be recycled, but economics depend on the varying mercury price. As a result, some Member States of the European Community have installed separate waste collection for primary batteries containing too much mercury.

Since 1985, the European primary battery industry has reduced by 50% the amount of mercury disposed of in batteries, and has committed itself to reducing this by another 84% by 1992. These reductions are far greater than international agreements to reduce

Table 1
Starter batteries (1)

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Sales by domestic producers (2)									
to car manufacturers	11 299	10 410	9 337	9 649	9 452	10 035	10 198	10 745	11 032
to other customers	20 406	19 650	20 434	21 035	19 922	21 731	20 955	22 159	20 554
Imports (3)	6 335	6 820	9 502	9 993	10 707	11 256	11 495	12 888	12 880
Total sales	38 040	36 880	39 273	40 677	40 081	43 022	42 648	45 792	44 466

(1) Austria, Belgium, Denmark, FR of Germany, Spain, France, United Kingdom, Italy, Norway, Netherlands, Portugal, Switzerland, Finland and Sweden.

(2) Including imports by battery manufacturers.

(3) Excluding imports by battery manufacturers.

Source: Eurobat.

power-station and CFC emissions which contribute to a perceived global environmental problem.

The waste reduction is done by:

- a removal of 97.5% of the mercury from the alkaline-manganese battery compared with the 1985 levels;
- the replacement where possible of the mercuric oxide battery which contains an average 30% mercury with the zinc-air battery which contains about 1% mercury and the lithium battery which contains no mercury.

NiCd rechargeable batteries dependent on varying prices of nickel and cadmium can be recycled almost on a cost neutral basis.

Foreign trade

At least three-quarters of the total European imports in value are intra-European; of the exports around two-quarters are intra-European. Of all the European countries only Germany, Switzerland and Belgium had an export surplus (in value) in 1988.

Most of the extra-European imports are coming from the USA and Asia (especially Japan). The imports from Asia are still growing fast which causes increased pressure on the industry.

Employment trends

In 1985 the battery segment employed around 16 000 people in Europe. Since then, the total production of dry-cell batteries has only known a relatively small and gradual increase. Because of growing efficiency in production lines, a fairly stable market, and a growing concentration of manufacturers, the total

number of people employed in the dry-cell battery segment is expected to decline.

Trends

The applications for which the consumer uses batteries in general do not change very fast. The electronic audio equipment will remain the most important area of application (about half of the volume) followed by the lighting application and toys.

The total European production of zinc-carbon and alkaline-manganese batteries is expected to stabilize, or decline slightly within the next five years. The ratio alkaline: zinc-carbon (which is now around 40:60) is expected to become 50:50 within a few years.

The European market of buttoncells is now around 350 million pieces. The silver-oxide systems of buttoncells (by far the most important buttoncell market segment at this moment) will become more important, as well as the zinc-air system. This will happen especially on account of the mercuric-oxide principle.

The total estimated European market of rechargeable nickel cadmium batteries in a consumer version has more than tripled between 1984 and 1989. This growth is not expected to stop in the next 10 years.

Although the lithium battery market is statistically not very important in the consumer area at this moment, it is expected to become more important in the near future.

Because of a growing miniaturization of the applications the R6 penlight batteries and other small sizes will become more important in the primary and rechargeable battery production.

Table 2
Production and external trade

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Western Europe Production	40 706	39 269	41 539	42 154	43 260	46 968	46 004	48 384	47 749
Trade extra-Western Europe (1)									
Exports (2)	2 513	2 957	2 927	2 447	3 045	3 289	2 843	3 224	2 818
Imports (3)	1 773	1 850	2 044	1 803	1 967	1 345	1 189	1 308	1 317
Apparent consumption	39 966	38 162	40 656	41 510	42 182	45 024	44 350	46 468	46 248

(1) Internal trade was approximately 28% of production in 1988.

(2) Includes exports intra-Western Europe to other battery manufacturers.

(3) Includes imports intra-Western Europe from other battery manufacturers.

Source: Eurobat.

The European primary battery industry will continue to promote the collection and recycling of used batteries for which it is technically feasible and economically viable.

Where technology allows, the industry will also replace the high mercury content batteries by low mercury or mercury free systems without reducing product performance.

Outlook

The industry's opportunities lie in its capability to innovate and produce batteries without harmful sub-

stances, increase its productivity, and manufacture products which meet the highest quality and safety requirements.

Within the primary sector the emphasis will change from zinc-carbon to alkaline-manganese. The rechargeable sector will still grow fast within the next few years.

Eurobat: Association of European Dry-Cell Battery Manufacturers

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DOMESTIC ELECTRICAL APPLIANCES

(NACE 346)

Summary

In the first half of the 1980s, flat consumer demand, adjustments to over-capacity, and increased imports from third countries all created difficult conditions for the electrical household appliances industry. Thanks to the substantial restructuring that has taken place, the industry has largely returned to profitability. However, competition remains intense, and there is need for higher capacity utilization and further productivity gains.

Description of the sector

NACE category 346 covers the manufacture of electrical appliances generally intended for use in the home. It includes the following items:

- microwave ovens
- cookers (free-standing and built-in)
- dishwashers
- home laundry products (including washing machines)
- spin-dryers and tumble-dryers
- refrigeration products (refrigerators and freezers)
- personal care products (hair-dryers, etc)
- small kitchen appliances
- vacuum cleaners
- irons
- heating products.

Current situation

Production of white goods is a major sub-sector of the electrical engineering industry. Within the EC, domestic-appliances production represents about 10% of total production in the electrical engineering sector. But among Member States, the relative weight of domestic appliances varies from less than 7% in the Federal Republic of Germany to nearly 15% in Italy. The volume of major white goods produced in the EC in 1985 was 40% higher than in the USA and 76% higher than in Japan.

The Federal Republic of Germany, France, Italy and the United Kingdom together account for around 83% of total Community production. German manufacturers tend to be more strongly export-oriented and account for around 30% of extra-EC exports.

The value of production of white goods in the EC reached ECU 17.1 billion in 1987, which represents a 5.5% increase over 1986 in real terms. However, real consumption increased by 6.2% in 1987. This implies that import penetration of foreign-produced goods in the EC has further increased. Indeed, as Table 1 shows, net export earnings have declined both in nominal and in real value.

Clearly, the EC domestic-appliances sector has finally overcome the downward trend in production which affected the sector during most of the early 1980s. Between 1980 and 1987 EC production increased by more than 5% against a background of substantial rationalization and restructuring in the industry. The sharpest production cutbacks occurred in France and the UK, where rationalization of the industry was particularly pronounced.

Table 1
Main indicators, 1980-89 (1)
Electrical household equipment

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	11 084	11 500	12 357	12 479	13 601	13 267	14 160	15 534	17 037	N/A
Net exports	891	692	731	743	645	717	704	512	578	N/A
Production	11 975	12 192	13 088	13 222	14 246	13 984	14 864	16 046	17 615	18 336
Employment (1 000)	278.2	258.9	245.2	235.8	226.9	218.2	211.4	206.6	204.1	200.2

(1) Excluding Belgium, Denmark, Luxembourg and the Netherlands.

Source: Eurostat (Inde).

The market for domestic electrical appliances is characterized by relatively fierce price competition both at the domestic and the international level. This is reflected in the price indices for household appliances, which have increased by 1.8% annually on average during the past few years. This rate is considerably below average inflation in the manufacturing sectors (3 to 4% per year during the same period).

Excess supply on the market and the resultant downward pressure on profits triggered rationalization of production capacities in the 1980s, which is to some extent still going on. However, there are already indications that the industry has returned to profitability, with some of the major groups such as Zanussi and AEG reporting good results.

Production

Rising living standards and increased mass purchasing power have caused a shift in consumer demand and hence some changes in production trends. Production in the EC, (see Table 2) increased to over ECU 187 million in 1987, which represents an 11% gain over 1980 and a 2% gain over 1986. During the period 1980-87, growth was fairly weak for the major household appliances (+6%), but strong in the small appliances and electric-heating products subsectors (both +13%). However, within the major appliances category, particularly strong

growth was recorded for microwave ovens and dishwashers, two products for which the market is far from saturated.

In 1980 refrigerators represented 38% of the market for major white goods. By 1987 this proportion had declined to 34%, and with it total production from 13.7 million to 13.3 million units. Dishwashers, home laundry products and microwave ovens account for an expanding share of the total market, although the latter still only represent a very small proportion of the total.

In the EC as a whole, microwave ovens represent 2% of total production of white goods. In the USA the comparable figure is 10.4% and in Japan the figure is dramatically higher at 42%. The latter figure reflects the drive towards higher technology, and hence items offering greater added value, on the part of Japanese industry. Far Eastern producers currently dominate the EC microwave market. But, in 1987, EC domestic production of microwave ovens grew sharply, by more than 75% and even faster in 1988, and apart from the UK, in 1989.

Some smaller domestic appliances have shown particularly strong growth over the past 7 to 8 years. This is true for small kitchen appliances, which grew in volume by 18% up to 1986, but declined again in 1987. The number of personal-care products, by contrast, showed a renewed strong growth trend in 1987, with total units produced increasing by 22 % between 1986 and 1987. In the smaller appliances sub-

Table 2
Production by type of appliance

(million units)	1980	(%)	1985	(%)	1986	(%)	1987	(%)	AAGR
Major appliances									
Refrigeration products	13.7	37.5	12.4	35.4	13.1	34.8	13.3	34.5	-0.4
Home laundry products	10.8	29.6	10.5	30.0	11.5	30.6	12.4	32.0	2.0
Cookers	10.0	27.4	9.2	26.3	9.6	25.5	8.6	22.2	-2.1
Dishwashers	2.0	5.5	2.2	6.3	2.5	6.7	2.8	7.2	4.9
Microwave ovens	0.0	0.0	.7	2.0	.9	2.4	1.6	4.1	N/A
Total	36.5	100.0	35.0	100.0	37.6	100.0	38.7	100.0	.8
Small appliances									
Small kitchen appliances	60.0	54.1	70.4	56.7	70.7	57.8	67.7	54.1	1.7
Personal care products	28.3	25.5	29.3	23.6	26.7	21.8	32.4	25.9	2.0
Irons	13.2	11.9	13.8	11.1	13.7	11.2	13.9	11.1	.7
Vacuum cleaners	9.4	8.5	10.6	8.6	11.2	9.2	11.2	8.9	2.5
Total	110.9	100.0	124.1	100.0	122.3	100.0	125.2	100.0	1.7
Heating products									
Space heaters	13.0	63.4	15.4	67.5	16.6	71.2	16.2	69.8	3.2
Water heaters	7.5	36.6	7.4	32.5	6.7	28.8	7.0	30.2	-1.0
Total	20.5	100.0	22.8	100.0	23.3	100.0	23.2	100.0	1.8
Grand Total	167.9	100.0	181.9	100.0	183.2	100.0	187.1	100.0	1.6

Source: CECED.

sector, irons and vacuum cleaners are saturated markets with less buoyant growth prospects.

Consumption

The early 1980s was a difficult period for the industry. Consumption grew only marginally, in line with generally poor consumer spending growth in most Member States. The past two to three years have seen some resurgence in demand, particularly in the northern EC Member States. However, the value of imports into the Community more than doubled over 1980-86. International competition in the domestic-appliances sector has become increasingly fierce.

Recently, Japanese producers, for the first time, launched a marketing campaign for their products in Europe, a market in which they had as yet virtually no representation (except for microwave ovens). It is expected that they will soon account for 5 to 10 % of the EC market for domestic appliances. However, a considerable part of these Japanese brand-name products will actually be produced in Europe. US domestic appliances producers have announced similar moves.

An important factor in consumption trends over the 1980s has been the degree of market saturation, which, for many products, has increased sharply over the past three decades. In 1987 96% of households owned a refrigerator, 88% a washing machine and 82% a vacuum cleaner. Only the dishwasher, freezer and microwave oven markets have not reached saturation levels yet. Estimated saturation levels for major products are indicated in Table 3.

These consumption trends are exacerbated by the stagnant population growth in the industrially more advanced Member States and slower growth in the others. However, the sharp increase in the number of households as results of socio-economic factors, partially offsets this.

Member States in which consumer demand has been relatively more buoyant include the FR of Germany, Italy and particularly the UK, where apparent con-

sumption in nominal terms grew by 77% over the period 1980-85.

Trade

The value of extra-EC exports peaked in 1987 at ECU 3.2 billion, which amount represents 19% of total production. In 1987, exports increased marginally. During the 1980s, exports became more significant for the industry than in the two previous decades, their value increasing by 52% between 1980 and 1987.

Most recently, the export trend has slowed due to greater competition from both South-East Asia and East European countries in third markets. This trend has been reinforced by exchange-rate movements affecting the competitiveness of some EC countries. Nevertheless, the EC remains a key competitor in overseas markets given its advantages in product quality and technological advances in product design. This particularly applies to trade with other developed countries.

Imports, however, have increased considerably faster than exports (by 171% in value). Given that the composition of imports is most probably different from that of exports, and given that exports tend to be biased towards high-quality, high-priced goods, the difference in real growth rates should be even higher. The export/import ratio declined further, from 1.9 in 1986 to 1.7 in 1987.

Employment

As a result of excess capacity in the 1980s, production rationalization and restructuring has led to a decline in employment. This decline began in the 1970s but accelerated sharply over the period 1980-87, by the end of which the number of persons involved in the manufacturing of white goods had fallen by 26% compared with the 1980 employment level. In 1987 210 000 persons were employed.

Table 3
Growth of home penetration

(%)	1970	1980	1985	1986	1987
Refrigerators	77	93	96	96	96
Freezers	8	30	37	38	43
Washing machines	63	79	86	87	88
Dishwashers	3	14	20	21	22
Vacuum cleaners	60	75	79	79	82

Source: CECED.

In some Member States, employment levels have been increasing, although only marginally. Productivity has shown a sharp improvement over more recent years and the emphasis on productivity gains is strongly evident in the industry. In 1987, the average employee in the domestic appliances sector produced about ECU 60 000 worth of goods, against ECU 42 000 in 1980. Labour productivity thus increased by more than 42% over the period 1980-87.

Employment levels declined to a much greater extent in France and the UK, by around 22% and 34% respectively. Moreover, these trends are still in evidence. By comparison, employment in the German industry fell by around 9% only between 1980 and 1986.

Structural change

The concentration of the domestic household appliances manufacturing industry has always been relatively high compared with other industries. Mass production methods and economies of scale are particularly important aspects of the manufacture of these types of products. Over the last two decades, industry concentration has increased and the

number of manufacturers decreased; this trend has been exacerbated by the rationalization process undertaken during the 1980s. The number of companies in the industry thus continues to fall.

In 1980 the EC counted 810 manufacturers of domestic electrical appliances. By 1987 this number had been reduced to 440. Most of the rationalization of the sector took place in the early 1980s, however, and the downward trend in the number of manufacturers is decreasing.

Compared with the other three major EC producers, the Italian industry is much less concentrated. The average number of employees per company for the EC as a whole is around 475 while the equivalent figure in Italy is only half as much.

Production is dominated by large manufacturing establishments, mainly for reasons of economies of scale. This has contributed towards effective cut-backs in production capacity.

In addition, a number of the largest European operators have been involved in mergers and acquisitions. Philips acquired Bauknecht in 1986. In 1987 Electrolux took over the Zanussi operations in Italy

Table 4
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC (1)	11 975	12 192	13 088	13 222	14 246	13 984	14 864	16 046	17 615	18 336
Index	85.6	87.2	93.6	94.6	101.9	100.0	106.3	114.7	126.0	131.1
USA (2)	9 002	11 463	12 600	16 066	20 373	21 037	16 743	15 019	14 693	16 098
Index	42.8	54.5	59.9	76.4	96.8	100.0	79.6	71.4	68.8	76.5
Japan (2)	7 998	10 042	11 083	14 587	17 270	18 205	17 921	16 300	18 827	N/A
Index	43.9	55.2	60.9	80.1	94.9	100.0	98.4	89.5	103.4	N/A
Production in constant prices										
EC (1)	15 136	14 414	14 617	14 110	14 629	13 984	14 708	15 285	16 785	17 473
Index	108.2	103.1	104.5	100.9	104.6	100.0	105.2	109.3	120.0	N/A
EC trade in current prices										
Exports extra-EC	1 577	1 613	1 639	1 779	1 967	2 134	2 105	2 150	2 329	N/A
Index (3)	71.8	75.6	76.8	83.4	92.2	100.0	111.5	113.9	123.3	N/A
Imports extra-EC	630	821	840	953	1 245	1 394	1 344	1 579	1 838	N/A
Index (3)	44.5	58.9	60.3	68.4	89.3	100.0	120.1	141.2	164.2	N/A
X/M	2.50	1.96	1.95	1.87	1.58	1.53	1.57	1.36	1.27	N/A
Imports intra-EC	2 446	2 643	2 902	3 123	3 818	3 655	4 313	4 745	5 209	N/A
Index (3)	69.7	72.3	79.4	85.5	104.5	100.0	114.9	149.2	138.8	N/A

(1) Excluding Belgium, Denmark, Luxembourg and the Netherlands.

(2) Census of Manufactures and Eurostat estimates.

(3) Taking into account changes in EC membership.

Source: Eurostat (Inde, Bise, Comext).

and Spain. The Italian companies Ariston and Indesit merged in 1988. There has also been takeover activity at the international level with the purchase of White Westinghouse in the USA by Electrolux and most recently the acquisition of Whirlpool (US) by Philips.

Mergers and acquisitions are a means of increasing a company's market share with overall relatively low-growth rates (in contrast to more lucrative markets such as, for instance, consumer electronics). However, mergers and acquisitions are also triggered by the pressure for further reduction of production costs through economies of scale.

The prospect of the 1992 single market is likely to further accentuate the rationalization process within the Community, although major changes have already taken place.

Production of domestic electrical appliances occurs in all the Member States of the Community. Since transport costs are an important component of overall costs, proximity to markets is a key factor in location decisions. Transport cost considerations have, so far, kept Japanese and US producers out of the EC market, except in the case of microwave ovens, where the ratio of transport costs to sales price is relatively low. Recently, however, Japanese producers have developed plans to acquire or set up production for products other than microwave facilities in the EC.

Differences concerning design and taste between European and Japanese consumers are another major obstacle to Japanese sales in Europe. In 1989, a few Japanese firms have started to test the marketability of their products in the EC, more specifically

on the UK market. If this proves to be successful, it is likely that the rest of the EC market will be opened in a similar way.

Outlook

Fears that the stock market crash of October 1987 would sharply reduce consumer demand have not been borne out. On the contrary, the crash drained resources away from financial investment to real investment, resulting in an upsurge in demand for investment goods.

The general shift in national spending away from consumption and towards investment had a negative impact on expenditure on domestic appliances in 1988 and probably also in 1989. Steady growth in consumption in the region of 2 to 3% in terms of units is expected for 1989 and 1990. However, some product sectors of the market, such as microwave ovens and dishwashers are anticipated to grow much faster.

Production growth rates in the EC are expected to reach the same order of magnitude, i.e. 2 to 3% per year for 1989-90. The industry will continue to operate in an intensely competitive environment both domestically and internationally.

CECED: Conseil européen de la Construction électrodomestique
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ELECTRIC LIGHTING

(NACE 347)

Summary

Total EC production reached ECU 5 980 million in 1988, providing employment for over 85 000 persons. Intra-EC trade grew considerably faster than extra-EC trade, to a large extent because high transport-to-value ratios prevent effective competition from distant producers, especially for the low-priced products. In 1987, the EC had an ECU 334 million trade surplus in the electric lamps sector. On the other hand, different norms and standards for electrical goods slow down the development of intra-EC trade.

Description of the sector

NACE group 347 covers the manufacture of electric lamps and other electric lighting equipment. It is divided in two subgroups: the manufacture of electric lamps (NACE 347.1) and the manufacture of other electric lighting equipment (NACE 347.2).

Current situation

Trends in demand for electric lamps can be ascribed to two major factors. On the one hand, there is a

Table 1
Main indicators, 1980-89 (1)
Electric lighting

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	3 197.8	3 075.4	3 255.1	3 312.8	3 680.5	4 122.5	4 328.9	5 028.2	5 646.7	N/A
Net exports	327.4	401.2	410.0	429.5	491.0	588.2	578.0	429.7	333.7	N/A
Production	3 525.2	3 476.6	3 665.1	3 742.3	4 171.5	4 710.7	4 906.9	5 457.9	5 980.4	6 289.0
Employment (1 000)	103.9	98.6	89.5	84.6	84.5	86.9	85.3	85.9	85.1	86.1

(1) Excluding Belgium, Denmark, Ireland, Luxembourg and Netherlands; 1987-88 estimated.

Source: Eurostat (Inde, Bise, Comext).

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC (1)	3 525.2	3 476.6	3 665.1	3 742.3	4 171.5	4 710.7	4 906.9	5 457.9	5 980.4	6 289.0
Index	74.8	73.8	77.8	79.4	88.6	100.0	104.2	115.9	127.0	133.5
USA (2)	4 070.5	5 330.5	6 251.2	7 539.0	9 624.2	10 867.9	8 742.6	7 755.0	7 815.9	8 724.7
Index	37.5	49.0	57.5	69.4	88.6	100.0	80.4	71.4	71.9	80.3
Japan (2)	2 185.0	2 716.0	2 908.0	3 377.0	3 863.0	4 072.0	3 957.0	3 817.0	4 522.0	N/A
Index	53.7	66.7	71.4	82.9	94.9	100.0	97.2	93.7	111.1	N/A
Production in constant prices										
EC (1)	4 702.5	4 300.7	4 237.5	4 177.7	4 376.9	4 710.7	4 887.0	5 386.9	5 661.6	5 805.0
Index	99.8	91.3	90.0	88.7	92.9	100.0	103.7	114.4	120.2	123.2
EC trade in current prices										
Exports extra-EC (3)	625.6	711.8	769.8	857.6	963.1	1 104.5	997.1	963.3	989.8	N/A
Index	56.6	64.4	69.7	77.6	87.2	100.0	90.3	87.2	89.6	N/A
Imports extra-EC (3)	296.4	321.4	340.6	359.8	419.1	455.3	453.0	506.4	605.4	N/A
Index	65.1	70.6	74.8	79.0	92.0	100.0	99.5	111.2	133.0	N/A
X/M	2.1	2.2	2.3	2.4	2.3	2.4	2.2	1.9	1.6	N/A

(1) Excluding Belgium, Denmark, Ireland, Luxembourg and the Netherlands); 1987-89 EC production forecasted.

(2) Census of Manufactures and Eurostat estimates.

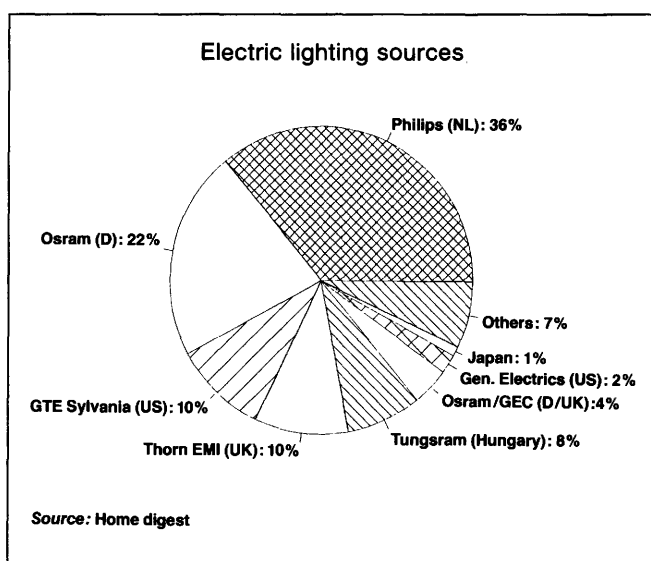
(3) Including estimates for Greece, Spain and Portugal. Excluding Belgium, Denmark, Ireland, Luxembourg and Netherlands.

Source: Eurostat (Inde, Bise, Comext).

fairly stable demand for the replacement of electric lamps. On the other hand, construction of new buildings and renovation of old ones generates demand for both new electric lamps and other electric lighting equipment required for the installation of these lamps. The latter type of demand is more cyclical and related to trends in the construction sector.

Growth in EC production was very poor during the early 1980s, mainly because of very low activity levels in the construction sector in most EC countries. From 1984 onwards growth rates increased rapidly, to fall again, however, in 1988.

Figure 1

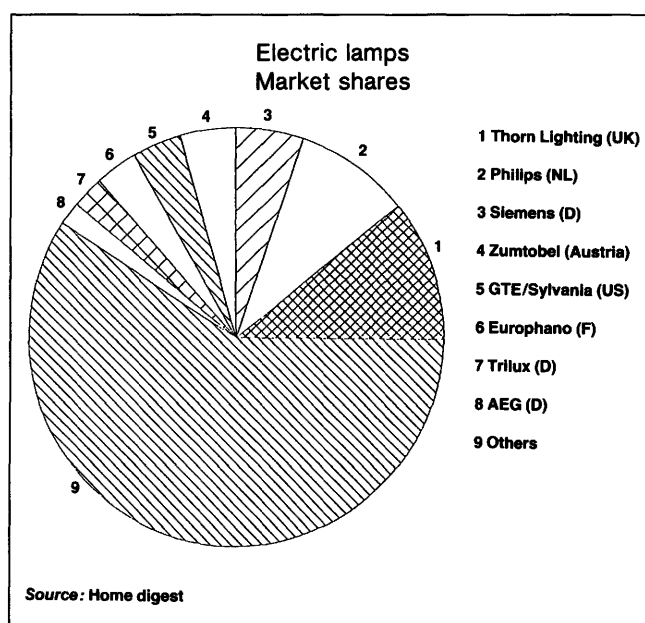


(20.2%), France (17.6%), Spain (13.8%) and Italy (10.8%). The Netherlands is also one of the main producers.

Employment

The number of persons employed in this sector has decreased rapidly during the early 1980s, mainly as a result of restructuring and elimination of obsolete or redundant production capacities in the EC. Employment figures in this sector are not available for all EC countries. But the available data show that total employment dropped from nearly 104 000 persons in 1980 to around 84 000 in 1983 — a decrease of nearly 20%. Thereafter, employment increased again and remained fairly stable at around 85-86 000 persons throughout the rest of the 1980s.

Figure 2



Production in the EC represented about ECU 6 000 million in 1988. The main producers are Germany (with a production of ECU 2 185 million, or about 36.5% of the total production), United Kingdom

Table 3
Production by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987 (1)	1988 (1)	1989
FR of Germany	1 346.4	1 297.9	1 375.0	1 522.8	1 628.5	1 795.2	2 004.4	2 053.0	2 185.0	2 258.0
Greece (2)	9.2	10.7	11.8	11.3	10.6	12.0	11.7	9.5	9.0	9.6
Spain	535.7	559.8	565.8	490.1	487.6	508.7	369.3	696.7	823.0	867.0
France	466.9	486.4	549.0	548.6	593.1	822.2	940.0	980.0	1 052.0	1 073.6
Italy	325.8	331.5	290.5	263.3	476.0	501.9	543.6	581.0	646.0	707.3
Portugal (3)	53.7	62.6	71.6	75.8	72.8	64.0	52.2	52.7	60.4	63.5
United Kingdom	787.5	727.7	801.4	830.4	902.9	1 006.7	985.7	1 085.0	1 205.0	1 310.0
Total	3 525.2	3 476.6	3 665.1	3 742.3	4 171.5	4 710.7	4 906.9	5 457.9	5 980.4	6 289.0

(1) Estimated.

(2) 1984-88 estimated.

(3) 1981, 1986-88 estimated.

Source: Eurostat (Inde).

Germany, which accounts for the bulk of EC production of electric lamps, also has the largest labour force in the sector: over 33 000 persons.

The restructuring of the sector in the early 1980s has improved labour productivity. In 1980, average labour productivity in the EC stood at ECU 34 000 per employed person. By 1985, after the main wave of restructuring, labour productivity had increased by 60% in nominal terms — that is, without taking into account changes in the price of electric lamps — to ECU 54 200 per person.

But the results differ by Member State. High-flyers in productivity improvement were Italy and Greece, where increases amounted to 108%. At the other extreme, the UK managed to squeeze out a 45% nominal increase only. Germany's productivity increases also remained limited to less than 50%.

Trade

The nominal value of extra-EC exports of electric lamps by EC countries increased by 58% over the period 1980-88, totalling ECU 990 million in the latter year. On the other hand, extra-EC imports increased even faster by 104% over the same period, to reach a value of ECU 605 million in 1988.

Still, throughout the 1980s, the EC has run a trade surplus for electric lamps with the rest of the world, except with Japan. By 1987, the surplus with the rest of the world stood at ECU 571 million while the deficit with Japan in particular amounted to ECU 93 million.

Within the EC, the Netherlands is the major supplier of electric lamps, followed at a distance by France

and Germany. The role of Philips, the Dutch electrical goods multinational, has certainly been crucial in granting the Netherlands this leading position.

The faster growth of imports than that of exports indicates that the EC is gradually losing its competitive advantage on the world market for electric lamps. In order to maintain its position, EC lamp industries have made efforts to invest more in high quality high-priced products, such as special types of energy saving electrical lamps and lamps and fittings with special design for interior decoration in homes and offices.

To a certain extent, the electrical lamps sector is sheltered off from competition from Asian or US producers. The relatively high cost of transport compared to the value of the product, has effectively prevented non-EC producers from entering the EC market. This is certainly true for the production of ordinary light bulbs, but perhaps less obvious for special-purpose electrical lamps, fittings and other types of related equipment.

Exception should be made for Eastern and Northern European producers; their transport cost disadvantage is less important. Exception should also be made for high-priced products such as design lamps where transport costs play a less important role. In the latter market, Northern European producers have made important inroads during the 1980s.

Last but not least, EC Member States often set different norms and standards for electrical equipment, including electric lamps, thereby effectively protecting domestic producers from foreign competition, unless the foreign producer is willing to make the necessary investment to comply with local standards.

Table 4
Employment by country

	1980	1981	1982	1983	1984	1985	1986	1987 ⁽¹⁾	1988 ⁽¹⁾	1989
FR of Germany	35 108	32 909	30 856	30 046	29 876	31 335	32 133	32 413	32 727	33 457
Greece ⁽²⁾	488	432	327	304	297	333	330	314	314	315
Spain	16 605	15 530	13 918	12 020	9 501	9 349	7 092	8 652	8 652	8 677
France	12 408	11 775	11 605	11 122	11 357	13 084	13 321	13 030	12 808	12 811
Italy	9 565	9 417	6 900	5 170	7 511	7 053	6 673	6 415	6 221	6 009
Portugal ⁽³⁾	4 132	4 200	4 269	4 156	3 868	3 172	3 049	2 978	2 987	2 996
United Kingdom	25 613	24 306	21 748	21 818	22 040	22 615	22 741	22 102	21 341	21 834
Total	103 919	98 569	89 523	84 636	84 450	86 941	85 339	85 904	85 050	86 099

(1) Estimated.

(2) 1984-88 estimated.

(3) 1981, 1986-88 estimated.

Source: Eurostat (Inde).

The impact of 1992

In view of the creation of the single market in 1992, the Commission of the EC is making efforts to harmonize electrical equipment standards, which should have a favourable effect on intra-EC trade in electric lamps.

In fact, intra-EC trade has been growing considerably faster during the 1980s than extra-EC trade. The value of intra-EC exports grew by 100% during the period 1980-87, while extra-EC exports increased by

71% only. On the imports side, intra-EC imports also registered a 100% growth rate over the same period, while extra-EC imports increased by 88% only. Clearly, transport costs as well as implicit trade barriers, such as different standards, have had a negative effect on the development of long-distance trade.

DRI-Europe

The industry is represented at a European level by:

ELC: European Lighting Council

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Tel: (32 2) 231 0373, Telefax: (32 2) 231 0684

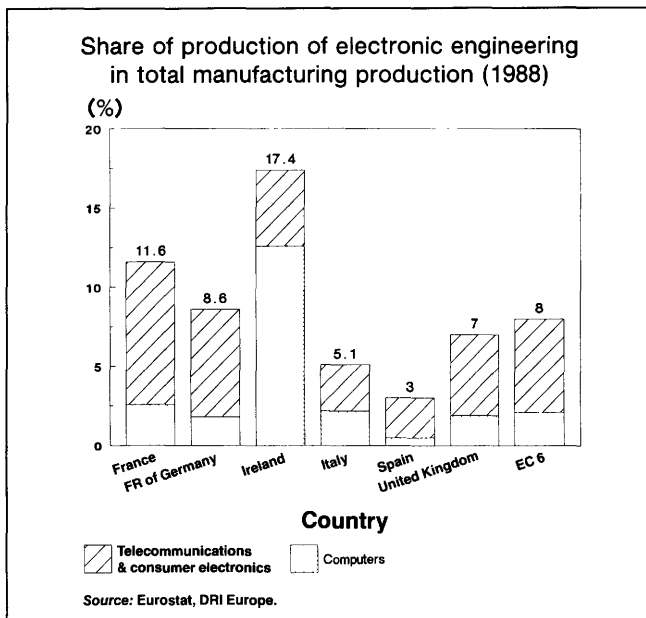
ELECTRONIC ENGINEERING INDUSTRY

(NACE 33, 344, 345)

The economic importance of the industry in the EC economy

The European electronics industry had a production of ECU 151 493 million in 1988 and contributed 8% to overall industrial production in the EC. Europe's top two employers, Siemens and Philips, are both dominant producers in the electronic engineering sector, and were important contributors to the industry's total level of employment of 1 734 517 in 1988.

Figure 1

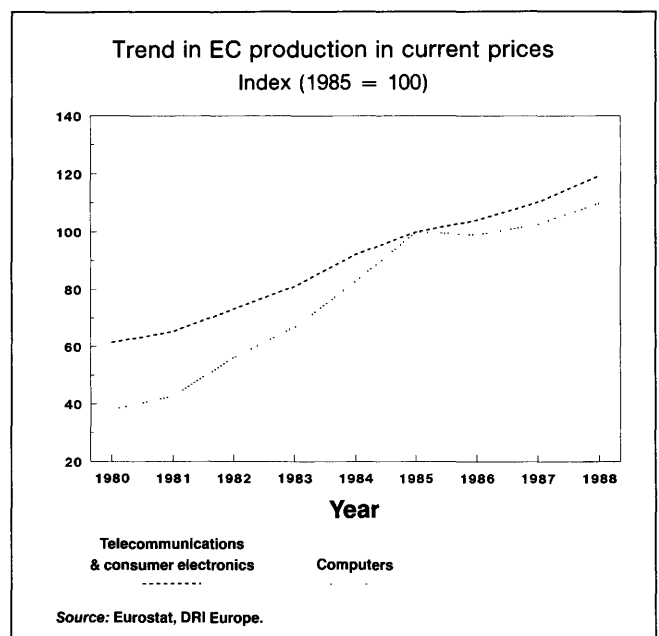


Within the EC, the importance of the electronic engineering sector in each Member State varies significantly, ranging from a startlingly high 17% of industrial production in Ireland (the recipient of large amounts of foreign investment for manufacturers wishing to set up production facilities in Europe) to Italy and Spain, where electronic engineering as a share of industrial production is 5% and 3% respectively. Data for the Netherlands are not available for reasons of confidentiality. Philips, which is based in the Netherlands, is the seventh largest company in the EC with worldwide turnover of

ECU 24 billion in 1988 of which 61 % was generated in Europe. In terms of employment, 35 % of the 185 000 people employed by Philips in Europe at the end of 1988 were based in the Netherlands. Although Philips is a major producer of electronic engineering, it is difficult to estimate what proportion of their sales are within NACE 33, 344 and 345.

Electronic engineering has been one of the fastest growing sectors in the EC over the last decade. Growth averaged 10% in nominal terms between 1980 and 1988 although much of this growth occurred earlier on in the decade, before 1986 when the industry experienced a downturn. Telecommunications and audiovisual equipment grew at a rate of 9% over the nine-year period compared to growth in computers and office equipment which posted an outstanding compound annual growth rate of 14% between 1980 and 1988. Rapidly changing technology and products make it difficult to measure trends in prices in the electronic engineering sector, thus we refer primarily to trends in production measured in nominal terms.

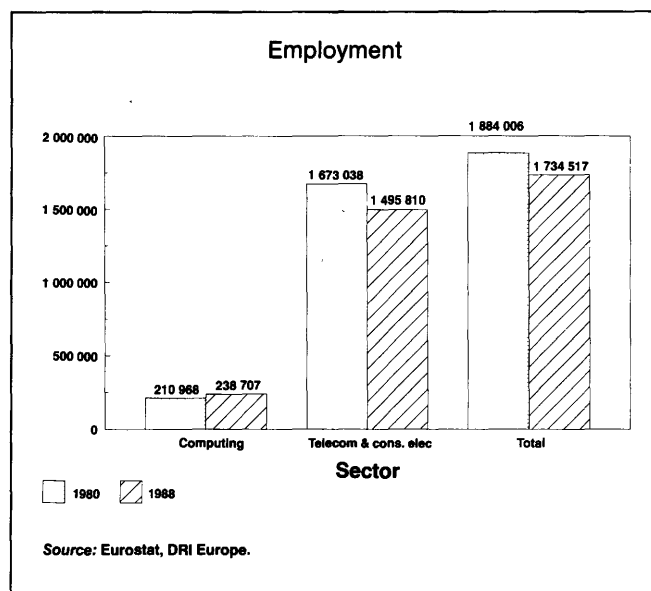
Figure 2



Products in the electronics industry require vast expenditures on research and development to bring them to market and thus prices are initially very high in order to recoup these high upfront expenditures. Thereafter, prices fall rapidly to discourage new entrants.

Despite this strong performance in production, employment in the electronic engineering sector fell from 1.88 million in 1980 to 1.76 million in 1988. Strong import competition, particularly in consumer electronics, had a negative impact on employment and further declines are anticipated as the industry restructures and consolidates in the coming years.

Figure 3



Description of the industry

This overview examines the trends in a very broad sector grouping which comprises computer and office equipment, telecommunications and consumer electronics. The industry has grown very rapidly over the past two decades, and it is difficult to capture in an overview the dynamics of this sector, the rapid development of new technology, the introduction of new products and the demise of others. It is still more difficult to base the more detailed analyses contained in the subchapters on the NACE classifications which date back to 1970, when many of the products that now characterize the electronic engineering sector were not yet developed.

Figure 4

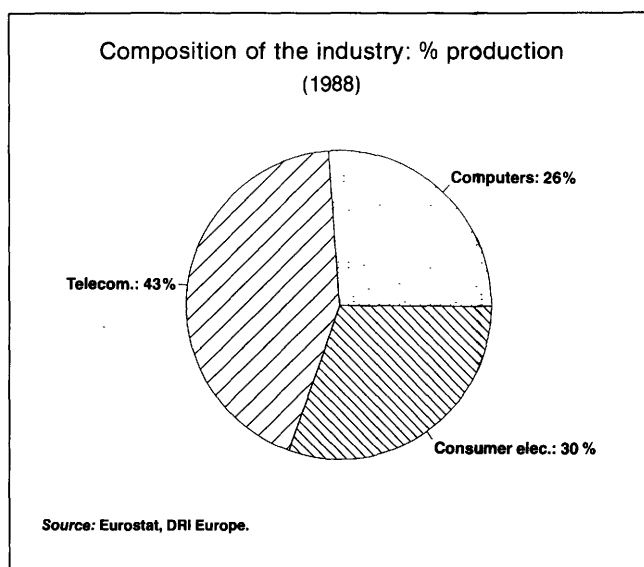


Figure 4 shows the distribution of these categories according to NACE. Telecommunications is the largest component of electronic engineering, with an estimated 43% of the electronic engineering sector. This is followed by computer and office equipment with 26%, and audiovisual equipment and records and tapes which together account for the remaining 30%.

Although the overview refers to all of the above categories, the subchapters within Chapter 12 exclude any discussion of tapes, records and compact discs (the latter being covered in Chapter 29). The subchapters are divided as follows:

- electronic components such as semiconductors and integrated circuit boards (NACE 344 and 345);
- computer and office equipment (NACE 33);
- telecommunications equipment (NACE 344); and
- consumer electronics excluding tapes, records and compact discs (NACE 345.1).

Electronic components, which are discussed in more detail in chapter 12.1, are contained in the NACE classifications of both telecommunications (NACE 344) and consumer electronics (NACE 345), which are grouped together in the overview.

Industry structure

The electronic engineering sector is highly concentrated. In the telecommunications industry, for example, the 10 largest companies account for 48%

of the market and in personal computers, IBM and Compaq hold the dominant positions in the market.

The rationalization and restructuring that is taking place in the industry will serve to further this already high degree of concentration. With the prospect of a single European market ahead, companies are seeking to expand their market share and geographical access, through mergers and takeovers rather than internally generated expansion. Also, opportunities for scale economies in production and in research and development have led firms to expand their operations as a means to retain their competitiveness.

Risks and opportunities

The electronic engineering sector is characterized by heavy upfront research and development costs, coupled with short product life-cycles (a matter of a few months for some consumer products). Being first in the marketplace is important because the initial high price of the first devices can cover research and development costs. As a result of these factors, however, there is a fine line between reporting a return on investment or a net loss. European manufacturers have traditionally entered the market following the USA and Japan as prices are falling and often do not achieve payback on their investment; thus, they will need to continue to strive for world-class facilities and production standards in order to meet the competitive pressures from abroad. A number of

European companies are considering or are already involved in joint ventures (such as Jessi, the joint research programme between several major European companies discussed in Chapter 12.1) in order to improve their competitive position worldwide.

Outlook

There is an increasing number of joint ventures and mergers ahead as the electronic engineering industry positions itself for the creation of the single market in 1992. The new EC regulation requiring that semi-conductors be 'diffused' in Europe in order to satisfy local origin requirements has also led to the establishment of new production facilities in Europe by foreign producers as they seek to take advantage of the growing European market for electronics.

Although the electronics industry will not achieve the exceptionally high rates of growth achieved in the early to mid 1980's over the next several years, there are still many opportunities in such markets as ISDN and high-definition television. The increasing content of electronic components in automobiles will also provide another growth market for electronic components. The next few years will be filled with competitive pressures and structural change, as the industry copes with ever-increasing research and development costs, and the rapid pace of technological change.

DRI Europe

ELECTRONIC COMPONENTS

(NACE 345)

Summary

In 1988 the EC electronic components industry (including active, passive and electromechanical components) achieved a manufacturing output estimated at more than ECU 14.4 billion, 4.6% up on the previous year. In a worldwide context, this can be compared to a components production of ECU 30 billion in the USA and ECU 39 billion in Japan.

The apparent consumption of components grew by 8.9%, resulting in a trade deficit of ECU 1.1 billion.

There has been a considerable increase in investment in this sector, particularly from foreign companies anxious to strengthen their European base prior to 1992. NEC, Hitachi, Toshiba and Fujitsu have announced that they all plan to establish semiconductor fabrication facilities in the EC. The recently adopted application of the rules of origin to semiconductors, which define 'diffusion' as the criterion for EC origin and which have been under discussion for some years, may have had the unintended side-effect of encouraging non-EC companies to set up fabrication plants in the EC. Co-operation amongst EC firms, assisted by governments, is increasing, e.g. Philips/Siemens and SGS/Thomson (ST), the aim of this being to pool R&D resources and improve production capabilities in order to compete more successfully in world markets.

Definition of the sector

Electronic components are the basic building blocks in the manufacture of all electronic equipment including electronic data processing, telecommunications, consumer, automotive, industrial, military/aerospace equipment. Electronic components encompass a vast catalogue of products, however, these can be classified into three main categories: active components, passive components and electromechanical components.

Active components include semiconductors (integrated circuits and discrete semiconductors) and electronic valves and tubes.

Passive components include capacitors, resistors and wound components (small transformers, chokes, coils and other inductors).

Electromechanical components include connectors, relays, switches and printed circuit boards.

The NACE coding system is insufficient to draw out the intricacies of this dynamic market place. Therefore, the statistics for this overview have been obtained from *Eurostat* using the Nimexe (1981-87) and Combined Nomenclature (1988) coding systems which provide finer detail. In addition, other specialist and general sources (BIS Mackintosh Elsevier, etc.) have been used. 1988 data have been used where available, employment figures being the main exception.

Current situation

The electronic components industry suffers from large cyclical swings; 1986 was an especially bad year for this industry, 1987 showed little improvement, however, 1988 proved to be a better year. The growth rate in 1988 was heading back towards the growth rates seen prior to 1986.

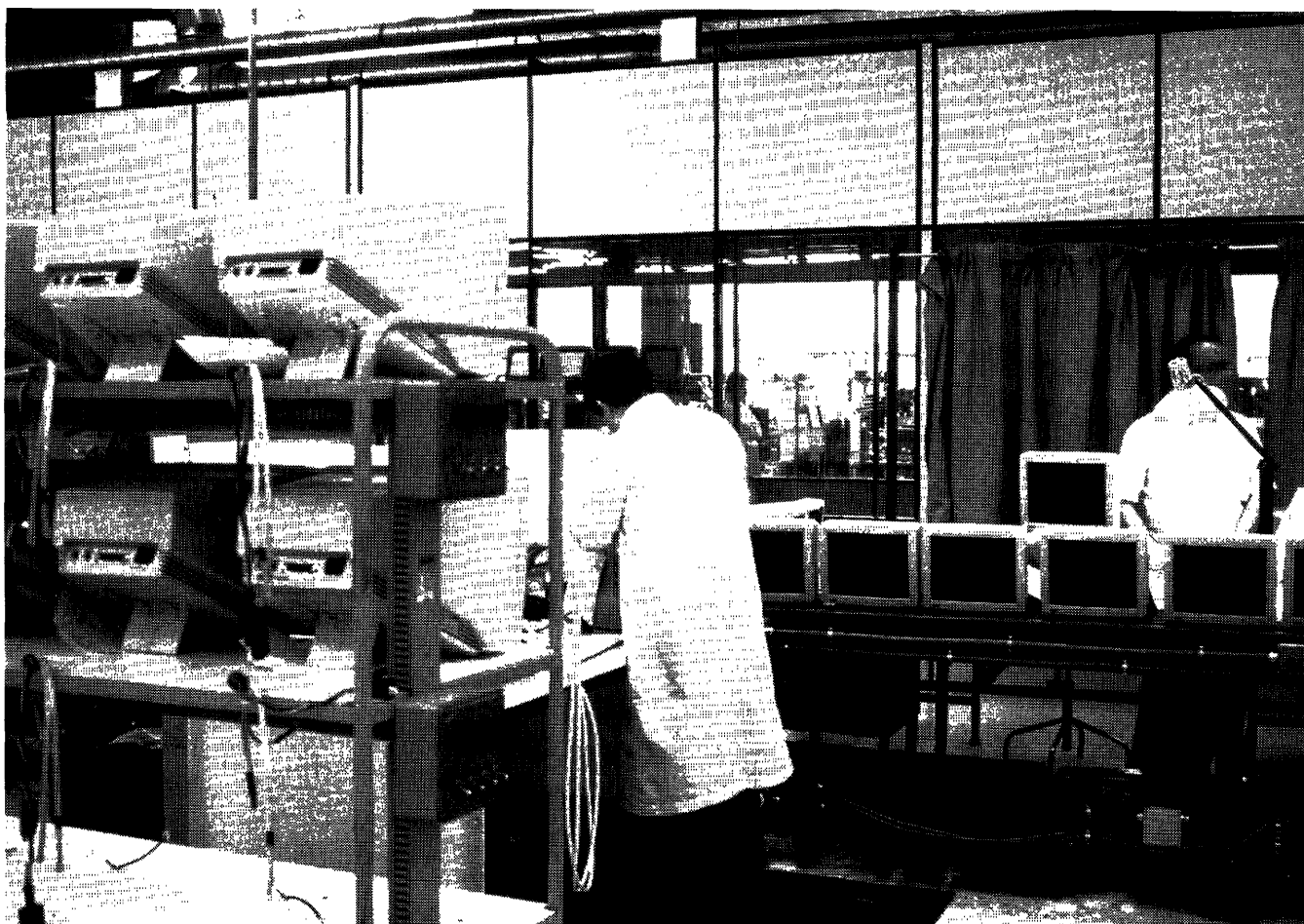
In 1988, the production of components in the Community was ECU 14.4 billion — significantly less than in the USA (ECU 30 billion) or Japan (ECU 39 billion).

The Federal Republic of Germany, France, the United Kingdom and Italy together account for more than 80% of EC output, with shares of 37, 19, 19 and 8 % respectively.

The EC components industry accounted for 17% of the total output of the Community electronics industry in 1988. This can be compared to a component industry ratio of 31% for the Japanese electronics industry and 21% for the American industry.

The production of active components was ECU 6.3 billion in 1987 rising to ECU 6.6 billion in 1988, an increase of 4.9% with Germany (31%), France (23%), the UK (19%) and Italy (10%) accounting for 83% of the total. Integrated circuits (ICs) represent the major share output for the industry followed by tubes and finally discrete components.

The share of active components in the production value of all components was 46%; that of integrated circuits alone was 21%.



Production of semiconductors in the EC is heavily biased towards the technologically simpler discretes than is the case in the USA or Japan. In Europe the split is 32% discrete and 68% ICs compares to 14% discrete for the USA and 27% for Japan. The main producer of ICs is Germany with 32% of output, followed by the UK (22%), France (19%), the Netherlands (13%) and Italy (7%).

The European production of passive and electro-mechanical components in 1987 was ECU 7.48 billion rising to ECU 7.8 billion in 1988, an increase of 4.3%. France accounted for 16% of this output, the UK 19% and Germany 41%. The European production of passive and electromechanical components accounts for 54% of the electronic component production in the EC. Of this production output the main products are: connectors (34%), printed circuit boards (23%) and capacitors (15%).

The EC market for components totalled ECU 15.5 billion in 1988, a rise of 8.9% compared with the previous year. Active components accounted for 59% of the market. By comparison, the USA provided a market worth more than ECU 32 billion in 1988 while Japan consumed components to the value of ECU 27 billion. 18% of the world market is

accounted for by the Far East and other European countries.

Table 1
Share of 1988 EC production

(million ECU)	Production	% Share
Integrated circuits	2 998	21
Connectors	2 670	19
Tubes	2 157	15
PCBs	1 794	12
Discrete semiconductors	1 442	10
Capacitors	1 134	8
Wound components	611	4
Relays	556	4
Switches	527	4
Resistors	517	3
Total	14 406	100

Source: BIS Mackintosh.

The UK and Ireland will overtake the Federal Republic of Germany as Europe's biggest semiconductor market with Italy and France running roughly equal. However, the Italian market shows a substantial growth of 50% in 1988 primarily fuelled by the domestic high-tech and automotive industries.

Significant emerging markets for electronic components include ISDN (Integrated System Digital Net-

work) in the telecommunications sector, HDTV (high definition television) in the consumer sector, and the increasing electronic content in automobiles which has been partly responsible for Italy's 1988 growth.

The European market for passive and electro-mechanical components in 1988 was valued at ECU 6.3 billion which represented an increase of 5.9% over the previous year. Connectors account for the largest share with almost one-third of this market, followed by printed circuits with almost a quarter of the market, and finally capacitors and resistors which together account for almost another quarter of the total.

The Federal Republic of Germany (32%), the UK (23%) and France (17%) were the largest consumers.

Technology trends

The transistor of the 1950s was followed by the bipolar IC in the 1960s. The 1970s saw the semiconductor memory and microprocessor and by the 1980s it was the turn of CMOS (Complementary Metal Oxide Semiconductor) technology and the growth of semicustom application-specific ICs. These developments have supported the evolution of the semiconductor from discrete components to complex subsystems on silicon.

At the same time, material costs have remained virtually fixed. The further IC design elements can be

shrunk, the more cost-effective complex ICs become. Density has increased from up to 2 000 transistors on a chip in the 1960s to today's upper reaches of several million transistor functions. Likewise, line widths of ICs have evolved from 5 microns in the early 1970s to today where the bulk of ICs have features in the 1.5 to 1.25 micron (1 micron = 10⁻⁶ metres) range and for leading edge products the transition to 1 micron and below is underway.

The industry believes that line widths of 0.35 micron will be possible with optical lithography techniques by the late-1990s following equipment refinements. The ability to go well into the submicron range without shifting to a new technique in the short term is expected to offer a substantial cost saving. In optical lithography, ultraviolet light is used to transfer a circuit pattern on to the surface of a silicon wafer. Alternatively, lines smaller than 0.35 micron can be achieved using X-ray lithography. A further option is to use direct-write techniques where a directed energy draws the circuit pattern directly onto the wafer.

Lasers are now beginning to find use, as are X-rays. Key players in the major production regions have been supporting X-ray research programmes. In Europe the project is run by a consortium of semiconductor and production equipment companies, centred at the Fraunhofer Gesellschaft in West Berlin and funded by various European governments.

Table 2
Breakdown of main indicators by segment, 1981-91 (1)

(million ECU)	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
All components											
Apparent consumption	6 826	7 451	8 943	12 894	13 708	13 722	14 263	15 532	N/A	N/A	N/A
Net exports (2)	951	1 125	819	-526	-480	-107	-491	-1 126	N/A	N/A	N/A
Production	7 777	8 576	9 762	12 368	13 228	13 615	13 772	14 406	14 860	15 492	16 125
Active components											
Apparent consumption	4 153	4 754	5 715	8 115	8 303	8 159	8 287	9 206	N/A	N/A	N/A
Net exports (2)	-871	-1 042	-1 330	-2 257	-2 330	-1 941	-1 998	-2 608	N/A	N/A	N/A
Production	3 282	3 712	4 385	5 858	5 973	6 218	6 289	6 598	6 819	7 330	7 842
Passive components											
Apparent consumption	1 561	1 713	1 842	2 243	2 338	2 412	2 417	2 608	N/A	N/A	N/A
Net exports (2)	7	-22	-55	-183	-217	-225	-224	-347	N/A	N/A	N/A
Production	1 568	1 691	1 787	2 060	2 121	2 187	2 193	2 261	2 321	2 356	2 391
E-Mech components											
Apparent consumption	1 112	984	1 386	2 536	3 067	3 151	3 559	3 718	N/A	N/A	N/A
Net exports (2)	1 815	2 189	2 204	1 914	2 067	2 059	1 731	1 829	N/A	N/A	N/A
Production	2 927	3 173	3 590	4 450	5 134	5 210	5 290	5 547	5 720	5 806	5 892

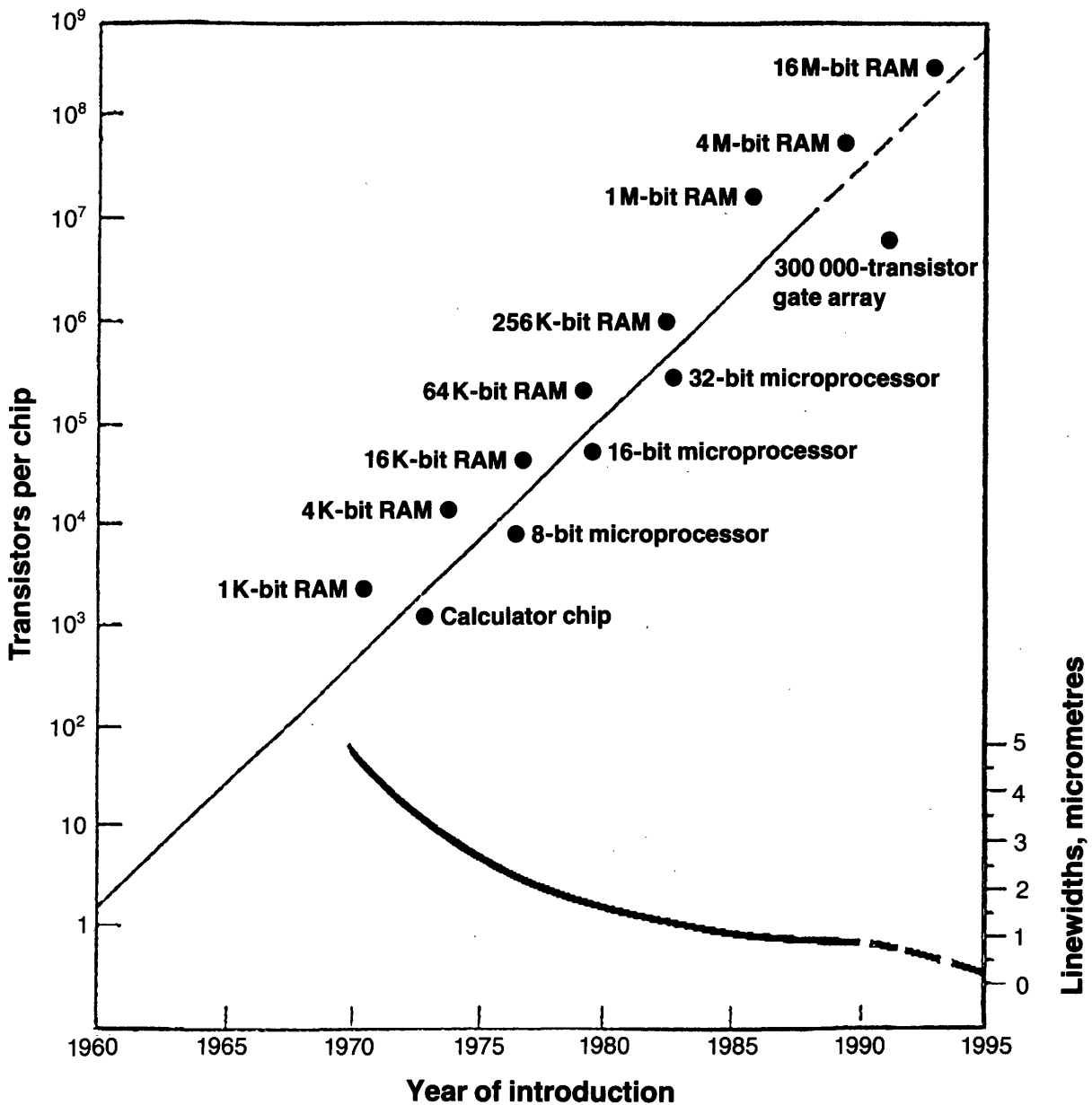
(1) 1981-83 EC 9.

(2) 1988 Greece estimated.

Source: Eurostat (Comext), BIS Mackintosh.

Figure 1

Evolution in the scale of integrated circuits



Source: Siemens AG, IBM Corporation.

Japanese semiconductor manufacturing equipment suppliers now dominate the field, especially since Perkin-Elmer's exit from the business in April 1989. High development costs (USD 100 million for the Microscan I 'step and scan' system) were cited as contributory factors in the withdrawal.

Despite advances in new technology, for example in Bimos (the combination of bipolar and CMOS technology) advances in mainstream IC design for the next few years will focus upon obtaining faster, more dense chips, the primary means to which is the continued shrinkage into submicron technology.

This focus is demonstrated by the rapid pace of development in the semiconductor memory field where designs of 256K-bit DRAMs (Dynamic Random Access Memory) have switched to 1M-bit DRAMs. No sooner has a new device been put onto the market than a leading supplier announces 4M-bit, 16M-bit, and even 64M-bit designs under development.

The technology of passive and electromechanical components is relatively mature. The most important technological change is the trend to surface mounting. This technique has penetrated all sectors of the market from surface mount capacitors and resistors to surface mount connectors and relays and, as a result, into printed circuit boards designed to accept these new components.

Research and development

The world electronic components industry is faced with an upward spiralling in research and development costs. It is estimated that it costs between ECU 5 million and ECU 100 million to design and develop a new state-of-the-art device. Couple this with short product lifecycles, sometimes a matter of a few months for some consumer products, and it is clear that the components industry places itself in a precarious position between obtaining a healthy return on investment and making a loss.

Furthermore, the on-going refinement of production facilities to submicron technologies is placing an increasing burden on manufacturers. In order to remain competitive in the world market it is essential to keep pace in production technology. It is not possible to take any short-cuts, each small refinement must be made in order to arrive at a world class production capability. For example, in 1985 a typical new semiconductor plant cost ECU 145 million, today this has risen to ECU 225 million.

Faced with this situation, European manufacturers have tended to lag behind world developments and United States and Japanese products have entered the market in advance of European devices. The initial high price of the first devices on the market enables the associated R&D costs to be recouped. At this time the price falls rapidly to exclude any further competition. European vendors have tended to enter the market on the falling edge of the price curve and do not achieve payback on R&D investment; furthermore, they do not derive capital to reinvest in new R&D.

In order to assist the European semiconductor and IT industries to catch up with their Japanese and US counterparts, a ECU 3.4 billion research programme known as Jessi (for Joint European Submicron Silicon) has been launched. The three major participants in the eight-year project are Philips, Siemens and SGS/Thomson (ST). The programme will cover process technology, end-applications (e.g. automotive electronics), production equipment, and materials and basic research. Jessi involves many leading European high-tech companies: Philips, Siemens, ST, Nixdorf, Bosch, Telefunken and Plessey among others. Within the framework of Jessi, ST has been entrusted with the mission of developing advance Eproms while Philips will work on static RAMs (Random Access Memory) and Siemens on dynamic RAMs. Funding has yet to be finalized but will be shared between the participating companies (50%), their governments (25%) and EC contributions (25%).

Trade and consumption trends

The trend in European components trade (see Tables 2 to 5) has been unfavourable since 1984.

In 1988, the overall trade deficit deteriorated to ECU -1.1 billion. The trade deficit for active components increased by ECU 600 million to ECU -2.6 billion. These figures must be interpreted with care because of nomenclature changes implemented in 1988. Furthermore, they conceal the fact that certain base components (e.g. wafers) are exported and, after further processing, re-imported (e.g. as memories or micro-processors). The reasons for this include the exploitation of labour cost and/or custom duty differentials. Monolithic digital memories are the largest import item; they are imported mainly from Japan (44%), the USA (30%) and South-East Asia (22%).

Since 1981, demand for active components has grown by 12% CAGR, compared with production growth of 10.5% CAGR. In 1988, EC production covered 72% of apparent consumption.

In passive components, the trade deficit has increased gradually since 1984 to ECU 350 million in 1988. At that time, EC production covered 87% of apparent consumption.

In electromechanical components, the Community has run a significant trade surplus since 1981. The surplus has been fairly stable and has totalled ECU 1.8 billion in 1988.

Between 1981 and 1988, the apparent consumption of electromechanical components has increased by a remarkable 19% CAGR; however, production has not kept pace (10% CAGR) and imports have grown twice as fast as exports (12% vs 6% CAGR) — especially imports of switches and printed circuit boards. This trend is reflected in the fall of net export earnings to production — from 62% in 1981 to 33% in 1988.

Tables 3, 4 and 5 provide an insight into the import/export trends for electronic components.

Investment

There has been significant investment in new plants in the EC from European and US companies, and Japanese companies particularly have announced large investment programmes.

Philips is bringing its new submicron wafer fabrication plant at Nijmegen onstream as planned: 220 wafers per day will be manufactured by the end of 1989. Siemens is increasing manufacturing space and adding new production equipment at its Regensburg plant to increase production of its 1M-bit DRAMs by 60% this year.

The growth in foreign direct investment continues as demonstrated by Harris (the US semiconductor company) planned investment of an ECU 85 million European chip manufacturing plant aimed at strengthening its position in the EC. Inmos is getting a cost injection from its new parent, SGS/Thomson, in order to double wafer output at its Newport plant. Motorola is investing ECU 50 million to expand production of its UK memory production plant. Sprague intends to establish a new chip production facility in the UK. Similarly, Texas Instruments has announced an 0.25 billion ECU fabrication plant in Italy, its third in Europe.

Table 3
Extra-EC exports of electronic components (1)

(million ECU)	1981	1982	1983	1984	1985	1986	1987	1988
Active components	979	1 068	1 270	1 975	2 120	1 966	2 261	3 139
Passive components	526	602	650	794	835	818	862	931
E-Mech components	3 053	3 567	3 767	4 103	4 467	4 376	4 136	4 580
Total	4 558	5 237	5 687	6 872	7 422	7 160	7 259	8 650

(1) 1981-83 EC 10; 1988 Greece estimated.

Source: Eurostat (Comext).

Table 4
Extra-EC imports of electronic components (1)

(million ECU)	1981	1982	1983	1984	1985	1986	1987	1988
Active components	1 850	2 110	2 600	4 232	4 450	3 907	4 259	5 747
Passive components	519	624	705	977	1 052	1 043	1 086	1 278
E-Mech components	1 238	1 378	1 563	2 189	2 400	2 317	2 405	2 751
Total	3 607	4 112	4 868	7 398	7 902	7 267	7 750	9 776

(1) 1981-83 EC 10; 1988 Greece estimated.

Source: Eurostat (Comext).

Table 5
Extra-EC export/import ratio (1)

	1981	1982	1983	1984	1985	1986	1987	1988
Active components	.53	.51	.49	.47	.48	.50	.53	.55
Passive components	1.01	.96	.92	.81	.79	.78	.79	.73
E-Mech components	2.47	2.59	2.41	1.87	1.86	1.89	1.72	1.66

(1) 1981-83 EC 10; 1988 Greece estimated.

Source: Eurostat (Comext)

However, arriving in Europe much later than the Americans, the Japanese are expected to make substantial investments over the next four years. The big four Japanese semiconductor companies NEC, Hitachi, Toshiba and Fujitsu will all establish wafer fabrication plants within the EC. NEC has an existing facility in Livingston, Scotland, and Fujitsu has announced a ECU 600 million plant, also in the UK. As a whole the EC has attracted some ECU 3 billion of investment from Japan. Furthermore, new investment is expected from the Republic of Korea with numerous EC manufacturing projects targeted for 1989.

Although this investment will not create many jobs within the components industry, as diffusion is highly automated, it will generate many complementary activities.

Structure of the sector

Within the EC, the European-owned electronic components industry is dominated by four companies: Philips in the Netherlands, the Franco Italian ST, Siemens in Germany and Thomson in France.

Most of the American semiconductor companies, with the exception of Intel, already have substantial wafer fabrication operations in Europe. The leading Japanese suppliers have established assembly and test operations within the EC and are expected to establish wafer fabrication plants over the next four years.

The continuing upward spiral of investment in R&D necessary in order to retain a competitive position in the world market-place has led to the increase in joint ventures, mergers and acquisitions. Examples include the joint Mega project between Philips and Siemens, the SGS/Thomson (ST) merger, and the acquisition of Inmos by ST.

In the future, increasing pressure can be expected from the American and Japanese suppliers which currently dominate the supply of many components (e.g. DRAMs and microprocessors). In addition, increased competition is coming from companies located in the newly industrialized countries of South East Asia (e.g. Korea and Taiwan).

The production of CTV (colour television) tubes within the EC is dominated by Philips, Videocolor (a Thomson company) and Nokia Graetz. The greater part of EC production focuses upon the high-end market FST (flatter squares tube) technology. However, in the low-end market in the EC competition is strong from low-cost Korean products.

The passive and electromechanical sector is made up of many small and medium-sized companies in each of the major European countries. Certain products such as capacitors and connectors are dominated by a few multinational manufacturers while others, PCBs (printed circuit board) and transformers for example, are supplied by a whole host of local manufacturers. This sector has seen significant acquisition activity with major deals in many areas. For example, STC Tantalum Capacitors was bought by AVX and further acquisitions are expected. Thomson CSF sold its PCB operation to CIRE.

The fragmented connector industry is also seeing some restructuring typified by the Labinal acquisition of Cinch from TRW, ITT's purchase of Sealectro from BICC, and Framatome's acquisition of Burndy and Souriau.

Employment

There were 233 810 people employed in the components industry in 1987 in the EC. The components industry is part of the electronic industry.

The number of electronics companies in the Federal Republic of Germany is estimated to be 1 400. Employment in the industry totals 400 000 with 18% (75 000) associated with components.

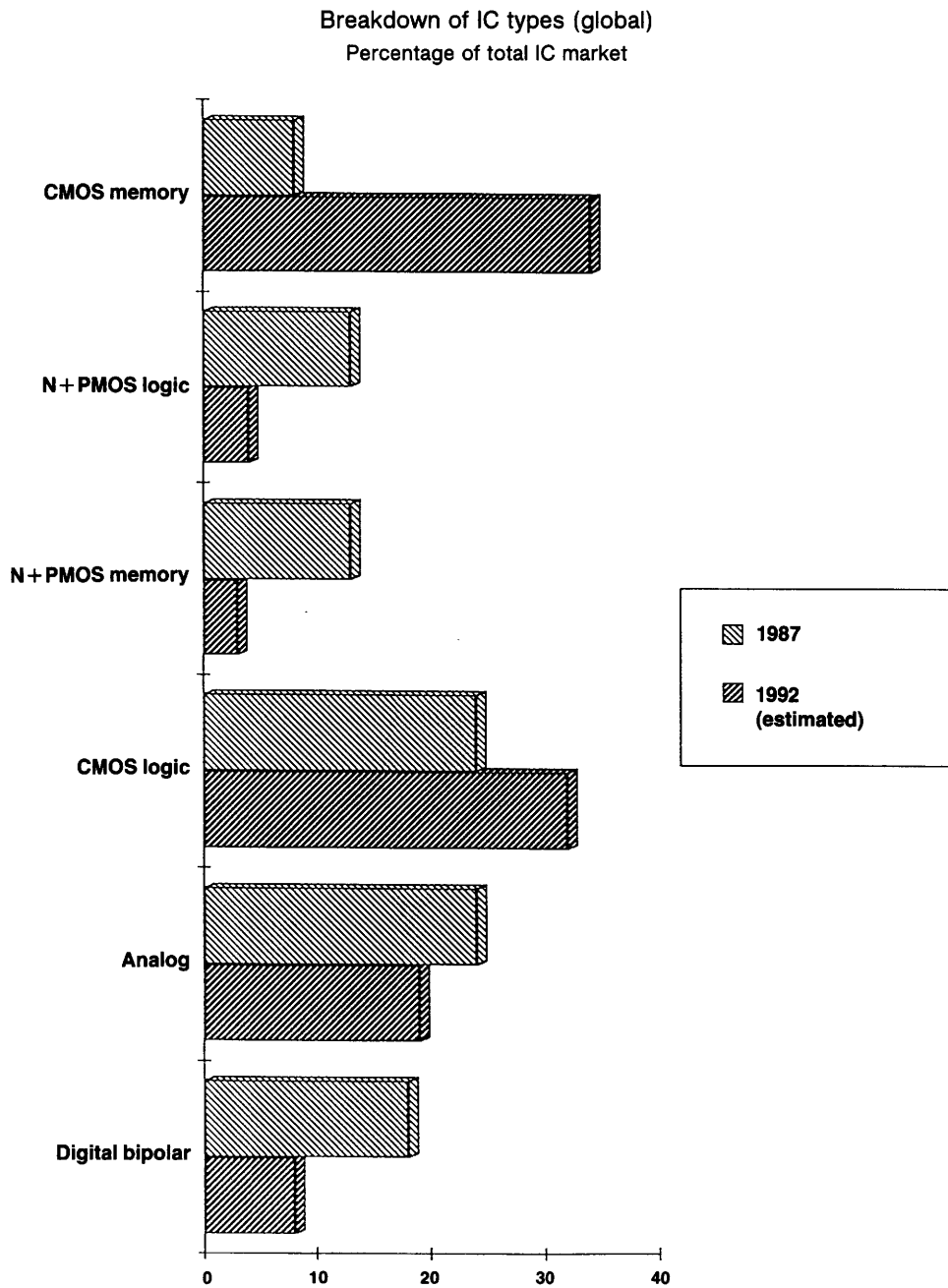
In France the number of electronics companies totals some 700, employing approximately 240 000 people. The largest segment in terms of the number of companies is the passive components sector accounting for 247 of the companies. Although there are only 25 active electronic companies in France, these tend to be much larger than the companies in the passive components sector.

The electronics industry in the UK comprises more than 80 firms employing over 840 000. There is a small group of indigenous manufacturers, GEC, Plessey, Ferranti and STC, which account for the major share of the production. In addition, several of the leading equipment companies have established in-house fabrication facilities.

A total of 613 companies employing almost 200 000 people make up the electronics industry in Italy.

Although dominated by one major company, Philips, there is a total of 100 electronic companies in the Netherlands employing some 110 000 people. Computers and components account for the majority of the output with the latter showing strong growth as a result of increasing demands in the telecommunications and consumer electronics sector.

Figure 2



Source: Benn Electronics Publications Ltd.

In Belgium, Mietec is the only indigenous component manufacturer specializing in the supply of custom chips.

The number of electronics companies in Denmark totals 250 and the industry employs 30 000. It is characterized by a large number of small companies, which have developed and exploited the niche market opportunities.

The number of electronics companies in Ireland totals 450, more than 300 of which come from the

US, Europe and the Far East. These companies provide employment for an estimated 24 000 people. The largest operating sector is the computer industry which accounts for more than 60% of production capacity. The other large sector is components which accounts for 13% of output.

In Spain, there are approximately 140 companies in the electronics sector providing employment for 54 000 people. Components companies number 45.

The impending integrated European market in 1992 has aroused considerable attention from the USA and Far East. This has led in part to the significant level of direct foreign investment into the EC as described elsewhere in this report. An additional factor is the recently announced move by the European Commission to insist that semiconductors be fabricated, not merely assembled, within the Community if they are to qualify as locally manufactured products.

Although this investment will not create many jobs within the components industry, as fabrication is highly automated, it will generate many complementary activities.

Forecast and outlook

European production of components is predicted to grow by 4.2% per annum over the period 1989 to 1991. By far the strongest growth is forecast in the active components sector. Passive components and electromechanical components are expected to grow slowly.

The active components sector is forecast to increase at 7.5% per annum over the period. Within the active component sector, ICs will show the strongest growth, particularly in the Federal Republic of Germany, France and Italy. However, in the UK tube production exceeds IC production. The slowest growth rate is in discrete components and production is actually falling in Italy.

The passive components sector will show some growth, forecast at 1.5% per annum, primarily in capacitors and resistors, however, production is actually falling in wound components in France and the UK and there is minimal growth in the Federal Republic of Germany and Italy.

The electromechanical sector is projected to grow by about 1.5%. Connectors, the main product category,

will go strong in the UK, Italy and, to a lesser extent, in France and the Federal Republic of Germany. Printed circuit boards have the highest growth potential, especially in the Federal Republic of Germany and Italy. Slow growth is expected in France and continued recovery in the UK.

Following a surge in the semiconductor market and in the prices of memory chips in 1988, expectations are for continued stability in 1989 and for 'soft landing' in 1990 — unlike the dramatic slump in 1985-86.

In the German market, the industrial electronics sector will continue as the largest consumer of electronic components at 25% followed by telecommunications at a little under 25%. Although the automotive industry accounts for only a small percentage, it is the fastest growth area.

In the UK the surge in the UK components market for computer chips in 1988 is predicted to turn into a slowdown this year. However, some sectors of the components industry will retain high growth rates fuelled by new projects including cordless public telephones, satellite TV broadcasting and the exploitation of the 30=GHz radio-frequency spectrum. Similarly, the French market is predicted to see a decline in the computer chip market, however, the tube market would see a boost if the French TV manufacturers move rapidly into high definition television.

The slowdown in the computer market will have a major impact in Italy where Olivetti represents the most important national computer manufacturer and the largest consumer of semiconductors. However, growth in the production of digital TV sets will boost the market as will automotive electronics with Marelli Autronica, the electronics arm of Fiat pursuing new electronic applications for automobiles.

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COMPUTER AND OFFICE EQUIPMENT

(NACE 33)

Summary

Western Europe makes up 28.7% of the total world market in this sector. The European market has been growing rapidly, at 16% per annum during the 1980s, and is projected by some market researchers to grow at 14% in 1993. Personal computers have had a major impact on the market during the 1980s, becoming the largest single product category.

The EC trade balance is in deficit, and this deficit has increased sharply over the past two years. Employment in this sector grew significantly in the mid-1980s, but has declined again to a total of 236 000 in 1988.

A shift is taking place within the sector from blue to white collar employment, with an increase in the share of employment in software, technical support and marketing.

The move to smaller systems, including personal computers, and the evolution of standards, both de facto and official, have resulted in considerably increased competition, and these trends are likely to continue for several years to come.

Sector definition

This chapter covers computing equipment and office machines. The statistical category used for most of the data (NACE 33) includes all computer processors and peripheral equipment as well as office machines such as typewriters and accounting machines; cash registers are also included; photocopying and facsimile machines are not included. This category is used for all data throughout, except where otherwise indicated. Computing equipment makes up over 85% of the sector's sales.

The NACE data presented here cover nine of the EC countries, excluding Greece, Portugal and Spain for which comprehensive statistics were not available for inclusion.

All of the data are from Eurostat, unless otherwise stated.

Production and consumption

The total world market for this sector has been estimated at ECU 164.2 billion in 1987 (Table 1). Of this, Western Europe accounted for 28.7%, following that of the United States (42.5%) but twice as large as the market in Japan (14.0%) and in the rest of the world (14.8%). Computing equipment made up 87% of the total world market for the sector. Table 1 gives the details.

Table 1
World market for information technology, 1987

(billion ECU)	Computer equipment	Office machines	Total	Share (%)
USA	53.5	9.2	62.7	38.2
Western Europe	44.7	6.2	50.9	31.0
Japan	26.9	3.0	29.9	18.2
Other	17.8	2.9	20.7	12.6
Total	142.9	21.3	164.2	100.0

Source: Electronics Industry Corporation.

The sector is growing rapidly. The EC market grew by an average 15.6% per annum (current prices) in the 1980s (Table 2). After a sudden slowdown in 1986, strong growth has resumed again. The growth slowdown in Europe lagged behind by about one year a similar slowdown in the USA.

Table 2
Market and production (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	15 294	17 375	22 902	27 837	33 731	40 666	42 664	45 228	48 841
Index	38	43	56	68	83	100	105	111	120
Production	13 662	15 220	20 060	23 919	29 366	35 344	35 177	36 489	39 115
Index	39	43	57	68	83	100	100	103	111

(1) EC 9.

Source: Eurostat (Inde, Comext).



Of the major computer categories, the fastest growing category has by far been personal computers. Its share of the computer and office equip-

ment market has risen to 40.3% in 1988, with mainframe and minicomputer growth slowing considerably during the 1980s.

Production in the Community rose at an average 14.1% per annum over the 1980-88 period, not quite keeping pace with market growth and hence, the trade deficit grew considerably.

Overall, the market demand per capita in Europe is roughly the same as in Japan; in both regions it is considerably smaller than in the United States, even if the gap is narrowing.

Trade

This sector provides a negative contribution to the EC's trade balance (Table 3). This deficit has increased sharply in the past two years (1987 and 1988).

For the EC 9, the deficit was ECU 9.7 billion in 1988. While exports grew significantly in the first half of the 1980s, they remained at approximately the same level for the last four years. However, imports have grown rapidly in the past two years, especially during 1988.

Exports as a proportion of production rose considerably during the mid-1980s, especially in 1984 and 1985, reaching a peak of 26% in 1985, but have fallen back steadily to 20.5% in 1988. During the same

Table 3
External trade (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Net exports	-1 728	-2 526	-2 992	-3 830	-5 683	-5 155	-5 304	-6 721	-9 665
Index	34	49	58	74	110	100	103	130	187
Exports extra-EC	2 809	3 277	3 976	5 052	7 084	9 180	7 595	7 598	8 028
Index	31.0	36.0	43.0	55.0	77.0	100.0	83.0	83.0	87.0
Imports extra-EC	4 537	5 803	6 968	8 882	12 767	14 335	12 899	14 319	17 693
Index	32.0	41.0	49.0	62.0	89.0	100.0	90.0	100.0	123.0

(1) EC 9.

Source: Eurostat (Comext).

Table 4
EC import penetration and export rate (1)

(%)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Import penetration	29.7	33.4	30.4	31.9	37.8	35.3	30.2	31.7	36.2
Export rate	20.6	21.5	19.8	21.1	24.1	26.0	21.6	20.8	20.5

(1) EC 9.

Source: Eurostat (Comext).

Table 5
Internal trade (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Intra-EC imports	4 441	5 432	6 818	8 970	11 449	14 502	15 082	16 337	17 754
Index	30.6	37.5	47.0	61.9	79.0	100.0	104.0	112.7	122.5

(1) EC 9.

Source: Eurostat (Comext).

period, the rate of import penetration increased, rising from 29.7% in 1980 to 36.2% in 1988, though fluctuating considerably in between.

The United States accounted for 48% of all imports to the EC in 1988, followed by Japan with 24%, South-East Asia with 18% and EFTA with 6%. Community exports went mainly to EFTA (40%) and the USA (28%).

Trade between Member States increased sharply over the period considered, considerably more rapidly than exports from the EC. This is partly due to intra-company trade by companies with plants in several Member States, and increased specialization at many of these plants as companies integrated their production across the Community.

Employment and productivity

Employment in the sector was static in the earlier part of the decade, but grew significantly in the mid-1980s, to a level of about 250 000; it fell back to 236 000 in 1988 (see Table 6).

Productivity (current value of production per employee) increased by an average 12.2% per annum, despite an overall rise in the number of employees of 13%.

The share of non-manual workers in total employment grew from 68% in 1980 to 73% in 1986. This will increase further in the coming years, as the proportion of people engaged in 'service-type' activities, such as software, technical support and marketing, increases.

Investment, productivity and training

Fixed capital investment (equipment and buildings) grew slowly in the first half of the decade (1980-84), but increased sharply in 1985, before levelling off again (Table 7 gives the details). As a result, the value of investment per unit value of production fell continuously with the exception of 1985 and, to a lesser extent, 1986; over the period as a whole it fell considerably. This happened despite large gains in productivity per employee, as outlined above.

Table 6
Employment and productivity (1)

	1980	1981	1982	1983	1984	1985	1986	1987(2)	1988(2)
Employment (1 000)	207.1	199.1	206.0	212.7	227.3	247.7	247.9	248.0	236.1
Production/employee (ECU)	65 969	76 441	97 381	112 455	129 193	142 690	141 900	147 433	165 671
Index	46.2	53.6	68.3	79.8	90.5	100.0	99.5	103.3	116.1

(1) EC 9.

(2) Estimated.

Source: Eurostat (Inde).

Table 7
Investment (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986
Investment	1 160	1 265	1 222	1 335	1 371	1 947	1 516
Index	59.6	65.0	62.8	68.6	70.4	100.0	77.9

(1) EC 9.

Source: Eurostat (Inde).

Investment reduced factor costs as well as enlarging capacity.

Strong measures are being taken by the industry to meet the growing competition in the sector. Many larger companies are slimming down their production, shutting down specific production lines and procuring components externally, or sub-assemblies for further production and, often, OEM products for resale under their own label. These companies are attempting to compete with a broad range of products (attempting to supply their customers with a full range of equipment) in a rapidly changing environment, while attempting to concentrate their resources on their points of greatest strength. In addition, inventories are being sharply reduced.

In addition to the investment in fixed capital above, most companies are investing heavily in research and development and training, as well as providing more services to their customer base. They are also increasing their emphasis on software, in an attempt to increase value-added as price pressure on purely hardware parts of their offering increases. Hence, there is a very high and increasing level of investment in human capital in the sector, a trend that is likely to increase in the coming years.

Structural changes and competition

Major trends in the industry include the following:

- the increased interpenetration of computing technologies, data-communication technologies and office-equipment technologies (copying and facsimile);
- a rapid increase in the share of the market taken by smaller computer systems, especially personal computers, with a corresponding decline in the share of larger systems, notably mainframe computers;
- a growing proportion of software and services in the sales of the suppliers;
- an increased emphasis on vertical markets and systems integration.

With the growth in standards, both de facto and official, smaller specialized suppliers have gained considerable market shares during the 1980s. Personal computers have had a major impact here, with the Unix operating system making rapid inroads into the rest of the market, especially from the mid-1980s. Computer systems running Unix have increased their share of the market from 7.9% in 1987 to 10.7%

in 1988, and most market researchers anticipate that this share could increase to over 20% of the total market by the mid-1990s.

Many customers try to obtain integrated solutions for their business problems. Many larger suppliers are attempting to provide these solutions themselves, while smaller suppliers are either cooperating with others, for example through acquisitions and joint ventures, or selling through others who integrate their products in solutions to end-customers.

Even the larger suppliers are looking to software suppliers and 'value-added resellers' (VARs) as they attempt to penetrate vertical markets such as the retail sector; these specialized suppliers often have the expertise that is required in the particular sector.

Table 8
Market shares, Western Europe, 1988 (1)
(% of the total market in each category)

(a) Personal computers	
IBM	24.2 %
Olivetti	8.2 %
Apple	7.0 %
Compaq	6.4 %
Others	54.2 %
Market size (million ECU)	14 266
(b) Technical workstations	
Sun	22.2 %
Hewlett-Packard	21.6 %
DEC	21.3 %
Apollo	18.3 %
Others	16.6 %
Market size (million ECU)	1 163
(c) Mid-range computers (2)	
IBM	22.8 %
DEC	13.4 %
Groupe Bull (4)	8.7 %
Siemens	5.8 %
Others	49.3 %
Market size (million ECU)	11 893
(d) Mainframe computers (3)	
IBM	55.5 %
Siemens	15.1 %
Groupe Bull (4)	7.0 %
Unisys	3.7 %
Others	18.7 %
Market size (million ECU)	7 848

(1) Figures are for the total computer system as sold in the initial package, including peripherals and software; later add-on sales of peripherals and software are not included.

(2) 'Mid-range computers' comprise multi-user systems selling between USD 6 000 and USD 1.5 million.

(3) 'Mainframe computers' comprise systems selling above USD 1.5 million.

(4) Includes Honeywell Bull.

Source: Dataquest.

There has been a tendency towards 'downsizing' in the form of replacing the expensive mainframe

installations in central DP departments by smaller and cheaper systems, decentralized in several offices and departments. Most frequently, this effect takes place through new installations, rather than replacing existing installations. This decentralization and the emergence of the personal computer from below — performing mainly word processing and spreadsheet work to date, though with several emerging applications — has led to the rapid growth in networks and standards for communication between systems. There has been a rapid growth of computer networks, both wide-area networks (between sites) and local-area networks (within a site). All market researchers expect a continuing sharp rise.

The computer market leaders within Europe are given in Table 8 for three major product categories and for one rapidly growing emerging segment, technical workstations, based on one set of estimates. Together these four product categories comprise the total computer systems market. Table 9 lists the leading suppliers in the order of their total turnover.

In terms of market concentration, the market for mainframe computers can be seen to be considerably

more concentrated than the others. These European market shares need to be taken in the context of the wider world market, with competition taking place on a world-wide basis in many segments of the industry.

The top 20 suppliers of computer systems of all kinds to the European market are listed in Table 9. There is a large number of smaller specialized companies with sales levels below these, mainly serving the growing markets of personal computers and Unix systems; these are predominantly US companies.

The European Commission has imposed anti-dumping duties on several Japanese manufacturers of office equipment and printers. The products concerned are electronic typewriters, photocopiers, dot matrix printers and daisywheel printers.

Geographical variance

Nearly 90% of production in this sector takes place in the four large Community countries (the Federal

Table 9
Top 20 computer companies,
ranked by sales in Western Europe, 1988
(million ECU) (1)

Rank	Company	Origin	Revenue	Share of top 20 companies (%)
1	IBM	USA	17 357	33.9
2	Siemens	EUR	4 480	8.7
3	DEC	USA	3 741	7.3
4	Olivetti	EUR	3 719	7.3
5	Groupe Bull	EUR	3 405	6.6
6	Nixdorf	EUR	2 395	4.7
7	Unisys	USA	2 232	4.4
8	Hewlett Packard	USA	1 972	3.8
9	Philips	EUR	1 867	3.6
10	STC	EUR	1 744	3.4
11	NCR	USA	1 486	2.9
12	Nokia	EUR	986	1.9
13	Canon	Japan	889	1.7
14	Apple	USA	788	1.5
15	Prime	USA	769	1.5
16	Wang	USA	754	1.5
17	Hitachi	Japan	698	1.4
18	Amstrad	EUR	662	1.3
19	Control Data	USA	661	1.3
20	Compaq	USA	612	1.2
	Total top 20		51 216	100.0

(1) Sales of some telecommunications equipment, notably facsimile equipment and digital PBXs are included in the figures. Sales of software and services are also included.

Companies selling predominantly telecommunications equipment or software, and leasing companies, have been excluded from the original Datamation listing.

The Datamation figures were given in dollars, and have been converted to ECU.

Source: Datamation, 1 July 1989.

Republic of Germany, France, Italy and the United Kingdom, in that order), with Ireland providing a significant proportion of the rest (6.6%). The geographical concentration of production in the four large countries is greater than that of the market.

Both Ireland and Spain had a high growth in production during the 1980s, though starting from a small base, largely through foreign direct investment. The Spanish market is showing a very high growth rate also, though again from a low base.

1992

Several forces are pushing computer companies that were largely nationally based to operate on a Europe-wide basis, notably:

- the opening up of public purchasing to greater competition;
- the increasing adoption of common standards across Europe by public authorities;
- the increased tendency of large multinational customers to purchase common equipment across countries, together with the increased internationalization of customers not already operating on a wide international basis;
- the increasing tendency of distributors to operate across European boundaries.

The internal market measures provide a substantial impetus to these trends.

Some companies, notably the major US suppliers, were already organized on a European-wide basis, and their competitors are moving as rapidly as possible to organizing on a similar basis, often through acquisitions. Further merger and acquisition activity may be anticipated, though the major trends in the industry worldwide are having a greater impact on the restructuring than the internal market measures.

Outlook

The trends identified in structural changes and competition are likely to continue for several years. Several market research companies estimate that the share of personal computers will reach half of the market some time in the mid-1990s, although the extent to which personal computers — connected together and to specialized servers in local area networks — will increase or decrease the demand for larger systems is still uncertain.

The total Western European market is expected to double from USD 41.6 billion in 1988 to USD 81.2 billion in 1993. The average growth rate of 14.3% per annum includes much higher growth rates for personal computers and technical workstations, of around 20% per annum each.

The networking of computers will increase sharply; there is also a tendency towards this networking to become more transparent over time, i.e. less evident to the user, so that in many cases the user will not be aware whether a resource being accessed is local or remote.

Standards, both official and de facto, are having a major impact on the industry, and are affecting the basis of competition between companies, to the detriment of proprietary systems.

With the shift to smaller systems, to standards and more open systems, competition in the sector is likely to continue to increase for some years.

There is likely to be a continued rapid pace of technical change, driven especially by the rapidly increasing power of the microprocessor, with several major complementary hardware and software technologies making major contributions as well.

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TELECOMMUNICATIONS EQUIPMENT

(NACE 344)

Summary

A number of factors are having a profound effect on the EC telecom industry. The changing regulatory environment for telecommunications administrations, for other service providers and for network and terminal equipment producers is tending to unify the Community market and increase competition, both from within and from outside. At the same time, the technological environment is changing rapidly. The network is being digitized, ISDN is being introduced on a commercial basis and a wide range of products is being developed. Competition in terminal equipment markets from Far Eastern producers is particularly intense. But Community producers are responding and mergers and agreements are taking place. The high growth markets are digital switching, optical cables and transmission, feature telephones, mobile communications, telefax and space communications, and Community or European producers are already well placed in all but the last two of these.

Description of the sector

The telecommunications equipment sector can not be treated in isolation from the telecommunications service sector, for which it provides the network and terminals. In particular, well over half of the Community's production of equipment is bought by the telecommunications authorities who provide the majority of telecom services. Moreover, regulatory developments in the service sector have important implications for the equipment sector and vice versa. Together the sectors represent over 2% of Community GDP.

The telecommunications equipment industry as referred to in NACE 344 is limited to:

- public and private switching including telex switching and packet switches;
- transmission equipment for lines and termination points;
- terminals such as telephone sets, telex and teletex terminals, telefax machines, videotex terminals;
- telecommunication-related equipment such as answering machines, testing analysis, and simulation equipment.

Not included in this NACE category are transmission cables, local area networks and radio-communication equipment, such as mobile telephones, radio-paging, microwave links and satellite communications equipment. The world market for the items referred to in NACE 344 is estimated at ECU 50 billion in 1987 but amounts to ECU 88 billion if these other categories of telecommunications equipment are taken into account.

Current situation

The European Community telecommunications equipment market was worth ECU 21.5 billion in 1987, nearly 25% of the world total as shown in Table 2. The respective total market sizes for the USA and Japan are ECU 29.8 billion (33.9%) and ECU 9.5 billion (10.8%).

As the Community had a trade surplus of about ECU 1 billion in 1987, total production of all telecommunications equipment was about ECU 22.6 billion in that year. About ECU 15.6 billion of this total consists of the production of equipment in the NACE 344 category, as shown in Table 3. The difference of about ECU 7 billion comprises transmission cables (ECU 2 billion), microwave links

Table 1
Main indicators, 1980-89 (1)
Telecommunications equipment

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Apparent consumption	36 074	35 119	37 637	39 809	44 928	47 269	47 242	49 947	53 367	N/A	N/A	N/A	N/A
Net exports	649	798	1 235	1 524	968	1 328	2 420	1 867	1 450	N/A	N/A	N/A	N/A
Production	36 723	35 917	38 872	40 613	45 026	48 597	49 662	51 814	54 817	57 220	62 541	63 041	63 545
Employment (1 000)	883	787	779	767	804	808	821	812	806	819	N/A	N/A	N/A

(1) Excluding Belgium, Denmark, Luxembourg, the Netherlands and Portugal.

Source: Eurostat (Inde, Bise, Comext).

Table 2
Geographical breakdown of the telecommunications equipment market, 1987

(billion ECU)	Market share	
	Value	(%)
North America	29.8	33.9
EC	21.5	24.4
Japan	9.5	10.8
East Europe and USSR	9.5	10.8
Rest of world	17.7	20.1
Total	88.0	100.0

Source: EC studies.

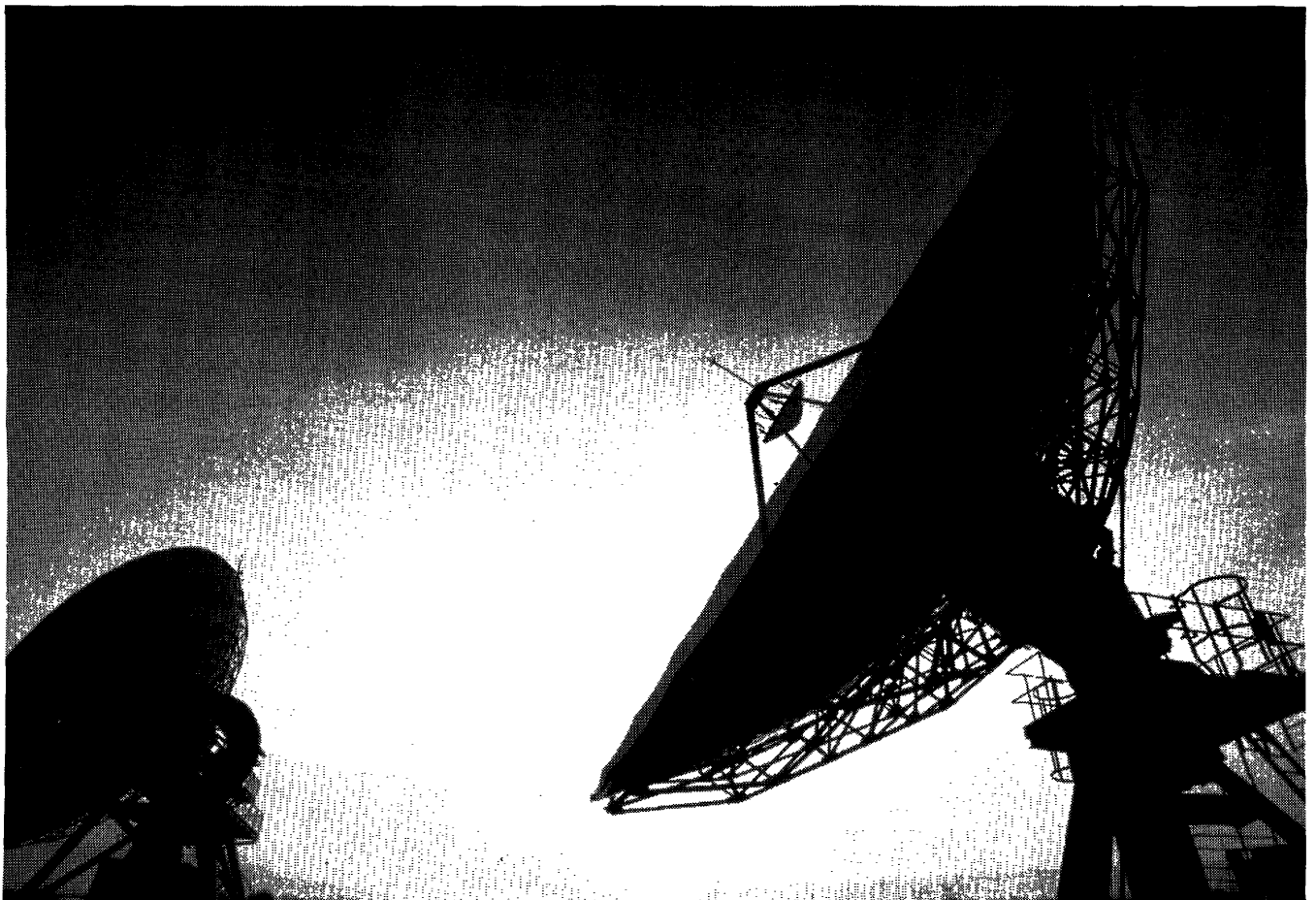
(ECU 0.5 billion), space telecommunications equipment (ECU 0.5 billion), local area networks (ECU 0.4 billion), equipment for cable TV (ECU 1 billion), mobile communications equipment (ECU 0.8 billion) and other items. The remainder of this chapter will focus on the broader and more realistic definition of telecommunications equipment rather than the narrower one implied by NACE 344.

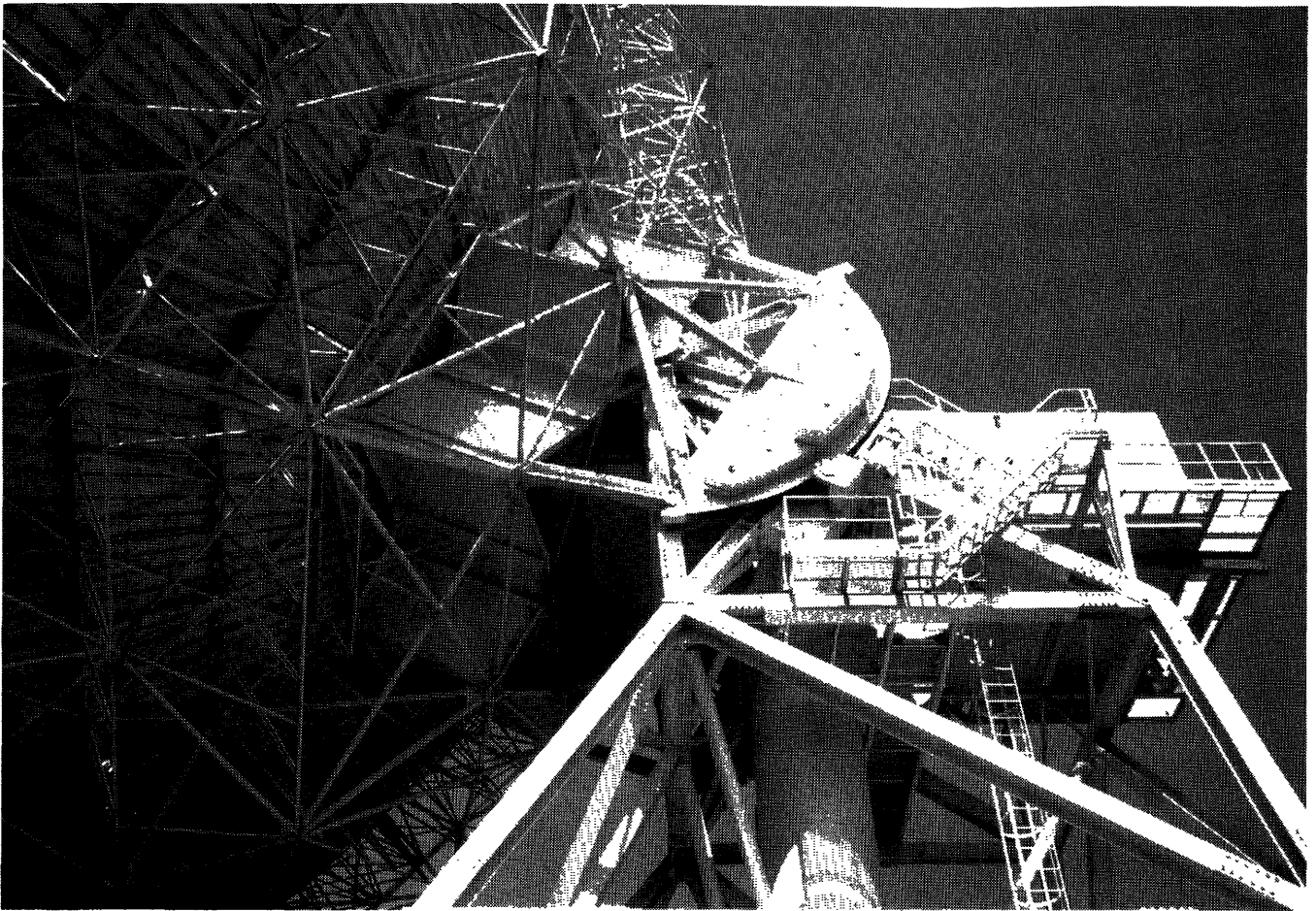
Telecommunications equipment markets and therefore production are clearly dependent on the size and state of the telecom network and on the equipment which is attached to it, and more particularly, on the rate at which this network and equipment is

Table 3
Breakdown of EC telecommunications equipment market, 1987

(billion ECU)	Prod.	Trade balance	Apparent consump.	Apparent consump. (%)
Public switching	5.8	.7	5.1	24.0
Transmission	3.4	1.0	2.4	11.0
Private switching	2.3	-0.2	2.5	12.0
Telephone sets	1.4	0.0	1.4	6.0
Other terminals	2.3	-0.3	2.6	12.0
Other equipment	.3	-0.1	.4	2.0
Sub-total	15.6	1.1	14.5	67.0
Other transmission cables	N/A	N/A	2.9	13.0
microwave link	N/A	N/A	1.9	N/A
space	N/A	N/A	.5	N/A
Other private switching	N/A	N/A	.4	2.0
LANs	N/A	N/A	.4	N/A
Other equipment	N/A	N/A	3.9	18.0
cable TV	N/A	N/A	1.0	N/A
mobile	N/A	N/A	.8	N/A
other	N/A	N/A	2.1	N/A
Sub-total	N/A	-0.1	7.2	33.0
Total equipment	22.6	1.0	21.6	100.0

Source: EC studies.





being replaced, upgraded and extended. The Community has one of the largest networks in the world with 123 million lines in 1987, an average of about 38 main lines per 100 inhabitants. In comparison, the USA had 126 million lines (52 per 100 inhabitants) ⁽¹⁾ and Japan 49 million (38 per 100 inhabitants).

Almost half of the present equipment market consists of public network equipment, i.e. transmission and public switching equipment. It is not surprising, therefore, that a major part of production is destined for the telecommunications authorities who, with the exception of the United Kingdom, are wholly publicly owned. The four largest Community countries, France, the Federal Republic of Germany, Italy and the UK account for 80% of the equipment market although the largest, Germany, is still less than 7% of the world total.

Until now the major manufacturer or manufacturers in many of the Community countries have tended to benefit from a privileged connection with the telecommunications authority. This position has pro-

⁽¹⁾ The figure for the USA applies to total existing lines rather than allocated subscriber lines. The latter is estimated at about 110 million lines or 45 per 100 inhabitants.

vided guaranteed sales, helped to finance R&D and led to European manufacturers being relatively strong in a world context, particularly in the production of transmission and switching equipment. One drawback, however, has been that European producers have been less successful in responding to world demands for new terminal equipment. Moreover, research and development costs in products where European manufacturers were traditionally strong are now so high that firms must look beyond individual European markets in order to survive.

This phenomenon explains the background to some of the action lines proposed in the Green Paper on telecommunications which involve opening public-sector contracts and terminal markets to competition, while providing mutual recognition on standards and encouraging joint research on the coordinated introduction of ISDN and broadband services so as to institute a genuine united market in the Community.

The detailed breakdown of the Community equipment market in 1987 is given in Table 3. Transmission and public switching equipment each have shares of 24% and this is reflected in the high proportion of production in these categories. The other half of the market consists of terminal equipment

and customer premises equipment, including PBXs, and a range of other equipment including mobile communications and cable TV.

The market for transmission equipment in 1987 was about ECU 5.3 billion, of which ECU 2.4 billion comprised NACE 344 items, i.e. multi-plexing equipment and the electronics for cable lines. Another ECU 1.9 billion of the market consists of cable, of which about a quarter is optical. Total production of transmission equipment in the Community in 1987 exceeded the market total.

The market for public switches was worth ECU 5.1 billion while production was almost ECU 5.8 billion. Digital equipment represents 70% of the market. Six major digital switching systems (against four in the United States) have been developed in Europe: System 12, System X, E10, MT20/25, EWSD and Proteo (see section on industry structure). The total market for private switches was ECU 2.9 billion in 1987 and production was about ECU 2.3 billion of which ECU 360 million comprises local area networks.

The total terminal market was worth ECU 4 billion in 1987 or 18% of the total equipment market. Trade flows in and out of the Community are extremely high in this category. Telephone sets comprise about one-third of the Community terminal market.

The disparity between different Member States is considerable; see Table 4. Main lines per 100 inhabitants varies from a low of 16 in Portugal to a high of 52 in Denmark, and the proportion of user lines

linked to digital local switches varied from zero in Greece and Portugal at the end of 1987 to 55% in France. This situation combined with the rapid proposed implementation of digitization and ISDN in the Community offers a large potential market for equipment producers.

Industrial structure

The EC telecommunications equipment industry employed about 322 000 people in 1987 or slightly less than 1% of industrial employment in the Community. An estimate of employment figures of the sector as referred to by NACE 344 would be about 241 000. The employment structure is characteristic of a highly specialized industry: 18% of the personnel are involved in R&D, 47% in manufacturing and 24% in marketing and after-sales service.

Community production of telecommunications equipment is dominated by Alcatel and Siemens. However, the international and fast-changing nature of the telecom industry means that the European picture is inevitably influenced by industrial structure at a world level. Despite the relatively high concentration of the sector (market share of the 10 largest companies in the world is 48%) competition for potential new markets is fierce.

The ranking of the world's 15 largest telecommunications equipment companies is given in Table 4, where the proportion of telecom equipment turnover in total turnover is also given. The two largest Community companies, Alcatel and Siemens, are second

Table 4
Distribution of subscriber lines and share of equipment market, 1987

	Subscriber lines		Digitization % (1)	Equipment market share %	ISDN launch date
	Number (millions)	Per hundred inhabitants			
EC	122.7	38.1	17.2	100.0	
Belgium	3.4	34.5	1.6	3.0	1990
Denmark	2.6	52.0	12.0	2.0	1991
FR of Germany	27.5	45.6	2.0	28.0	1988
Greece	3.5	35.0	0.0	1.6	1993
Spain	10.2	26.2	7.0	5.2	1991
France	24.8	44.6	55.0	19.2	1988
Ireland	.8	22.3	42.0	.6	1991
Italy	19.0	33.3	13.0	16.0	1992
Luxembourg	.2	45.9	12.0	.2	1991
Netherlands	6.2	42.7	7.4	5.0	1989
Portugal	1.6	15.8	0.0	1.4	1993
United Kingdom	22.9	40.8	9.6	17.8	1989

(1) Percentage of user lines linked to digital local switches at end of year.

Source: EC studies.

and third behind AT&T in telecoms equipment turnover and seven European companies (including Ericsson) appear in the top 15. AT&T has a unique position in the sense that the majority of its remaining turnover derives from the provision of telecom services.

The company situation in Europe has changed markedly over the past four years. In 1986 nine manufacturers dominated the 12 national markets of the Community: Alcatel, ITT, Siemens, CGE, GEC, Plessey, Ericsson, Italtel and APT. Now, in 1989, Alcatel, Siemens, Ericsson and Italtel, AT&T are set to be the major forces and Siemens may well link up with GPT if either the bid for Plessey goes ahead or Plessey sells its half share in GPT to GEC and part is sold on to Siemens.

The change of structure began in 1986 when Alcatel nv was created as a result of the takeover of ITT by CGE and the merger with Alcatel. In the same year Siemens took over the worldwide transmission and foreign central office switching activities of GTE. Also in 1986 GEC launched a bid for Plessey but was blocked by the UK Monopolies and Mergers Commission who argued that a dominant defence conglomerate would be created. Then in April 1988, GEC and Plessey agreed to pool their telecommunication interests in a 50-50 venture, GPT.

Finally in November 1988, Siemens and GEC; launched a hostile bid for Plessey. The European Commission approved the bid in principle but the MMC in the UK stipulated a number of conditions con-

cerning Plessey's defence interests. The present situation is that discussions are still underway to try to satisfy concerns expressed by the UK Ministry of Defence. If Siemens and GEC are unable or unwilling to go ahead with the bid, it may be that Plessey will sell its share in GPT to GEC; the original bid plan envisaged 40% of GPT passing to Siemens.

In Italy, following the failed attempts to link with Telettra (Fiat's telecom subsidiary), and after inconclusive negotiations respectively with Siemens, Alcatel and Ericsson, Italtel in February 1989 reached an accord with AT&T and an agreement was signed in June. The partnership was concluded with an ECU 130 million investment of AT&T to compensate for the difference between the price of the 20% stake that AT&T is acquiring in Italtel and the 20% share holding that STET, Italtel's parent company, is to acquire in the Dutch-based AT&T Networks System International.

The result of these mergers and link-ups is a significant rationalization of telecom equipment provision and a potential rationalization of public switching systems. In 1987 five producers, Alcatel, GPT, Ericsson, Siemens and Italtel supplied 90% of the European public switching market. By the end of 1989 it may well be that four suppliers are providing eight different systems (Alcatel with E10, System 12 and MT20/25, Siemens, GPT with EWSD and System X, Ericsson with AXE and AT&T, Italtel with 5ESS and Proteo).

Table 5
The world telecommunications equipment market
Revenues of top 15 companies, 1987 (million ECU) (1)

	Country	Company	Telecom turnover	Total turnover	Specialization ratio
1	USA	AT&T	7.900	29.114	(2)
2	EC	Alcatel (CGE)	6.800	11.200	61 %
3	EC	Siemens	5.200	24.800	21 %
4	Canada	Northern Telecom	3.980	4.206	95 %
5	Japan	Nec	3.700	16.340	23 %
6	USA	Motorola	3.000	5.812	52 %
7	Sweden	Ericsson	2.600	4.430	59 %
8	USA	IBM	1.850	46.982	4 %
9	Japan	Fujitsu	1.810	12.324	15 %
10	EC	GPT	1.740	1.740	100 %
11	EC	Bosch	1.650	12.245	13 %
12	EC	Phillips	1.300	22.590	6 %
13	Japan	Matsushita	1.100	20.030	5 %
14	EC	Italtel (STET)	1.000	1.000	100 %
15	USA	GTE	880	13.363	7 %

(1) ECU 1 = USD 1.154 = YEN 166.1

(2) Most of the remaining revenue of AT&T comes from service provision.

Source: EC studies.

A number of factors have motivated these mergers and agreements. A major one has been the prospective integration of Community markets along the lines proposed in the Commission's Green Paper. By means of mergers and takeovers, companies have extended their geographical access to European markets and the traditional ties between national companies and telecommunications authorities have begun to weaken. Scale economics in production and particularly in research and development have also led firms to maintain or increase critical size even if the initial costs, for example, of marketing alternative switching systems, are high. Finally, the cost of competing at a world level with large companies in North America or Japan who tend to be dominant in their own markets has encouraged some firms to try to increase their size or establish agreements in order to defend and increase world market share.

At the same time, Community production is still characterized by companies whose market share is relatively low, either because their telecommunications equipment sales are small relative to total turnover (e.g. Philips, Bosch, Matra) or because they have specialized market niches (e.g. Racal). The relative shares of companies' equipment production in the Community is given in Table 5.

Trade

The recent period has been the continuance of certain traditional patterns in the Community's trade in telecommunications equipment combined with the increasing importance of imports of terminal equipment from Far Eastern markets. For the past decade, the Community has maintained a significant surplus in telecommunications equipment trade based on exports of transmission, switching and terminal equipment to countries other than the rest of Europe, North America and Japan. EFTA countries have remained the Community's most important trading partner in terms of trade flows in both direc-

tions and the Community deficit with the USA and Japan has continued (Table 6).

But the dramatic increase in world trade in terminal equipment, which has taken place in recent years, has meant that imports from Japan have been rising steadily. This feature combined with an absence of exports to Japan has driven down the Community's overall trade surplus. Indeed in 1988 imports from Japan rose to ECU 1.2 billion, a dramatic increase from ECU 0.9 billion in 1987 and ECU 0.7 billion the previous year. Over half of 1988 imports were accounted for by facsimile terminals and parts, and imports of all terminal equipment accounted for about three-quarters of imports from Japan. Clearly facsimile equipment and terminal equipment in general is a fast growing market, and dominated by Far Eastern producers, but these trends could be reversed as production is transferred to Europe, particularly under Japanese licence.

Regulatory changes

The combined effect of the creation of the internal market, the technological advances that are taking place and the regulatory changes envisaged both in the Commission's Green Paper and by Member States is having a profound impact on the telecommunications sector and is behind many of the industrial mergers and agreements that are taking place. Liberalization on the services side is having a significant effect on the industry and these developments are discussed in more detail in the chapter on telecom services. Meanwhile Community legislation is affecting markets for both terminal equipment and network equipment.

In May 1988 the Commission issued a directive to open the Community terminal market to competition by the end of 1990. Some Member States have already liberalized their terminal markets. The Commission in June 1989 also adopted a proposed Council directive for the mutual recognition of type

Table 6
Telecommunications equipment trade with extra-EC, 1988

(million ECU)	Partner					Total
	USA	Japan	EFTA	SE Asia	Rest of world	
EC exports	412	51	1 038	186	2 095	3 782
EC imports	819	1 220	950	342	355	3 686
Net exports	-408	-1 169	88	-156	1 740	95

Source: Eurostat (Comext).

approval for terminal equipment throughout the Community. On the question of standards in general, the European Telecommunications Standards Institute (ETSI), created in April 1988, has been recognized as the body charged with issuing European Telecommunication Standards (ETS), and has taken over those responsibilities from CEPT. ETSI standards will be developed in line with CCITT technical recommendations.

In October 1988 the Commission also submitted a proposed Council directive on opening procurement procedures of the public telecommunications operators, aimed at opening public sector contracts to competitive bidding on a progressive basis by 1992.

Outlook

Despite a number of developments (e.g. the entry of other service operators to Europe, the increase in private switching capacity, the growth in mobile communications and the advent of the simple resale of leased lines), the major investments in the foreseeable future in the Community will continue to be made by the telecommunications administration.

The digitization of the network is proceeding rapidly and the average proportion of user lines linked to digital local switches in the Community will increase from 17% in 1987 to 35% in 1990. In this respect, the Community is on a par with the USA (20%) and ahead of Japan (5%), although the situation is very variable between Member States; see Table 2 and the chapter on telecom services.

By the end of 1989, commercial ISDN will be in service in three Community countries (France, the

Federal Republic of Germany and the Netherlands) plus the UK with its IDA (pre-ISDN) service. The Community has fostered the coordinated introduction of ISDN services and a memorandum of understanding was signed by 18 European network operators in April 1989. ETSI has the task of completing the ISDN specification work by the end of 1989 and will be responsible for access and terminal standards.

It is important to note, however, that although international ISDN will be the major public network service, it will face competition from mobile services, managed data services and specialized private services. In this context, the development of cross-border electronic data interchange (EDI) is of special interest to European companies operating in an increasingly unifying market.

In the next five years it is expected that equipment markets in the Community will grow by an average of 7% annually in nominal terms. The highest growth segments will be optical transmission, facsimile terminals and private digital switching (20% or more). In addition, markets for space and mobile communications (though from a low base) and digital public switching (already in excess of ECU 3 billion) are expected to grow at rates in the region of 15%. With the exception of facsimile terminals and space communications, European producers are already well placed in these markets.

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CONSUMER ELECTRONICS

(NACE 345-1)

Summary

Audiovisual consumer electronic equipment is the main vehicle of culture, education, information and entertainment. With electronic components and professional equipment, AV consumer electronics constitutes one of the three, indissolubly linked, key sectors of the electronics industry, the strategic importance of which is recognized by all.

Research and development, notably in the area of electronic components, are the lifeblood of this sector, in which products are being upgraded and replaced more and more quickly, given the pace of technological innovations.

European industrialists have lost a large share of the European market, first to Japanese manufacturers, more recently to manufacturers in the newly industrialized countries (NICs) of South East Asia. The giants of Japanese electronics have stepped up their production of new consumer products to be sold on the world market. They also proposed the adoption of a single global production standard for High definition television (HDTV) in 1986.

The restructuring carried out by European manufacturers and the relocation of some of their production lines enabled them to improve their competitiveness in 1986 and 1987. At the same time, these same companies launched a new compatible HDTV (HD MAC) concerted programme that was selected as a Eureka project by the European Community.

However, the new competitors from South East Asia, led by South Korea, stepped up their attack in 1988. Europe's manufacturers are fully aware of the industrial and commercial stakes of this Far Eastern offensive.

Description of the sector

This sector of activity corresponds to NACE 345-1 (Manufacturers of radios and TV receivers). More specifically, this industrial sector consists basically of the manufacturers of audiovisual consumer electronics, i.e.:

- video equipment: television sets, VCRs and video cameras, camcorders, specialized selectors and/or decoders and videographic terminals for receiving

pictures transmitted by radio wave, cable or satellite networks, etc.;

- audio equipment: the complete range of hi-fi equipment (stereos, compact disc players, analogue and digital tape players, radio receivers, car radios, etc.);
- the complete range of accessories for both types of equipment (for example, microphones and headphones) and blank audio and video magnetic media.

Some materials and equipment used in teaching and training programmes have also been included in this product group.

On the other hand, PCs and home computers, electronic musical instruments and pre-recorded tapes, records and discs, have not been taken into account here.

Current situation

Given the steady stream of technological innovations (generalization of digital technology, etc.), the development of new types of media (direct satellite broadcasting, cable networks, audio and video laser discs, etc.) and the boom in the number of new television stations, this sector is the scene of fierce competition between European firms and their Japanese and NIC challengers, especially those from South East Asia (The Republic of Korea, Hong Kong, Taiwan and Singapore).

The stakes are both economic (for example, control of the entire chain of electronic goods) and cultural, for audiovisual electronic equipment is an important vehicle of culture, education, information and entertainment.

Supply and demand

General trend

Based on apparent consumption, the consumer electronics market rose by 10% in value between 1987 and 1988 after a downturn in the previous period.

More specifically, the apparent consumption rose from ECU 19 201 million in 1987 to ECU 21 055 million in 1988.

This rate of growth in value terms does not show up as such in the European manufacturers' ledgers, however, given the concomitant sharp fall in retail prices, ranging from 6 to 10%, for the equipment involved.

The value of the European manufacturers' combined output rose by 3% in 1988, from ECU 12 526 to 12 906 million. The considerable loss of jobs in the industry, which employed 123 000 in 1988, must also be pointed out.

In 1988, the breakdown between video equipment, audio equipment and virgin magnetic supports is respectively 56%, 34% and 10%, or total sales of slightly less than ECU 11 800 million, ECU 7 300 and ECU 1 995 million, respectively.

Between 1987 and 1988 these markets rose by 4% and 19% in value, for the video and audio equipment markets respectively.

Once more, the huge drops in the mean unit prices of these types of equipment must be borne in mind.

The video equipment market

Colour television

Colour television sets, which account for 35% of the total consumer electronics market, remains the market's leading item.

The number of colour TV sets sold in 1988 was up 13% (in quantity) over the 1987 figure (18 254 000 sets in 1988 versus 16 121 000 in 1987) and 10% in value over the same period. Once again, prices fell somewhat for these items, especially for small-screen sets (less than 42 cm measured diagonally).

Indeed, this type of colour television set, which often comes from South East Asia and accounts for the surge in sales, is sold at very low prices. In one year, their share of the total sales of colour sets rose from 36 to 40%, increasing significantly the number of households with two colour sets.

Table 1
Main indicators, 1980-91
Consumer electronics

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption	11 350	12 200	13 487	13 318	12 925	14 304	18 550	19 201	21 055	N/A	N/A	N/A
Net exports	-3 468	-3 529	-3 637	-5 254	-5 117	-5 409	-6 439	-6 675	-8 149	N/A	N/A	N/A
Production	7 882	8 671	9 850	8 064	7 808	8 895	12 111	12 526	12 906	13 809	14 812	15 967
Employment (1 000)	160	151	147	146	134	134	131	127	123	124	N/A	N/A

Source: EACEM.

Table 2
The colour television market

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Colour televisions	9 912	10 108	11 340	11 516	12 543	12 879	14 945	16 121	18 254

Source: EACEM.

Table 3
Breakdown of the colour television market
by size of screen

(%)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Screen ≤ 42 cm	13.3	21.0	22.8	25.0	31.2	31.7	34.7	36.3	40.3
42 cm < screen ≤ 52 cm (1)	21.0	21.0	15.5	19.4	18.0	19.5	N/A	21.0	21.3
Screen > 52 cm (1)	65.7	58.0	61.7	55.6	50.8	48.8	65.3	42.7	38.4

(1) 1986: screen > 42 cm included in screen > 52 cm.

Source: EACEM.

Table 4
Equipment rate of European households
at the end of 1988

(%)	B	DK	D	F	I	NL	UK
CTV	85.0	85.0	89.0	85.6	85.0	91.0	98.0
VTR	27.0	24.0	38.0	25.9	18.0	46.0	60.0
VCR	4.0	2.0	3.0	3.0	2.7	5.0	1.0
CD players	12.0	10.0	13.0	10.0	4.3	27.0	10.0

Source: EACEM.

It should be stressed that, although large screens now account for a smaller share of the market, this is the category that boasts the most sophisticated equipment. Most of them are made in Europe, and equipped with new cathode ray tubes which give an excellent stereophonic reproduction of the broadcast's of those programmes that are produced with this type of modulation.

In addition, they can be equipped with the latest technical refinements (decoders for D2 MAC/packet satellite broadcasts, for example).

Table 4 gives the prevalence of the main types of consumer electronic equipment in households in the major European countries at the end of 1988.

Despite the gains made by small sets, most of which come from South East Asia, most of the colour sets sold on the European market are made in Europe. Table 5 shows the trends in the leading supplier countries' market shares.

As one can see, Europe, with 72% of the market, remained well out in front in 1988, followed by the Republic of Korea (9%), Hong Kong (6%) and Japan (2%).

Actually, the Japanese brands control a larger share of the European market (of the order of 20 to 25%),

as a result of Japanese industrial investments in Europe.

Similarly, due to the relocation of some European plants in the Far East, European models account for a large part of the imports from non-EC countries.

Video cassette recorders (VCRs)

The surge seen in this market over the past few years continued to pick up speed in 1988. The growth in apparent consumption between 1987 and 1988 was 18% in terms of volume (9 749 000 units sold in 1988 versus 8 233 000 in 1987). However, the increase in value over the same period was only 12%, from which it follows that prices fell an average of 6% over this period.

Almost all home VCRs are now built to the VHS standard following Sony's decision to drop the BETA standard. A noteworthy improvement in the VHS standard, S-VHS, giving greatly improved picture quality, was also introduced in 1988.

While Japanese competition in the early 1980s had practically forced European manufacturers out of the picture, the industry has bounced back, for in 1988 more than 50% of the VCRs sold in Europe were also made in Europe.

Japan's share of the market has shrunk (for reasons similar to those invoked for colour TV sets) and

Table 5
Principal producers of colour televisions

(%)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC production	84	90	80	87	81	85	82	74	72
Imports extra-EC	16	10	20	13	19	15	18	26	28
of which, from:									
Republic of Korea					.2	7	3	7	9
Hong Kong									6
Japan	6	7	6	6	6	6	5	3	2
Total market	100	100	100	100	100	100	100	100	100

Source: EACEM.

Korea's has stabilized following the temporary anti-dumping taxes adopted by the Commission at the end of 1988.

Camcorders

The market for the portable combined video camera and recorder (camcorder) is marked by continued strong growth — 47% between 1987 and 1988, after a growth of 87% in the previous period.

The market is divided between the 8 mm and VHS-C (now joined by S-VHS-C) standards.

Audio equipment market

Measured also by the trend in apparent consumption, the audio equipment market rose 19% in terms of value between 1987 and 1988, from ECU 6 116 million in 1987 to ECU 7 300 million in 1988. This

strong growth was also accompanied by a noticeable fall in unit prices of about 6% per year.

We shall limit our discussion to analysing the market trends of two highly representative articles in this sector — the CD player and car radio, rather than examining the entire market product by product.

- The CD player, which was invented by Philips, is truly a major technological breakthrough. Its diversification, primarily in sound, but also in the areas of the image (CD- V) and data processing (CD-ROM), has led to a great surge in the number of new products and services offered.
- The car radio is one of the elements of 'mobile communications', an area that is booming as the result of the introduction of new services such as the RDS (radio data system) for programme identification transmission, the transmission of traffic information, etc.

Table 6
The video tape recorder market

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988
VTR	1 191	2 469	4 968	5 082	4 890	5 425	6 459	8 233	9 749

Source: EACEM.

Table 7
Principal producers of video tape recorders

(%)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC Production	N/A	4	17	16	22	40	45	51	52
Imports extra-EC	17	96	83	84	78	60	55	49	48
of which, from:									
Republic of Korea						2	6	16	13
Japan	94	94	80	82	74	58	51	43	33
Total market	100	100	100	100	100	100	100	100	100

Source: EACEM.

Table 8
Video camera recorder market

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988
VCR	N/A	N/A	310	246	277	288	426	797	1 169

Source: EACEM.

Table 9
The audio market

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Audio products	N/A	N/A	4 815	4 282	3 827	4 175	6 046	6 116	7 300

Source: EACEM.

Table 10
Audio market products

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988
CD players	N/A	N/A	N/A	138	272	655	2 095	3 951	6 211
Car radios	7 940	7 576	8 520	10 137	10 467	11 818	13 469	15 218	15 925

Source: EACEM.

Finally, both products are manufactured primarily by European concerns.

In other words, the intra-Community trade statistics reflect the results of restructuring decisions rather than measuring traditional trade movements.

Foreign trade

Intra-Community trade

The intra-Community trade figures do not reflect accurately the real situation. The companies involved in this market are European at the very least, but most are global concerns. Moreover, they have used the past few years to carry out a high-speed restructuring of their manufacturing set-ups, cutting the number of plants drastically.

For example, under the J2T joint venture, the Thomson group manufactures at its plant at Tonnerre, in Burgundy, the basic components of VCRs for assembly in West Berlin.

The end products are then distributed throughout Europe under the Thomson and JVC trademarks.

Trade with non-EC countries

Both imports and exports rose considerably — + 28% and + 50%, respectively — between 1988 and 1987. While this trend appears to be representative of the market, one may nevertheless wonder whether these measurements are truly accurate. One cannot rule out the possibility that the worldwide change in nomenclature that went into effect on 1 January 1988 (switching from Nimexe to the harmonized system, HS), may have had some perverse effects.

Be that as it may, imports accounted for close to 50% of apparent consumption, while the export/import ratio was only about 27%. Europe's external trade deficit in this sector worsened between 1987 and 1988.

Table 12 shows that EC trade with EFTA countries is balanced.

Table 11
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production in current prices									
EC	7 882	8 671	9 850	8 064	7 808	8 895	12 111	12 526	12 906
Index	88.6	97.5	110.7	90.7	87.8	100.0	136.2	140.8	145.1
USA (1)	N/A	N/A	N/A	N/A	N/A	11 647	9 515	8 602	9 023
Index	N/A	N/A	N/A	N/A	N/A	100.0	82.0	74.0	77.0
Production in constant prices									
EC	7 888	7 903	8 314	6 468	5 300	6 460	8 527	8 621	8 881
Index	122.1	122.3	128.7	100.1	82.1	100.0	132.0	133.5	137.5
EC trade in current prices									
Imports extra-EC (2)	4 560	4 719	4 913	6 632	6 737	7 393	8 395	8 670	11 133
Index (3)	61.7	63.8	66.5	89.7	91.1	100.0	113.6	117.3	150.6
Exports extra-EC (2)	1 092	1 190	1 276	1 378	1 620	1 984	1 956	1 995	2 984
Index (3)	55.2	60.1	64.5	69.7	81.7	100.0	98.6	100.6	150.4
X/M	23.9	25.2	26.0	20.7	24.0	26.8	23.3	23.0	27.0

(1) Census of Manufactures and Eurostat estimates.

(2) 1980 EC 9; 1981-83 EC 10.

(3) Taking into account changes in EC membership.

Source: EACEM, Eurostat (Comext).

The volume of trade with the USA is low and the export/import ratio close to 50%.

The EC's number 1 supplier is Japan, with 50% of imports and 28% of the European market. The Republic of Korea is close behind Japan, with 11% of the EC's total imports and 6% of the internal market. European exports to these two countries are mere trickles. As a result, the EC's trade deficit with Japan was a record ECU 5.5 billion in 1988.

Table 12
Structure of imports and exports, 1988

(million ECU)	Exports from EC	Imports to EC	X/M (%)
Japan	43	5 513	.8
Republic of Korea	80	1 228	6.5
USA	341	709	48.1
Austria	309	628	49.2
Taiwan	38	603	6.3
Singapore	52	579	9.0
Hong Kong	34	456	7.5
China	13	353	3.7
Malaysia	19	260	7.3
Total extra-EC	2 984	11 133	27.0
of which from EFTA	1 061	1 032	102.8

Source: Eurostat (Comext).

Employment

The number of jobs in consumer electronics declined from 250 000 in 1975 to 123 000 in 1988.

1980-88 was marked by two major phenomena — the closing of more than 100 plants and the disappearance of 50% of the industry's jobs in the face of stiff competition and the two-way relocation of manufacturing facilities.

The paradox is that while European companies are starting to set up facilities in the low-wage countries of South East Asia, Japanese and Korean firms are investing in production and assembly units in Europe.

To give a rough idea of the situation, the 43 Japanese and Korean plants located in Europe employ 16 000 people, while the 113 'native European' plants employ a total workforce of 110 000.

Table 13
Structure of industry

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Employment (1 000)	160.4	151.2	146.5	145.5	134.2	133.7	131.0	126.6	123.0
Number of factories	N/A	N/A	N/A	N/A	N/A	N/A	N/A	224	165

Source: EACEM.

Investments — research and development

The consumer electronics industry is characterized by:

- fast-paced innovation; 60-70% of its products become obsolete every 10 years;
- investment financing costs that are as high as 4% of turnover;
- an annual drop of prices of about 10%;
- R&D costs that are about 7% of turnover.

In conclusion, the industry has turned over to consumers the full fruit of the gains in productivity that it has made over the past 30 years, without having collected any dividends on its investments.

A solution to the paradox of the European consumer, who wants to 'live here but buy there' must be found if the major balances of forces within the EC are to be preserved.

The relocation of plants discussed in the previous section is not the right answer to this basic question.

Structural changes

Competitive pressure has forced European industry to speed up its concentration of undertakings. Today, Europe is the home of two of the world's four leading consumer electronics groups, Philips and Thomson (Thomson Consumer Electronics). In addition, the Finnish company Nokia has just created a third European heavy-weight through a series of recent acquisitions in France and the Federal Republic of Germany.

Finally, a large share of the domestic market in many EC Member States continues to be held by small and medium-sized enterprises, especially in hi-fi equipment.

Thomson's acquisition of General Electric's consumer electronics division has created a close tie between Europe and the United States. Philips is in a similar position *vis-à-vis* its American holdings.

Robert Bosch and its subsidiary, Blaupunkt, are also heavy-weights in automotive electronics.

Finally, this is the place to recall the Japanese companies' decisions to transfer to Europe production and assembly plants for products with a very wide range of added value, depending on the products and companies involved.

Geographical distribution

The United Kingdom and, more recently, Spain are the countries of predilection for Japanese industrial infrastructure investments.

Environment

From the environmental standpoint, the development of the consumer electronics industry — a clean industry — can only be encouraged.

Impact of '1992'

The strategic importance of the consumer electronics industry in post-1992 Europe is twofold:

- The Council and Ministers responsible for cultural affairs have asserted repeatedly that audiovisual media are one of the main means of transmitting information and culture among the citizens of Europe and that they help strengthen Europe's cultures as well as the 'European identity'; in other words, that there cannot be a European cultural policy without audiovisual support.
- The electronics industry can be symbolized by a three-legged stool with research as the floor. The three legs are electronic components, consumer electronics and professional equipment. Each of the legs is necessary. If one of them breaks, the stool will collapse.

Consequently, the completion of the single market by 1993 will require the maintenance and expansion of a sound, dynamic consumer electronics sector.

New technology

The 1988 launching of the TDF1-TVSAT Franco-German direct broadcasting satellites must be considered in this context.

The first programmes broadcast using the new D2 MAC/Packet television standard pave the way for the future HDTV system, HD MAC. This system is being developed as a project in the EC's Eureka 95. It unites engineers from Philips, Thomson and Robert Bosch, the high qualifications of such broadcasting companies as the BBC, IBA, TDF, RAI, Bundespost/FTZ, etc., universities and many private companies. Recent presentations, including the one at IBC '88 in Brighton, have been totally convincing.

European consumer electronics firms are participating in many other European R&D programmes. These include Esprit II (especially in home robot and smart house projects), RACE, Media, Delta and Drive, in addition to a number of Eureka projects.

Outlook

Backed by short and medium-term technological innovations such as HDTV, the consumer electronics sector cannot but look forward to a brilliant future. However, the cut-throat competition on this market and high standards make it difficult for challengers to break into. Cracking this nut is strategically crucial for Europe.

The demand can be expected to fall off in 1989, although volume growth will continue at a projected 4%.

Sales of the major items are expected to increase slightly: 1% for colour television sets and 2% for VCRs. Strong growth can be expected in camcorder (close to 30%) and, turning to audio equipment, CD player sales only.

1989 will also be marked by continued work to launch video CDs and television receivers for direct satellite reception, as the TV SAT2, TDF2 and BSB satellites are put in orbit, joining the TDF1 and Astra satellites, which were launched in 1988.

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TRANSPORT EQUIPMENT

(NACE 35 and 36)

Summary

The transport equipment sector occupies a privileged position within European industry, because of its size but also because of the fact that it provides a positive contribution to the balance of payments. The beginning of the 1980s was marked by stagnation in real production, but was followed by a revival of activity from 1985. Major restructuring took place which was reflected in continuous job losses up until 1988, accompanied by productivity gains and improvements in profitability. The process of concentration which had been initiated in the 1970s continued in the 1980s. Medium-term prospects are good, but the sector is suffering nevertheless from several handicaps in terms of competitiveness with regard to its chief American and Japanese competitors.

The importance of the sector within European industry

The current situation

With 1989 production standing at around ECU 280 billion, the transport equipment sector makes up one of the principal industrial sectors in Europe. Ranked by turnover, this sector is ahead of the chemical, electrical and building sectors. Only the food industry manages to do better.

With real growth running at over 3.5%, 1988 turned out to be a very good year for the sector. This growth was even reflected in a virtual stabilization of employment, which came after seven consecutive years of reductions in the labour force.

Production and consumption

The transport equipment sector was, of course, affected by the aftermath of the second petrol crisis at the beginning of the 1980s. However, this gave rise to a stagnation of real production rather than a genuine downturn. From 1980 to 1984, with the exception of 1982, growth was either very low or negative. During this period, real production progressed by a mere 0.6% per year on average.

On the other hand, the situation has been reversed from 1985 onwards. This revival, which was far more vigorous than in the majority of European industrial sectors, led to a growth in real production close to 4% between 1984 and 1988. The main driving forces behind this growth were the motor manufacturing industry in the broad sense of the term (that is to say, including heavy vehicles and spare parts), and the aeronautical industry. The car industry benefited from a revival in demand for motor vehicles, which lasted longer than expected by most analysts, as well as the good performance of demand for trucks. On the other hand, the aeronautical industry was able to take advantage of the strong development in world civil aviation, helped firmly in this by the Airbus programme.

The transport equipment sector does, admittedly, concern a wide range of economic agents, insofar as its production covers not only finished consumer goods with a share of 40% (chiefly in motor vehicles), but also capital as well as intermediate goods, whose shares are similar, at around 30%.

This latter category mirrors the importance of the spare parts industry, in so far as the main customer

Table 1
Main indicators, 1980-88
Transport equipment

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Apparent consumption	135 827	144 525	158 689	169 228	172 890	191 219	206 868	223 035
Net exports	16 566	20 652	23 869	22 676	27 299	28 241	25 625	25 294
Production	152 393	165 177	182 558	191 904	200 189	219 459	232 493	248 329

Source: Eurostat.

Table 2
Production in 1985 prices
Transport equipment

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	6 765	6 647	8 060	7 841	7 558	8 449	8 597	8 218	8 273
FR of Germany	65 714	69 575	70 999	72 384	72 627	78 850	79 722	80 941	81 095
Denmark	1 155	1 395	1 493	1 518	1 374	1 473	1 445	1 156	1 163
Spain	12 499	11 663	12 088	13 359	12 912	12 830	14 102	15 911	17 911
France	54 222	55 217	55 913	55 467	53 362	52 025	57 254	57 861	61 598
Greece	739	851	600	525	498	429	448	460	509
Italy	21 776	21 445	21 795	21 863	22 811	23 190	25 482	25 067	28 035
Ireland	548	562	460	390	235	159	162	177	188
Luxembourg	0	0	0	0	0	0	0	0	0
Netherlands	4 857	5 236	5 428	4 788	4 736	4 777	4 025	3 737	3 006
Portugal	1 092	1 015	1 057	958	794	860	918	1 086	1 220
United Kingdom	36 730	32 053	33 289	33 686	33 966	36 417	39 068	42 749	42 823
EC	206 097	205 658	211 183	212 780	210 873	219 459	231 223	237 363	245 820

Source: Eurostat.

for intermediate goods for the transport equipment sector is the sector itself.

As a customer, the transport equipment sector exerts the role of a locomotive for a large number of other industrial sectors, among which:

- the iron and steel industry and metal products,
- mechanical engineering,
- the electrical industry (the importance of which is becoming increasingly marked as transport facilities 'go electronic',
- plastics and chemicals.

Foreign trade

In 1988, the EC recorded a trade surplus in the transport equipment sector of more than ECU 20 billion. This surplus, which may be subject to considerable fluctuations from year to year, was then below the level recorded in 1981. However, during the 1980s, imports grew rapidly, nearly twice as fast as exports. This partly results from the poor performance of European exports since 1986. Following a sharp fall in that year, these suffered virtual stagnation in 1987 and 1988. On the other hand, imports,

which had themselves witnessed a drop in 1986, picked up again in 1987 and recorded formidable growth of over 30% in 1988.

However, the cyclical developments come on top of more structural problems, among which the constant decline, since 1982, of the export-import ratio and the poor level of competitiveness of the Community.

Employment

The stagnation in the sector's activity at the beginning of the 1980s led to major restructuring. Considerable restructuring investments implemented at that time were designed to substitute capital for labour, which led to notable cut-backs in the labour force. Employment steadily declined between 1980 and 1988, reducing the number of employees from more than 3.2 million to less than 2.7 million, a fall of over 15%.

At the same time, productivity has grown continuously at an average rate of around 4.5% per year. Nevertheless, the industry in Europe remains stricken by a lower productivity level than that of its main competitors, namely the United States and Japan.

Table 3
Trade (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Extra-EC exports	26 992	34 059	37 904	39 481	45 571	48 247	43 554	44 106	44 697
Extra-EC imports	11 462	15 197	15 919	18 358	21 247	22 701	21 273	22 134	28 922
Intra-EC imports	30 745	35 035	41 970	44 137	45 583	48 337	58 844	65 077	72 910

(1) 1980 EC 9; 1981-85 EC 10.

Source: Eurostat.

Description of the sector

According to the European NACE classification, the transport equipment sector covers the following:

- motor vehicles, parts and accessories (NACE 35),
- shipbuilding (NACE 361),
- rail transport facilities (NACE 362),
- cycles and motorcycles (NACE 364),
- aerospace industry (NACE 364),
- other equipment (NACE 365).

The spare parts and accessories sector for motor vehicles poses some problems, in so far as there is no real consensus as to its composition. It is for this reason that it does not appear in Figure 1. However, its turnover for 1988 can be estimated at ECU 65 billion, or one third of the total turnover of the motor vehicle industry. Such statistics nevertheless involve the taking into account of products which are classified under NACE in other sectors, such as the electrical industry, for example.

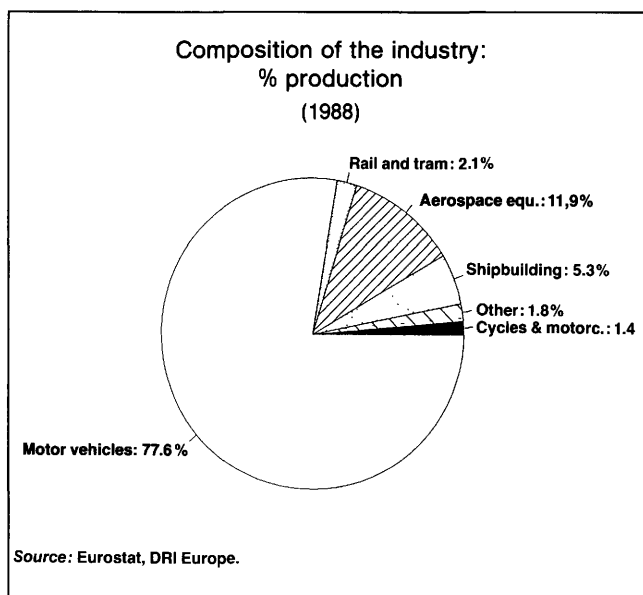
As shown in Figure 1, the two main components of the transport equipment sector are the motor vehicle industry in the broad sense of the term (that is to say including parts and accessories) with over 60% of production, and the aerospace industry with around 12% of production. These sectors are also the two which have recorded the fastest growth rate in the course of the 1980s.

Structure of the industry

The transport equipment sector is, on the whole, a very concentrated sector. As indicated in the first part of this book, in the chapter on the 70 largest

European corporations, the three leading companies (in terms of turnover) belong to this sector.

Figure 1



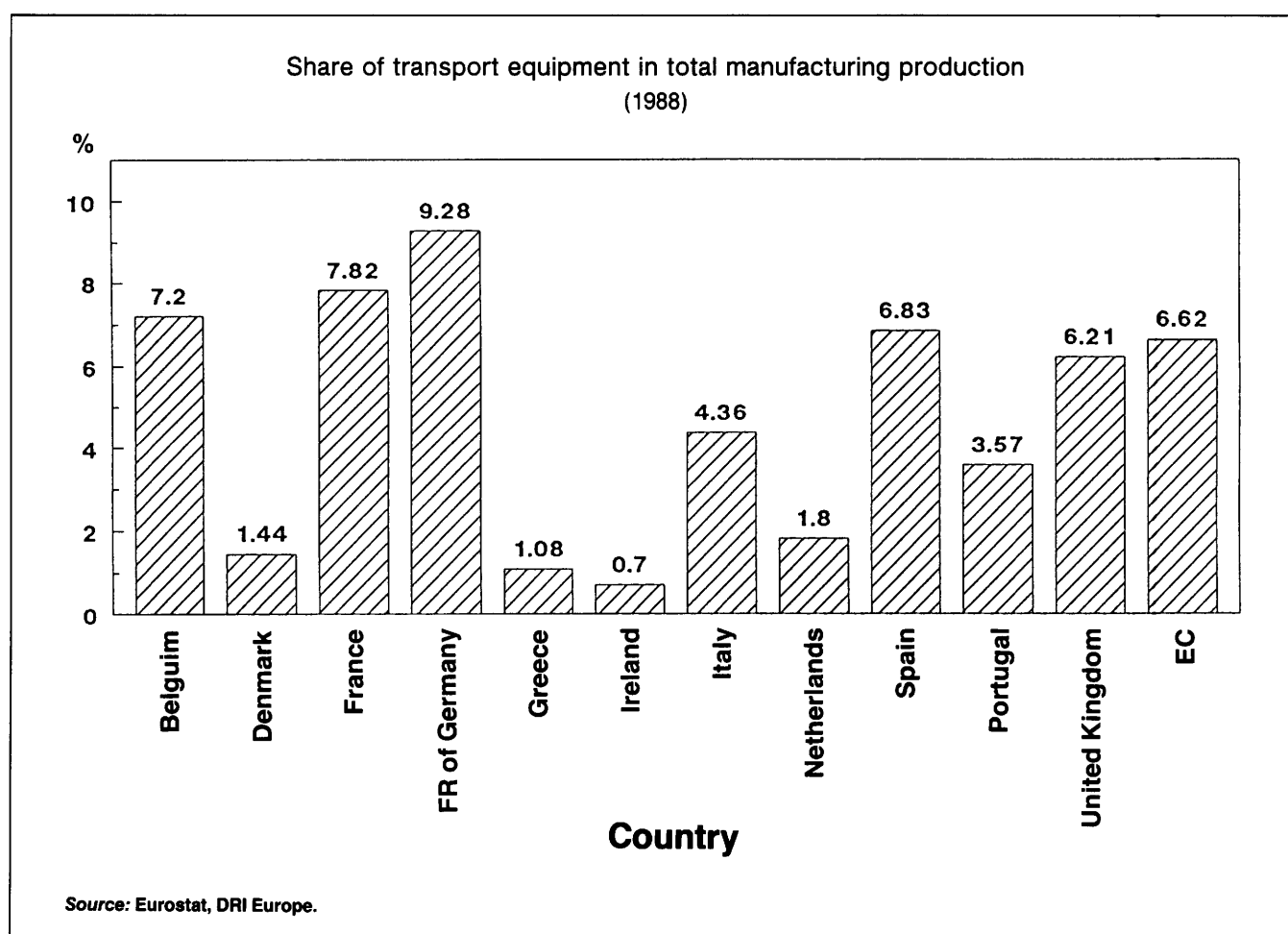
It is important to note that this concentration is not confined to the different branches within the sector, but that the products offered by the main companies generally cover a large variety of transport equipment products. The links between the motor vehicle industry and the trucks industry for instance are well known. Yet it should not be forgotten that links of this sort also exist between the motor vehicle and the mopeds and motorcycle sectors. More recently, in the course of the 1980s, we have companies forging links with other companies in another segment of the market, such as the purchase of Rover by British Aerospace in the United Kingdom, and the imminent and somewhat controversial takeover of the German aircraft firm MBB by Daimler-Benz.

Table 4
Employment by country

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	75 165	67 470	76 816	65 301	62 882	62 757	63 611	63 072	60 509
FR of Germany	865 615	865 501	858 077	858 625	860 867	874 213	893 456	906 520	906 185
Denmark	22 555	23 227	23 861	21 323	20 646	22 491	21 180	17 634	17 516
Spain	241 672	227 053	226 431	224 668	213 503	201 790	196 417	196 335	196 335
France	664 626	636 837	628 268	618 164	597 984	563 911	534 758	512 824	514 161
Greece	26 265	27 939	23 604	21 529	21 600	22 271	22 292	22 000	22 000
Italy	406 149	385 505	373 929	349 970	338 035	314 415	300 592	289 481	285 993
Ireland	6 741	5 655	5 254	4 458	2 557	1 824	1 712	1 623	1 744
Luxembourg	0	0	0	0	0	0	0	0	0
Netherlands	69 653	68 857	66 391	59 180	57 377	56 169	56 905	57 967	66 295
Portugal	46 814	45 948	45 081	42 561	39 023	34 119	32 795	32 038	32 133
United Kingdom	813 363	724 683	659 957	605 843	574 554	552 932	528 691	501 405	496 146
EC	3 238 618	3 078 75	2 987 669	2 871 622	2 789 028	2 706 892	2 652 409	2 600 899	2 599 017

Source: Eurostat.

Figure 2



The concentration of the transport equipment sector which has taken place in the course of the 1980s and which will probably continue in the future, has not stopped the emergence of new, flexible forms of cooperation, such as joint ventures or cooperation agreements in R&D, particularly with Japanese and American competitors.

Geographical distribution

In 1988, more than 85% of EC production was concentrated in four countries: the Federal Republic of Germany, well ahead of the other Member States with 36% of production, France (23%), the United Kingdom (16%) and Italy (11%). Spain was also a significant producer with around 7% of production in the Community. The distribution between Member States has not changed significantly during the 1980s. Figure 2 compares the production of each country, taking account of its relative size. The Federal Republic of Germany comes out as most specialized in the transport equipment sector, followed by France, Spain and, perhaps more surprisingly, Belgium. A portion of Belgian production is

the work of companies from other European countries.

Table 5
Main indicators, 1989-95
Transport equipment

	Share 1989	Percent changes			Com- pound growth 89-95
		1989	1990	1991	
Europe 4					
Production	100	3.1	2.6	3.6	2.8
Apparent consumption	100	3.3	3.2	3.8	2.8
FR of Germany					
Production	44.4	2.5	1.6	3.3	2.8
Apparent consumption	38.3	2.9	3.4	5.2	3.1
France					
Production	25.3	3.7	2	4.4	1.4
Apparent consumption	23.8	2.3	2.5	2.4	1.9
United Kingdom					
Production	15.2	4	4.2	2.6	2.8
Apparent consumption	19.1	5.3	2.6	1.4	1.5
Italy					
Production	15.1	2.8	4.7	4	4.7
Apparent consumption	18.7	3.4	4.2	5.1	4.7

Source: DRI Europe.

Prospects

The medium-term outlook for the industry is good. Indeed, even if the first signs are there that the impressive expansion of demand for motor vehicles is slowing down, qualitative changes in supply (with a rise in the average quality of the products), as well as the favourable outlook for the aerospace industry, are all reasons to remain optimistic. However, a certain number of problems threaten this sector's future development. Among these is the still relatively low productivity and profitability level of certain branches, even if some improvement was recorded in the

second half of the 1980s. Lastly, it has to be admitted that, although this sector is highly concentrated, the size of European firms is still relatively small when compared to the chief competitors in the United States and Japan.

Table 5 sets out the forecasts carried out by DRI Europe over the period 1989-95 for the Federal Republic of Germany, France, the United Kingdom and Italy. Together, these four countries accounted for more than 85% of production in the EC in 1988.

DRI Europe

MOTOR VEHICLES

(NACE 351)

Summary

The automobile industry has been and continues to be a focal point of industrial progress, not only because of its own growth and size (it represents about 9% of EC industrial value-added) but also because of its close interrelationships with a wide range of basic industries. Its role in the Community economy is vital, in terms of external trade (ECU 20.5 billion of net positive balance or 28% of the total manufactured goods balance in 1987), in terms of industrial development and of technological innovation. Although the EC market is not expected to grow by more than 1 to 2% per annum in volume terms, it should continue to be the largest market for passenger cars and present scope for growth as European consumers tend to move upmarket.

Current situation

Representing about 9% of the EC industrial value-added content, the automotive sector employs 1.8 million people directly (about 8% of the employment in the manufacturing industry). It is, however, esti-

mated that one out of 10 jobs in the EC depends directly or indirectly on the automobile sector in the largest sense (from third-tier suppliers to servicing and repair shops).

The automobile industries of North America, Japan and the EC are of comparable size, each producing approximately 12 million cars and trucks per annum. These three major trading areas dominate total world vehicle production, which is estimated to be around 48 million vehicles.

Production and consumption

Consumption

In the years following the 1979 energy crisis, the EC automobile industry went through a period of stagnation characterized by slackening motor vehicle sales. Due to the poor general economic situation, uncertainties created by the oil crisis and restrictive national economic policies, demand for motor vehicles in the EC stagnated at a level of about 10.4 million until 1984.

Table 1
Main indicators, 1980-89
Motor vehicles

(millions)	1980	1985	1986	1987	1988	1989
Net exports						
Cars	.7	.8	.5	.3	.3	N/A
Vans and lorries	.2	.2	.2	.1	.1	N/A
Total	.9	1.0	.7	.4	.4	N/A
New registrations						
Cars	9.2	9.5	10.5	11.2	11.8	11.8
Vans and lorries	.9	1.3	1.3	1.5	1.6	1.6
Total	10.1	10.8	11.8	12.7	13.4	13.4
Production (1)						
Cars	9.9	10.0	11.3	11.7	12.2	12.2
Vans and lorries	.8	1.3	1.3	1.5	1.6	1.6
Total	10.7	11.3	12.6	13.2	13.8	13.8
Number of vehicles						
Cars	91.8	110.2	113.3	116.6	119.8	122.6
Vans and lorries	9.3	10.9	11.2	11.7	12.5	12.6
Total	101.1	121.1	124.5	128.3	132.3	135.2
Passenger car density (2)	310	362	371	382	391	399

(1) Excluding double count.

(2) Cars per 1 000 population.

Source: DRI, MK Systems, WARDS, Eurostat.

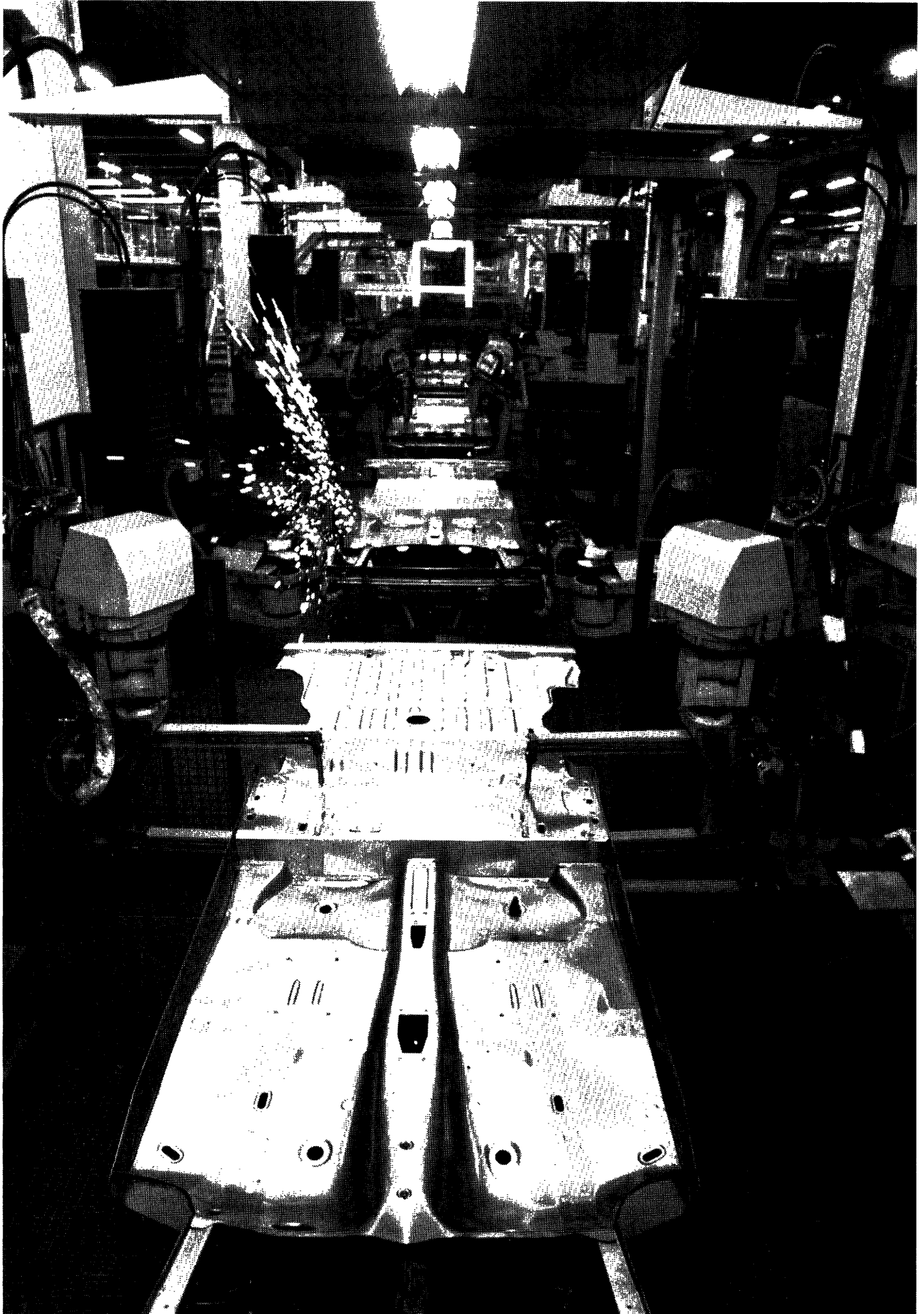


Table 2
World production of motor vehicles

(millions)	EC	North America	Japan	Total world
1970	11.4	9.5	5.3	29.7
1980	11.7	9.4	11.0	38.8
1981	10.9	9.2	11.2	37.4
1982	11.3	8.2	10.7	36.4
1983	12.0	11.0	11.1	40.0
1984	11.1	12.8	11.4	42.2
1985	11.3	13.6	12.3	44.3
1986	12.6	13.3	12.3	45.1
1987	13.2	12.6	12.2	45.7
1988	13.8	13.2	12.7	48.0
1989	13.8	12.8	12.6	48.0

Source: JAMA, Automotive News, AID, CLCA, DRI.

During this period, cyclical developments differed from country to country. France, Italy and the United Kingdom were hit later than other Member States, such as the Federal Republic of Germany. In Spain, the situation was comparatively better due to the need to enhance the motor vehicle fleet. Smaller EC countries benefited from an earlier upturn mainly because of replacement demand. Demand was weak both for passenger cars and commercial vehicles. In the latter sector, demand for heavier trucks suffered from a greater setback than demand for light commercial vehicles.

In 1985, demand started to pick up again having reached 10.8 million vehicles EC-wide. Since then, the EC market continued to grow, leading to peak sales of 13.4 million vehicles in 1988 i.e. +24% over 1985. Demand rose in all sectors and every country benefited from this upturn.

Table 3
Density of car ownership, 1988

(cars per 1 000 population)	1988
EC	391
Belgium	356
Denmark	314
FR of Germany	482
Greece	126
Spain	276
France	403
Ireland	196
Italy	401
Netherlands	340
Portugal	138
United Kingdom	365

Source: DRI.

Although the European auto market had been forecast to experience a downturn in 1988, vehicle sales rose by 5.5%, the most spectacular increases having

been achieved in Portugal (+50%), Spain (+16%), Italy and the UK (+10%).

Passenger cars

In 1988, EC registrations of new passenger cars reached the record level of 11.8 million, which for the second time made the EC the largest world market for passenger cars.

Indications for 1989 reveal that demand has started off strongly, in line with 1988 trends. Despite almost universal forecasts of lower sales this year, production volumes for the first few months indicate that no major downturn is expected to occur, although it is unlikely that the 1988 record level will again be reached.

Table 4
Registrations of new passenger cars

(millions)	1985	1986	1987	1988	1989
EC	9.6	10.5	11.2	11.8	11.8
Total Europe	10.6	11.6	12.3	12.9	12.9
North America	12.8	12.5	11.3	11.8	10.9
Japan	3.1	3.1	3.3	3.7	3.9

Source: DRI, MK Systems, JAMA, Wards.

With the exception of the Federal Republic of Germany (-3.7%), the Netherlands (-13.1%) and Denmark (-28.2%), all other EC countries have benefited from strong demand with particular emphasis on southern Europe and the UK.

In the Federal Republic of Germany, which remains the largest Western European market, new car registrations during the first months of 1988 were extraordinarily weak because a large number of car purchases had been pulled forward into 1987 as a result of the rundown of tax incentives on 'clean' cars. For the rest of the year, higher prices appear to have more than mopped up available growth of consumer spending on cars in 1988. In the Netherlands, the exceptionally high rates of replacement registered in 1986 and 1987, coupled with the uncertainty with regard to the government's planned introduction of cash incentives for cars complying with US emissions regulations, seem to be the major factors explaining the drop experienced during 1988. In Denmark, adverse economic conditions are responsible for the decline. In Italy, where production exceeded 2 million units last year, the sustained increase during the last year was mainly a result of faster income growth. In Spain, Portugal, Greece and Ireland, growth in disposable income, low car density and an extremely old parc of cars, are major factors behind the exceptional growth rates experi-

enced during the most recent years. In the UK, after four consecutive years of growth, the market reached a peak of over 2.2 million units, mainly attributable to the continuing consumer spending boom which has forced the government to take measures against the over-heating of the economy, such as substantial rises in interest rates during the last months of 1988. In France, new model releases, better credit conditions and high replacement rates have helped the market to maintain sustained growth rates.

Table 5
Registrations by EC country

(1 000)	1985	1986	1987	1988	1989
EC	9 540	10 450	11 187	11 745	11 758
Belgium and Luxembourg	360	395	406	427	434
Denmark	157	169	124	89	71
FR of Germany	2 379	2 829	2 916	2 803	2 751
Greece	79	65	51	58	62
Spain	572	644	861	991	1 050
France	1 766	1 912	2 105	2 217	2 272
Ireland	59	58	54	61	61
Italy	1 746	1 825	1 977	2 184	2 179
Netherlands	496	561	556	483	487
Portugal	93	110	124	213	184
United Kingdom	1 832	1 882	2 014	2 216	2 207

Source: DRI, MK Systems.

Trucks and commercial vehicles

The EC truck and van market showed continued growth in 1988, which proved to be the best year since the beginning of the decade. Two or three years ago a major factor behind truck sales was the renewal of the fleet built up in the late 1970s. In 1987 and 1988 it was new rather than replacement demand that gave the market its strength. Increased trade between Member States also provided a positive contribution to growth.

Table 6
LCV and lorry registrations

(1 000)	1985	1986	1987	1988	1989
LCVs up to 6 tonnes	1 021	1 112	1 256	1 312	1 343
Lorries over 6 tonnes	201	201	228	254	263
Total EC	1 222	1 313	1 484	1 566	1 606
Western Europe	1 348	1 440	1 614	1 703	1 751
North America	5 075	5 284	5 373	5 657	5 350
Japan	2 432	2 540	2 722	2 980	2 950

Source: DRI, WARDS, JAMA.

Production

Traditionally oriented towards its internal market where its leading position has been unchallenged for decades, the EC automobile industry is now facing growing internal and external competitive pressure from other world automotive industries, especially

Japanese ones. This increasingly competitive environment coincided with a period of overcapacity problems, following the 1979 energy crisis.

Passenger cars

As a result, EC car manufacturers have had to adjust their strategies, taking into account the significant changes that were being implemented in products, production processes and competitive requirements. Substantial reductions in unit production cost were required, as well as improvements in quality control, productivity, and investment in research and development. Improved flexibility was also an absolute necessity to restore profitability. Emphasis has been placed on lowering the production break-even points through technological modernization, rationalization and improved utilization of existing production facilities.

The above improvements were achieved through various means. Plant closures and rationalization of plant layout took place. Most operators, including the component sector, were affected by this trend which was often accompanied by consolidation amongst companies with the objective of generating economies of scale via standardized production and the use of common platforms. Massive workforce reductions took place. This has especially been the case in France, the United Kingdom, Italy and Spain. The Federal Republic of Germany, by contrast, was able to increase employment.

Changes also occurred in business practices. Innovative procurement policies were implemented involving modified relationships with suppliers, more efficient delivery systems and increased demand for out-sourcing alternatives in an attempt to reduce vertical integration. The German car assemblers, for example, have reduced their value-added share in the final product by about 8% on average per annum during the period 1978-86. New standards and quality requirements were also implemented whereby outside suppliers assume full responsibility with regard to quality and warranty. This required substantial changes in industry practices, as well as training programmes to implement quality systems similar to the Japanese model.

An essential factor of improvement was the new investment in high technology manufacturing processes, such as computer-aided manufacturing (CAM) equipment, robotics, and flexible and more efficient productive systems. In addition, significant changes in product technology are taking place as a result of new R&D strategies and the reduction of product lifecycles requiring sophisticated equipment

(such as CAD) and improved applied research infrastructures. This trend created a need for massive investment at a time when competition from Japanese industry was heavily felt and most EC markets were stagnating. Generally relying on their capability to self-finance their investment programmes, most car manufacturers were confronted with huge financial requirements while profitability seriously deteriorated. The total capital expenditure by EC car manufacturers reached the impressive amount of ECU 66 billion during the period 1981 to 1986 (about 8% of turnover). It is not surprising, therefore, that government intervention has played a significant role in the overall process by providing (and/or facilitating access to) funds but also by trade protection to facilitate the restructuring of the industry. Renault is a good example of such government intervention. Early in 1989, the French Government decided to write off a ECU 1.7 billion debt of the State-owned car-maker.

Trucks and commercial vehicles

Within the commercial vehicle industry, the light commercial vehicle segment is of special interest to most European vehicle manufacturers, due to its rapid growth potential. Even if large volumes are produced, production is also very fragmented, both in terms of models and vehicle manufacturers. Joint ventures and technical cooperation agreements were concluded by European manufacturers, mainly with the Japanese, who are interested in segments where they were not previously present or by manufacturers with relatively small volumes. The largest import segment for joint ventures is the car-derived van market which accounts for approximately 42% of the total under six tonnes. This trend has contributed to the large penetration of Japanese models in this segment (about 23%) either through direct imports or assembly in Europe from CKD parts (Spain, the United Kingdom, the Federal Republic of Germany).

Table 7
LCV and lorry production

(1 000)	1985	1986	1987	1988	1989
LCVs up to 6 tonnes	1 124	1 112	1 154	1 310	1 315
Lorries over 6 tonnes	190	229	246	281	283
Total EC (1)	1 314	1 341	1 400	1 591	1 598
Western Europe	1 384	1 405	1 466	1 662	1 687
North America	4 324	4 288	4 651	5 049	N/A
Japan	4 544	4 407	4 308	4 443	N/A

(1) Excluding double count.

Source: DRI, WARDS, JAMA.

The truck industry now only consists of a small number of operators, following the successive consolidations generated by a mature market with low projected long-term growth.

Amongst the major European manufacturers, Renault, PSA and Ford have a leading position in the less than six tonnes range, while production of trucks over six tonnes is dominated by Daimler Benz, Volvo and Iveco.

Trade

While trade between Member States continues to grow at a steady rate, reflecting the good performance of the European market, serious difficulties have been experienced on the US market, mainly as a result of the depreciation of the dollar against all major European currencies. The German specialist manufacturers have been particularly affected by this situation. Import growth reflects the increased penetration of the Japanese automobile industry, which now holds about 11.3% of the western European passenger car market (unchanged for the past two years) and higher imports from the Comecon countries.

Table 8
Intra and extra-EC trade

(millions)	1980	1985	1986	1987	1988	1989
						(1)
Intra-EC trade	3.2	3.7	4.2	4.5	4.7	4.6
Exports extra-EC	1.7	1.9	1.7	1.6	1.6	1.6
Imports extra-EC	1.0	1.1	1.2	1.3	1.3	1.3
Net exports	.7	.8	.5	.3	.3	.3

(1) Partial forecast.

Source: Marketing Systems.

Employment trends

The level of direct employment in the EC automobile industry reflects the restructuring which has taken place since the early 1980s. Overall, about 390 000 (18%) direct jobs were lost in the industry between 1980 and 1987, although it is believed that total job losses (both direct and indirect) is closer to 600 000 (i.e. if considering all sectors involved in automotive activities are considered). France, Italy and the United Kingdom were mostly affected by this trend; only the Federal Republic of Germany achieved a remarkable performance and consistently increased employment levels (+68 000).

In the long run, the downward trend in employment should continue as investments aiming for productivity gains remain high; technical developments in

assembly imply a substitution of capital for labour, and output is not forecast to grow significantly.

Table 9
EC vehicle output per employee

(millions)	1980	1984	1988
Production	10.7	11.3	12.2
Direct employment (1)	2.2	1.9	1.8
Vehicles/employees	4.9	5.9	6.8

(1) 1988 partial estimate.

Source: DRI.

Productivity gains continue to be a main priority for the EC automobile industry. Industry output per employee increased by roughly 39% between 1980 to 1988, thanks to major restructuring efforts and substantial investment in advanced manufacturing equipment and processes. This trend is expected to continue over the coming years.

Since concerns about excess capacity lead to frustrations over not being able to meet still growing demand, most European car manufacturers are carefully planning capacity increases to avoid the costs of new 'greenfield' plants, and avoid getting hurt by unused capacities should conditions become less favourable. Using overtime as much as possible, companies try to avoid expanding their workforce which would be difficult and expensive to reduce during a downturn period.

The position of the firms

In the car market, European leadership continues to stimulate VW and Fiat moves towards larger model ranges for better exploitation of market niches (Fiat/

Lancia/Alfa, VW/Audi/Seat) although PSA is now seriously positioned to challenge such leadership.

In 1988, Japanese car sales in the EC (1 088 000 or 9.2% of the market share) rose by 1.7% compared with an overall increase of sales of 5.4%. This was the second year since 1984 when Japanese volume increase was below the market growth rate, and is mainly explained by the fact that the highest volume increases took place in countries where Japanese car sales have limited access (France, Italy, Spain, the United Kingdom and Portugal).

Generally speaking, capacity utilization in western Europe is now adequate (overall capacity is currently estimated at around 14 million passenger cars/year).

As far as the commercial vehicle market is concerned, the main companies are the following (market shares are based on the number of units produced):

- in the LCV segment, Renault and PSA are leading, both with a 20% market share, followed by Ford with 17%, Fiat/Iveco with 10% and Volkswagen with 10%;
- in the truck segment (over 6 tonnes), Daimler-Benz is leading with 22%, followed by Fiat/Iveco (14%), Renault (13%), Leyland-DAF (11%) and Volvo (11%).

Financial performance

The combined financial performance of the EC automobile manufacturers has improved dramatically since 1984. After combined losses of ECU 2.2

Table 10
Western Europe: registrations by manufacturer
Passenger cars

(1 000)	1985	% Share	1986	% Share	1987	% Share	1988	% Share
VW Group	1 524	14.4	1 698	14.6	1 838	14.9	1 919	14.9
Fiat Group	1 458	13.7	1 628	14.0	1 754	14.2	1 926	14.9
PSA Group	1 222	11.5	1 324	11.4	1 499	12.1	1 669	12.9
Ford	1 263	11.9	1 355	11.7	1 472	12.0	1 455	11.3
GM	1 205	11.4	1 263	10.9	1 298	10.6	1 337	10.4
Renault	1 129	10.6	1 229	10.6	1 304	10.6	1 309	10.1
Rover Group	419	4.0	409	3.5	416	3.4	445	3.4
D. Benz	395	3.7	434	3.7	427	3.5	430	3.3
BMW	290	2.7	296	2.6	292	2.4	350	2.7
Volvo	255	2.4	267	2.3	267	2.2	267	2.1
Other	305	2.9	332	3.0	345	2.8	352	2.7
Japanese	1 143	10.8	1 358	11.7	1 404	11.3	1 448	11.3
Total Europe	10 608	100.0	11 592	100.0	12 316	100.0	12 905	100.0

Source: DRI.

billion for the period 1981 to 1984, 1985 to 1987 has seen auto companies realizing a net profit of ECU 10.6 billion and estimates for 1988 indicate a total profit of about the same level.

1987 was the first of many years in which almost all auto companies have been in the black. This turnaround in profitability is mainly the result of the extremely good performance of the EC automotive market, where European car manufacturers enjoy a leading position, and of the positive effects of the industry's restructuring. Increased flexibility having been achieved through sizeable reductions of break-even points (mainly by volume producers), the overall competitive position of the industry is now better. However, the profitability of EC operators, debt rates and capacity to finance investments from internal funding, remain below the standards of their US and Japanese counterparts.

Environmental protection

The issue of road vehicles and the environment is a major one and, despite a significant clarification of the legislative framework during 1989, remains subject to numerous uncertainties.

Two gaseous emissions, unburned hydrocarbons and carbon monoxide, have been controlled by EC legislation since the early 1970s, and in 1978 oxides of nitrogen were added to the list. The 'Luxembourg Compromise' of 1985, finally passed into legislation at the end of 1987 as a result of the Single European Act, introduced far tighter regulations for cars with engines over 1 400cc capacity. However, cars with smaller or diesel engines, and so over a half of the EC car fleet, were largely unaffected by the legislation which in any event was to be phased in over the period to the end of 1993 and left individual Member States the option to delay implementation still further.

The 1985 proposal brought consumer reactions and national industry interests into play for the first time. The steady tightening of regulations until then had passed unnoticed and was decided by consensus. By contrast, the technical changes required to meet the new legislation, including in the large majority of cases an autocatalyst system, were substantial, involving both car producers and consumers in additional costs. For the consumer, the cost impact and dislocation was made more significant by the related technical requirement to fuel such cars with unleaded gasoline. A separate EC directive requiring Member States to make unleaded gasoline widely available by the end of 1989 (lead itself being regarded as a pollu-

tant) was issued in 1985, but at the time, the fuel was only patchily available at a Community level. It is also significantly more expensive in the absence of offsetting fiscal change, and the major capital investment required from the petroleum industry to refine and distribute the fuel brought another variable into the balance of national and industry interests.

By 1989, the generalization of environmental concern among Member States and a more acute recognition of the need for European integration at an industrial and legislative level allowed the compromise to be removed. Final detailed legislation is still pending but it is generally viewed as inevitable that all new cars, irrespective of engine size category, will have to meet standards as severe as those originally established for large cars (over 2 000cc), by 1992, and that the legislation will be mandatory, not 'optional'. Legislation was established to this effect for the most contentious 'small' car class during 1989.

Most EC Member States have still to deal with the disruption to demand and supply that will result. The additional costs involved are reduced by wider economies of scale, and the problem of inadequate unleaded gasoline supply is largely resolved. They nevertheless must be borne and an increasing number of Member States are considering the introduction of fiscal subsidies for 'clean' cars, both to avoid demand disruption (particularly in car-producing Member States, where national producers generally hold commanding market shares) and to accelerate the reduction in emissions. Only the Federal Republic of Germany, and to a lesser extent, the Netherlands have progressed far enough already that disruption to the car market will be insignificant.

Moreover, the period 1985-89 has seen a widening of concern about the environment, as well as intensification of concern about specific environmental issues. The catalyst for concern over 1983-85 about the above three gaseous emissions was 'acid rain' or defoliation. In a very short period, attention has transferred to the environment in general. Consequently, diesel cars are now being treated as 'unfriendly', and often taxed accordingly even though their contribution to acid rain is very small as a result of inherent technical characteristics. Instead, the fact that they may emit carcinogenic particulates is the main motivation for current and prospective legislation. Similarly, unleaded gasoline contains a higher proportion of carcinogenic hydrocarbons than leaded, and EC legislation on the subject is lax by international standards. The diesel issue is fundamentally important for the freight transport sector,

where a viable alternative to diesel is not in the offing; where control technology, in contrast to that for gasoline engines, is only at an early stage of development and will markedly affect the economics of commercial vehicle operation; and where no EC legislation currently exists relating to a key area, that of diesel fuel composition.

Finally, perhaps most importantly, neither the EC nor any individual Member State has any regulations concerning automotive fuel consumption and the directly-related issue of carbon dioxide emissions, the main contributor to the 'Greenhouse effect'. Such regulations have been in place in the USA since the 1970s as a fuel-saving measure, but have recently been tightened out of concern for the emissions consequences. It is likely that the average new car sold in the EC in 1988 had a higher specific fuel consumption than that in 1987 as technical progress failed to offset the progressive move to heavier and more powerful cars; due to the decline in popularity of fuel-efficient diesel cars; and to the immediate effects of other gaseous emissions reductions. Until then most evidence points to a steady improvement due to technological advance. This is undoubtedly the next challenge facing automotive producers, consumers and legislators in the Community.

Outlook

Passenger cars

EC car manufacturers are now facing the most challenging and competitive period in their history. The creation of the single market will boost internal and external competition, which in turn will change the face of the industry. Companies will continue to restructure, merge, pursue other forms of strategic alliances and take other actions. Even if the market is not expected to grow by more than 1 to 2% per annum, it will continue to be the world's largest market for passenger cars, with scope for growth in value terms as European consumers tend to shift upmarket. All major world players will treat the EC as an 'open' market and strategies currently under development will be aggressively implemented. Despite the current apparent good shape of the industry, there are signs of uncertainty about the future. In particular, the following could constitute potential problems:

- the financial capability of several European operators when compared with their US and Japanese competitors;
- the instability of competition between six producers of about the same size;
- competition with potential Japanese transplants in Europe;
- falling revenues from exports to the USA mainly as a result of currency fluctuations, further endangered by the Japanese move to the upper class market segment, which constitutes a large and profitable part of European exports to the USA;
- potentially higher exports from Japanese and American manufacturers in the USA;
- the emergence of new producers in the Asia and Pacific basin area, who are preparing large-scale production for export.

At present, European producers control a large part of their domestic markets and a high-value export market in the USA. In the future, several new Japanese players will most probably join the large producers in Europe and strive for access to the upper market segments. If this materializes, shifts in ownership of capacity are likely to occur.

Vans and trucks

The van and light truck market is likely to continue to show signs of strength in the long run. This sector will continue to benefit from design improvement and technological innovation adapted from the passenger car industry. With regard to large trucks, and in spite of the increasing level of road transportation, the situation remains unclear, partly because the market has reached a degree of maturity and partly because there are uncertainties regarding definition of future standardized product lines.

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MOTOR VEHICLE PARTS AND ACCESSORIES

(NACE 353)

Summary

The motor vehicle parts and accessories sector, also called the automotive suppliers industry (ASI) has emerged as an important industry in its own right. Employing around 0.6 million people in about 1 500 enterprises in Europe, the sector is estimated to have generated in 1988 a turnover of around ECU 65 billion in the Community, i.e. about one-third of the overall revenue of the European motor vehicle industry. Original equipment parts account for approximately 60% of firms' revenue, with the remaining 40% attributable to replacement of parts. This sector continues to earn a significant trade surplus which reached ECU 5.3 billion in 1987. In addition, the mutual dependence and the synergies linking automotive manufacturers and suppliers makes the ASI a strategic sector in terms of new technology diffusion owing to the importance of the automotive activities within the overall European economy. International competition in automotive parts is intensifying as trade develops and investment requirements reach new heights. Being a key element within the competitive structure of the automotive industry, the industry is therefore confronted with the challenges facing the EC automotive industry as well as with the need to adapt to the changing industrial standards of the profession.

Description of the sector

It should be noted that comparative statistics on this industry must be interpreted with caution due to the lack of a standard definition of the sector and its subsectors.

Relationship between manufacturers and suppliers

The pattern of relationships between manufacturers and suppliers is being substantially modified. A major reason behind such a change arises from the necessity for car manufacturers to limit investment and resources to essential activities which represent the core of their industry while increasing outsourcing and passing on to their suppliers (systems

suppliers and/or specialized affiliated companies) the responsibility for product development, manufacturing and quality assurance functions. Components producers thus contribute to the competitiveness of the industry, and the increased interdependence of the two sectors becomes a logical result. Although conceiving, designing and producing in accordance with manufacturers' specifications, the component producer is increasingly technically autonomous. This is typically the case of systems suppliers who possess proprietary technology and product know-how. As the example of the Japanese car industry shows, the necessity for the car manufacturer to increasingly rely on such a supply base, necessarily implies fundamental changes in the structure of the sector, i.e. increased share in high value-added products, need for fast growing R&D expenditure, need to adapt organizations to new constraints (excellence in quality, delivery and price as well as production flexibility), need to share with car manufacturers productivity gains on a continuous basis but also need to finance a growing share of the productive investments (tooling and specific equipment) required for tailor-made products. In return, car manufacturers are offering longer term purchasing commitments and close cooperation contributing to improved stability in mutual relationships.

Structural change in the industry

The increased internationalization of the automotive industry is forcing the ASI to compete on a global basis. Once relatively isolated from foreign competitors, EC component suppliers are now facing increased domestic, European and worldwide competition. The creation of the single European market is forcing European suppliers to intensify cross-penetration of each others' markets, following the example of multinational component suppliers. At the same time, as car producers' external investment increases, foreign competition is more heavily felt. This results from the combination of Japanese car investment in the Community on one side; the Japanese involvement in the EC shall imply the arrival of new component competitors who in turn become potential new sources of supplies for the EC car manufacturers. On the other side, the increased

internationalization of EC car producers imply geographically enlarged supply bases with a constant search for lower cost purchasing alternatives. In essence, these developments are tracing a new international division of component production.

Nature of the automotive product

The nature of the automotive product together with shorter product life cycles puts increased emphasis on the technological content of automotive parts. Increased use of electronics and new materials leads to increased collaboration with other leading high-tech industries and a sizeable investment in R&D organizations and equipment at all levels of the pyramidal structure of the sector. Once almost exclusively oriented towards applied engineering, the existing R&D resources of the ASI are now taking more initiative in new technologies offering improved performance, fuel economy, emission control, safety and comfort. Black-box engineering is becoming more and more a standard practice within the industry requiring therefore enlarged R&D functions utilizing up-to-date CAD equipment and involvement at the early stages of the development of new vehicles.

Competitive pressure on costs

The competitive pressure on costs, prices, quality and delivery standards has led the industry to restructure in a way similar to the car manufacturers. Auto parts suppliers compete on the basis of price as well as on delivery and quality. The excellence of the Japanese industry in such fields, considered as a major reason for their competitive edge, has generated a trend towards adapting Japanese-type production techniques in order to achieve better control of all the factors having a significant bearing on production costs. Just-in-time, zero-defect, CAM, automation, better and faster communication systems, are some of the features which have allowed substantial productivity gains while improving flexibility and allowing self quality assurance schemes to be put in place. However, this process, which requires sizeable investment and resource to skilled manpower, is far from being completed especially amongst small and medium-sized producers.

European distribution channels

The European distribution channels are being reshaped not only as a result of the completion of

the single market which will eliminate still existing barriers to intra-EC trade in automobiles and parts (differences in standards, taxation and certification procedures), but also as a result of increased product sophistication and squeezed margins which tend to eliminate intermediaries and see increased involvement of car manufacturers and specialist component traders mainly in the replacement market. In these circumstances and owing to the fact that there is increased pressure for fast-moving adjustment, a considerable 'shake-out' is unavoidable, mainly of smaller suppliers. The main driving force behind such pressure is the necessity to reach critical dimensions allowing economies of scale and financial strength on an international basis.

Current situation

Traditionally, the parts and accessories market is broken down into two main segments: the market for original equipment parts (OEM) that car manufacturers buy from specialized producers for assembly into their vehicles and the market for replacement which comprises parts destined for repairs and automotive accessories. Another important segment of the ASI trade includes exports of both automotive components and vehicle parts destined for assembly outside the Community.

Table 1
External trade

(billion ECU)	1980	1985	1986	1987
Intra-EC trade	6.3	11.4	13.1	15.3
Extra-EC trade				
Imports	1.0	2.7	2.9	3.3
Exports	5.4	8.7	8.3	8.6
Net exports	4.4	6.0	5.4	5.3
of which:				
FR of Germany	2.3	3.6	3.5	3.7
France	.7	1.2	1.1	1.0
Italy	.5	.9	.8	.7
United Kingdom	1.1	1.1	.8	.7
Other	-0.2	-0.8	-0.8	-0.8

Source: Eurostat (Comext).

Consumption

The original equipment parts market

The situation in the OEM depends on the degree to which car manufacturers are integrated, on demand for vehicles and on product trends. More and more, this portion of the market tends to be supplied by large companies operating either independently or on an international (sometimes worldwide) basis or

as part of the integrated activities of the car manufacturers. Currently, the pattern with regard to outsourcing practices within the EC automotive industry differs greatly from manufacturer to manufacturer. However, it is generally accepted that the overall level of outside purchasing carried out by the European car manufacturers (60 to 70% of total component requirements) is more important than in the US industry (40 to 50%) but less than in Japan (around 80%). There is also a well-established trend towards more component outsourcing by car manufacturers, in-house production of parts being increasingly seen as a handicap. Such developments combined with the fundamental changes in the nature of the industry, as explained above, are having a dramatic result on the overall numbers of independent operators present in the industry. Vehicle manufacturers are cutting back on their number of suppliers while committing larger shares of their purchasing requirements to preferred systems suppliers. Overall, during the past five years, it is estimated that the number of independent companies, previously direct suppliers to the EC car manufacturers, has been reduced by approximately 50%. A large part of this reduction has been achieved via mergers, takeovers and consolidations amongst previous competitors or companies having industrial synergies as for instance Valeo/Neiman and Magneti-Marelli/Solex/Jaeger/Weber.

In spite of the increased presence of large, international companies, the original equipment ASI continues to be very fragmented. This is essentially due to the nationally based nature of parts procurement. Although intra-EC trade has grown to extremely high levels during the past decade, most vehicle manufacturers continue to source largely from their domestic supplies. For instance, Daimler-Benz procures approximately 90% of its needs from the Federal Republic of Germany, Renault about 70% from France and Fiat about 85% from Italy.

Another characteristic of the sector is related to the fact that the European components industry com-

prises mainly small and medium-sized companies. It is currently estimated that there are about 1 500 companies operating in this sector in Europe. The average size of the employment is about 400 people but 55% of these enterprises employ less than 100 persons. Only 10% of the companies have more than 1 100 employees, although these firms account for more than 60% of total employment.

The replacement parts market

It is generally estimated that about 70% of this market is supplied by the ASI with the remaining 30% controlled by the car manufacturers via their distribution and service networks. The replacement parts market differs greatly from country to country. Market features in the various EC countries depend largely on the characteristics of the cars on the road, the age of the park of cars and the existence of specific legislation with regard to obligatory inspection of vehicles having a certain number of years on the road.

In the Federal Republic of Germany, for example, the combination of mandatory inspection and the large proportion of upper-range models sold explain why Germans spend the relatively high figure of ECU 200 a year per car for replacements. In contrast, Italians only spend an estimated ECU 140.

The export market

Parts and accessories firms mainly sell to the European market but they are seeking to diversify their sales to other markets such as the United States in order to enlarge their market base and to soften the impact of swings in European demand. Internationalization of the industry is also a determining factor in the substantial increase in foreign trade experienced since 1980, which has reached ECU 8.6 billion worth of exports in 1987 (from 5.4 in 1980).

Table 2
Structure of production

(%)	FR of Germany	France	Italy	USA	Japan
Engine parts	20	14	13	31	23
Chassis	20	53	21	30	22
Accessories	41	2	19	20	32
Body parts	4	15	20	12	15
Electrical	15	16	27	7	8
Total	100	100	100	100	100

Source: National and EC sources.

The analysis of the flows of trade (see Table 1) shows that the trade surplus of Europe as a whole has regularly increased between 1980 and 1985 when the trade balance of the EC reached a record ECU 6 billion, while trade between Member States almost doubled during the same period. However, during 1986/87 the Community has experienced a decrease in its trade balance of about 13% as compared with 1985 when, concurrently, trade between Member States grew at sustained rates (about 15.5%). This situation is mainly attributable to the boom in car demand experienced in Europe since 1986. Indeed, while European parts producers were predominantly busy trying to meet increased demand from the EC car manufacturers, EC exports remained almost flat and imports (mainly from Japan and other NICs) of parts and accessories reached a new height at ECU 3.3 billion in 1987 (three times higher than 1980 as compared with an overall increase of 60% in exports for the same period).

With regard to the EC trade surplus, the Federal Republic of Germany continues to be the major contributor having increased its share from 51% in 1980 to almost 70% in 1987.

Production

The EC motor vehicle parts and accessories industry is based on five national sectors with differing structures and performance levels. There are basically three types of producers:

- the large diversified producer whose output consists of many products in addition to auto parts (Bosch and Siemens in the Federal Republic of Germany);
- the larger producers specializing in auto parts (Valeo-Neiman in France, Magneti-Marelli in Italy);
- hundreds of SMEs producing auto parts on a smaller scale.

German industry

The German industry dominates the European market with about 54% of total European production (estimated at ECU 36 billion in 1988). This strength comes from the sheer size of the German motor vehicle industry, the importance of the upper market segment and from strict legislation on car maintenance. The large German firms have played a major role in developing new products as is illustrated by

Bosch, the world's largest unaffiliated auto parts producer, which is a pioneer in the field of fuel injection, as well as in the field of anti-blocking system brakes. Bosch alone is estimated to account for nearly a quarter of the German production. The leader's vitality pulled many smaller firms along with it and contributed, together with other large firms such as ZF, Fichtel and Sachs, Teves and VDO, to the unchallenged leadership of the Federal Republic of Germany within the European ASI.

French industry

The French industry is the second largest in Europe, with about 24% of the European total, but its structure is still very much characterized by a large number of nationally oriented small and medium-sized producers. Major restructuring has taken place in recent years led by the three international scale emerging groups: Valeo-Neiman, Epeda-B-Faure-Luchaire and ECIA (PSA group).

Italian industry

The Italian industry which accounts for about 11% of the European production, is dominated by the Fiat group. The leading producer is Magneti-Marelli, a subsidiary of Fiat, which is now having an increased presence in all major European markets (France, Federal Republic of Germany and Spain). Widely dispersed in the early 1970s, the sector is being seriously restructured under the influence of Fiat.

UK components industry

The UK components industry, which accounts for about the same as the Italian sector, has been badly hit by the decline of UK vehicle production and its excessive dependence on domestic manufacturers. However, the existence of an important replacement market together with the increased rate of Japanese investment in automotive production activities in the UK has allowed the large UK component producers (Lucas-Girling, T&N, GKN, Automotive Products) to restructure and regain vitality in a market with considerable potential.

Spanish industry

The Spanish industry has emerged since the late 1970s as another important producer of automotive components having now reached a size comparable with Italy and the UK. Originally developed to comply with local content requirements, the industry

has grown considerably since the early 1980s, thanks to the increased importance of Spain as a car manufacturing country. However, most of the components producers present in Spain are subsidiaries of foreign companies.

Europe in comparison to the USA and Japan

The high degree of integration of the American industry makes American car makers the world's biggest producers of motor vehicle parts and accessories (this is particularly true of GM). Alongside them, there are large diversified US corporations with strong market positions and proprietary technology in the automotive market in the US and around the world. Leaders include Allied-Signal-Bendix, Rockwell, Dana, United Technologies, ITT and Eaton. Most of these firms have global strategies and long-established operations in Europe where they enjoy leading positions in all major European car producing countries.

The efficiency of the Japanese supply industry has been a key factor in the international competitiveness of its automobile industry. Although smaller than the European industry (200 000 compared with 600 000 people), the Japanese components industry is much less fragmented. Aside from the 40 000 sub-contractors, who form the second and third tiers of the pyramidal structure of the Japanese industry, there are 310 component suppliers, compared with 1 500 in Europe, and the average size of enterprises is 900 compared with the European level of 400. 45% of the Japanese firms employ 500 people, compared with only 15% in Europe.

These Japanese companies have close organizational and financial links with the vehicle manufacturers, and most of them form themselves into groups around a constructor. For instance, Nippondenso, the largest Japanese component producer, is partially owned by Toyota.

Many component producers are owned by more than one vehicle producer. This system has resulted in an industry which is more specialized and concentrated than in Europe.

The extensive transfer of Japanese auto production overseas has led to increasing overseas investment by Japanese parts producers. In the USA there are already 120 plants in operation, and this number is forecast to double by 1990.

There is as yet little Japanese parts investments in Europe. However, the likely rapid increase in Japanese automotive production and assembly in Europe will clearly bring with it an influx of components suppliers, probably at first in joint ventures with European companies. Of course, these suppliers will not just be content with supplying Japanese transplants, but will try for a bigger share of the total European market.

In this context, the European component producers must be able to compete, particularly in the high-growth electronic segment of the market, or face losing a large slice of the next decade's ECU 30 billion growth to Japan.

It should, however, be noted that several European component producers have interests in the Japanese industry such as Bosch which has a minority stake in Nippondenso.

Outlook

It is likely that the market for components in Europe will extend rapidly over the next decade reaching around ECU 95 billion in the 1990s from a current ECU 65 billion, although the level of vehicle production is unlikely to grow significantly.

With regard to the original equipment market, most of the growth will result from:

- the increased sophistication of vehicles which will be standard fitted with increased automotive electronics, anti-pollution devices, more efficient safety restraint systems;
- the general 'up-market' move in car demand with customers demanding more equipment, comfort and power;
- the increased component outsourcing by car manufacturers with high added value.

With regard to the replacement market, one has to consider that this segment is governed by the number and the state of vehicles on the road as well as the changes in consumers' behaviour. These changes can either come about spontaneously or be spurred by legislation on vehicle testing or compulsory maintenance. The constitution of the single market by 1992 makes it likely that such measures will spread to the countries where they have been absent up till now. This, combined with the consumers' desire for safer

and more comfortable driving and the expected growth of the total car park in Europe (forecast to reach 129 million by 1993 as compared with 116 currently), implies that there will be promising demand growth in the replacement parts market. On the other hand, technological advances are resulting in much longer lasting parts and thus slow replacement cycles.

The overall outlook for growth in motor vehicle parts and accessories is good but major adaptation

and competitive efforts from the industry are still required.

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MOPEDS AND MOTORCYCLES

(NACE 363)

Summary

After having held a dominant position until the beginning of the 1970s, the European production of mopeds and motorcycles experienced a long period of decline, due to the shrinking of market demand and strong import competition from Japanese products.

The leading firms reacted to this situation by investing and restructuring, with consequences on the level of employment.

Today, the situation seems to be settled and an inversion of the general trend is possible.

Description of the sector

The NACE definition is very general since it includes also cycles and parts.

Mopeds are motor-driven vehicles with two or three wheels, with an engine displacement not exceeding

50 cc (if thermic) and a maximum design speed not exceeding 50 km/h; legal definition and limits vary from Member State to Member State.

Motorcycles are motorized vehicles, with two or three wheels, exceeding the legal definition of moped; in certain Member States, some four-wheelers also fall into the category of motorcycles, when conforming to particular design limitations.

Production and consumption

The EC industry dominated the worldwide production of mopeds and motorcycles until the early 1970s, when these vehicles began to play a large role.

Subsequently, the industry encountered a period of difficulties, because of a decrease in demand, which resulted from the drop in the birth-rate, a shift in favour of four-wheelers and some legal requirements.

Table 1
Production of mopeds and motorcycles by country

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Mopeds									
EC (1)	2 142.9	1 548.9	1 308.3	1 391.2	1 191.5	1 185.4	1 019.1	1 034.2	1 196.5
Belgium (2)	N/A	N/A	N/A	53.2	55.8	58.3	47.0	48.7	49.0
FR of Germany	253.4	128.4	74.4	98.1	78.7	45.6	32.0	34.3	26.2
Greece	N/A	N/A	N/A	5.2	5.0	4.0	4.0	3.0	N/A
Spain	193.0	152.0	131.0	139.0	143.0	146.0	149.0	190.0	250.0
France	651.0	486.4	500.3	513.6	443.8	441.3	283.4	274.9	298.8
Italy (3)	1 025.1	773.0	596.5	529.0	425.5	451.7	444.8	404.5	504.0
Netherlands	18.7	8.1	6.1	8.0	6.2	6.5	12.6	28.9	18.5
Portugal (2)	N/A	N/A	N/A	45.0	33.0	32.0	46.0	50.0	50.0
United Kingdom	1.7	1.0	0.0	.1	.5	0.0	.3	0.0	0.0
Motorcycles									
EC	545.7	647.5	586.4	457.1	404.3	470.9	507.8	432.6	544.2
FR of Germany	49.5	88.3	58.8	41.5	41.3	40.2	33.8	27.6	23.8
Spain	39.0	35.0	35.0	40.0	34.0	27.0	33.0	66.0	78.0
France	3.4	5.5	3.2	4.9	5.6	4.7	6.0	3.4	6.4
Italy (4)	442.3	515.6	484.0	368.6	321.7	396.0	432.3	334.0	435.0
United Kingdom	11.6	3.1	5.5	2.2	1.8	3.0	2.7	1.6	1.0

(1) 1980-83 excluding Belgium, Greece and Portugal. 1988 excluding Greece.

(2) 1988 estimated.

(3) Including three-wheelers under 50 cc.

(4) Including CKD vehicles and three-wheelers.

Source: Colimo.

At the same time, EC manufacturers were confronted with strong Japanese imports.

During the 1980s, the European production of both mopeds and motorcycles continued to decrease, though differences could be noted from Member State to Member State; the strongest drops were recorded in the Federal Republic of Germany and France, while the situation remained good in Spain.

At the end of the 1980s, the downward trend in production of mopeds and motorcycles seems to have come to a stop and the situation looks quite steady.

The trend in consumption was similar, and the same comments as above apply to cross-border differences, though the decline in the demand for motorcycles was more continuous and does not seem to have completely stopped.

Most observers believe that the demand cannot fall much further, and forecast a positive future trend, mainly for mopeds and light motorcycles, as a result of the general traffic congestion.

A positive production trend could follow for EC manufacturers, though this forecast should be

viewed with caution given that the implications of the single market on this industry are still uncertain.

External trade

EC exports represent more than a quarter of the total EC production (CKD vehicles included).

In volume terms, about two-thirds of EC exports are accounted for by Italy.

With regard to imports, available statistics reveal considerable market penetration by Japanese manufacturers.

The EC industries located in Italy, France, Spain and Portugal are somehow protected by import restrictions on Japanese vehicles. On the other hand, there are several agreements between EC manufacturers and licensees for production/assembly of European models (mainly scooters and three-wheelers) in South-East Asia, India, the People's Republic of China, Taiwan and the Middle East.

Table 2
Sales of mopeds and motorcycles by country

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Mopeds									
EC (1)	2 002.3	1 535.1	1 280.8	1 278.2	1 074.2	1 017.0	989.4	1 038.6	1 087.2
Belgium	N/A	N/A	N/A	44.3	41.7	39.6	42.5	45.6	44.2
FR of Germany	386.7	196.7	113.4	162.2	126.4	92.4	63.4	66.5	58.5
Greece	N/A	N/A	N/A	37.4	41.7	44.4	38.4	41.0	N/A
Spain	178.0	147.0	131.0	144.0	147.0	132.0	144.0	195.0	264.0
France	430.0	357.5	361.8	324.7	252.5	221.3	215.0	231.6	223.5
Italy (2)	815.0	647.5	500.0	412.0	330.0	365.0	350.0	310.0	350.0
Netherlands	50.2	47.5	41.7	47.0	45.4	44.3	59.4	64.5	63.0
Portugal	51.8	48.0	42.4	40.4	35.3	31.0	40.0	55.2	60.0
United Kingdom	90.5	90.9	90.4	66.3	54.1	47.1	36.7	29.2	24.0
Motorcycles									
EC (3)	760.7	824.2	843.7	768.3	631.8	558.3	509.9	464.8	488.0
Belgium	N/A	N/A	11.0	10.6	8.5	7.5	6.6	6.5	6.7
FR of Germany	141.9	241.8	256.7	230.0	179.3	122.3	98.4	96.6	93.1
Greece	N/A	N/A	N/A	20.1	10.6	10.8	7.2	N/A	N/A
Spain (4)	41.0	39.0	41.0	42.0	32.0	38.0	45.0	60.0	80.0
France	147.7	106.6	116.9	98.3	78.6	71.6	84.7	91.8	102.4
Italy (2)	190.3	239.6	261.6	248.0	223.6	223.0	191.2	138.4	133.1
Netherlands	14.6	13.2	14.6	9.8	9.0	8.4	8.9	9.6	10.7
Portugal	N/A	N/A	N/A	1.0	.5	.3	1.0	4.0	N/A
United Kingdom	255.1	184.1	141.9	108.5	89.6	76.4	66.8	58.0	62.0

(1) 1980-83 excluding Belgium and Greece. 1988 excluding Greece.

(2) Including three-wheelers.

(3) 1980-82 excluding Belgium, Greece and Portugal. 1983 and 1987 excluding Greece and Portugal. 1986 excluding Greece.

(4) 1988 estimated.

Source: Colimo.

Employment

The recent negative trend in production had a negative impact on direct employment levels, as a result of plant closures and cuts in employment, especially in the northern countries. A few successful factories were however able to increase their labour force.

Employment is now expected to stabilize close to the present level.

Investment

Since the early 1980s, some European manufacturers have undertaken major investment projects in order to improve their competitiveness, especially in the area of mopeds production, scooters and low-capacity motorcycles.

Restructuring, rationalization and modernization of technologies were pursued by the leading firms.

All this was not favoured in the last decade by the drop in demand. However, the better prospects for demand are driving major efforts for the future.

Furthermore, Japanese manufacturers own local plants and have recently increased their financial stakes, thereby assuming control of existing European companies.

Structural changes

Another reaction of the industry to the dismal economic situation in the early 1980s, was to engage in M&A activity.

The movement towards concentration accelerated recently, and is expected to continue until the companies which operate in this sector achieve a sufficient dimension to allow economies of scale and synergies.

This applies especially to Italy, where Piaggio acquired the Austrian Puch and the group Cagiva-Ducati merged with Moto Morini and Husqvarna.

The 1980s thus saw the growth of new dynamic factories.

Geographic features

The EC motorcycle industry is mainly concentrated in southern Europe. Nearly 54% of EC production is assured by Italy (42% of EC moped production and 80% of EC motorcycle production); Spanish manufacturers represent nearly 19%; France closely follows with 18%, while Japanese manufacturers control 17.4% of EC production through licensing agreements, financial stakes or local plants. Most of the EC production is carried out in regions with medium to high unemployment rates.

In Italy, the Piaggio Group (Piaggio, Gilera and Puch) is the largest manufacturer and, with more than 500 000 units per year produced in Italy, is also the largest European manufacturer. Motovespa, the largest Spanish producer, is also part of the Piaggio Group. The other important Italian manufacturers are the Cagiva Group (Cagiva, Ducati, Husqvarna and Moto Morini), Aprilia and the Moto Guzzi-Benelli Group. There are also many other smaller producers.

Table 3
Extra-EC exports of mopeds and motorcycles by country

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Mopeds									
FR of Germany (1)	38.6	10.9	4.8	12.0	8.1	4.8	3.5	2.4	2.4
Spain	N/A	3.7	2.6	2.8	4.1	4.6	4.7	4.1	6.0
France	N/A	N/A	N/A	219.1	N/A	237.5	90.0	78.0	98.3
Italy	130.3	74.2	37.2	51.9	48.5	41.3	45.1	42.1	N/A
Netherlands	N/A	N/A	N/A	N/A	.3	.3	.3	.4	N/A
United Kingdom	.5	.3	0.0	0.0	.2	0.0	.1	0.0	0.0
Motorcycles									
FR of Germany (1)	17.2	18.6	17.3	13.6	15.7	15.5	18.9	7.8	7.0
Spain	N/A	2.6	3.0	2.6	.7	.4	1.2	2.1	1.0
France	N/A	N/A	N/A	.3	N/A	.5	3.4	.3	.4
Italy (2)	111.4	57.2	26.1	159.5	135.7	214.6	269.5	206.4	N/A
United Kingdom	3.5	.9	1.7	.7	.5	.9	.8	.5	.3

(1) 1988 estimated.

(2) 1980-83 excluding CKD vehicles.

Source: Colimo.

Table 4
Structure of the Industry, 1988

	Employment (1 000)	Number of firms
EC (1)	22.2	52
BLEU	.5	1
FR of Germany	1.9	5
Greece	.1	2
Spain	4.0	7
France	1.8	2
Italy (2)	12.0	25
Netherlands	.1	2
Portugal	1.7	6
United Kingdom	.1	2

(1) Direct production estimate. The industry estimates that there are 100 000 direct and indirect jobs.

(2) There are about 15 other secondary manufacturers (mainly assemblers).

Source: Colimo.

In France, the largest manufacturer, Peugeot MTC (which produced about 180 000 vehicles in 1987), in which Honda is a 25% shareholder, is producing mainly mopeds and scooters (50/80 cc); Peugeot scooters and some 50 cc engines are produced under licence from Honda. The second French manufacturer, MBK, is under full control of Yamaha and is assembling Yamaha scooters and mopeds.

In Spain, Motovespa (Piaggio Group) and Derbi are the main manufacturers, representing 59% of the Spanish production of motorized two-wheelers. Honda, Yamaha and Suzuki have plants in Spain where they assemble one-third of local production.

In the Federal Republic of Germany, the most important manufacturer, BMW, produces large-capacity motorcycles.

In Portugal, SIS Vehiculos Motorizados LTDA is the largest manufacturer and produces mainly mopeds equipped with engines either from Fichtel & Sachs (FRG) or from Franco Morini (Italy). SIS is also assembling Yamaha trial bikes using imported parts. The second Portuguese manufacturer is Famel.

In Belgium, production is carried out by Honda Belgium with 75% of the parts being of European origin. Some engine types are supplied by Peugeot.

In the Netherlands, the most important manufacturer, Sparta BV, produces light mopeds; assembling of mopeds and mopeds is made by Tomos.

Special issues

Environment

Thanks to its capability to solve traffic problems and reduce congestion of towns, mopeds and motorcycles could be regarded favourably from an environmental point of view.

The operating time on the road, greatly reduced because of the capability of this form of transport to escape traffic jams and ease of parking, are features that lower the pollution from these vehicles.

Industry is developing cleaner and quieter vehicles and eliminating components containing asbestos in order to reduce as far as technically feasible the impact on the environment.

The impact of 1992

The abovementioned process of concentration by leading firms and the recent efforts by the industry to increase its competitiveness are also motivated by the prospects of the single market.

Therefore, notwithstanding recent market difficulties, all major EC manufacturers are actively pursuing strategies designed to take advantage of the opportunities offered by the new competitive environment resulting from the single market.

New production technologies

Industry is developing new technologies both in the conception of vehicles (CAD-CAM) and in their construction, employing robots, laser cutting machines, improved pointing systems, more sophisticated quality control systems and so on.

Outlook

Experts believe that most difficulties have been overcome and the situation will now become more stable.

Recent and continuing efforts by the manufacturers to restructure and reorganize their activities augur well for the future.

Positive prospects are facing the industry nowadays, because of the increasing traffic congestion, especially in urban areas, that may lead to a new shift in demand in favour of mopeds and motorcycles. This also encourages governments and local authorities to propose and make provisions in favour of motorized two-wheelers.

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SHIPBUILDING

(NACE 361)

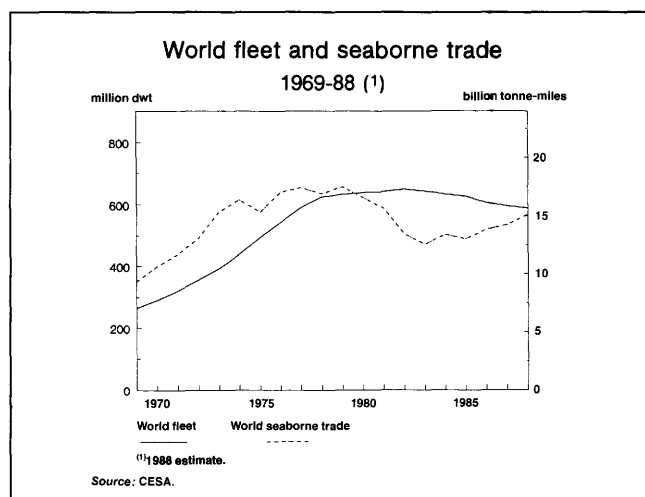
Summary

The world's production of new merchant ships has decreased continuously since the mid-1960s, reaching its lowest level in 1988. However, the strong economic growth recorded both in the industrialized countries and in the newly emerging economies of South-East Asia stimulated world trade, the trade balance being almost balanced for the first time since 1981. This improvement was reflected in higher freight rates. The outlook is promising, but the improvement of the market could be reversed if capacity were reactivated or expanded carelessly.

By the end of the first oil crisis, after the tanker boom of the early 1970s and the subsequent expansion of world shipbuilding, both shipping and shipbuilding industries were left with huge excess capacity. The situation deteriorated further after the second oil crisis and the recession in the world economy which followed in the early 1980s. In 1983 over 100 million dead-weight tonnes (dwt) of shipping (about 15% of the world fleet) were laid up for lack of employment. Successive waves of capacity reduction in Western Europe and Japan were counteracted by the overambitious expansion of the Korean industry, and by speculative new orders intended to take advantage of the low pricing policies of Far Eastern shipyards. As a result of this low pricing policy, Far Eastern shipyards incurred heavy losses, with Korean shipyards in particular recording losses of USD 460 million in 1988.

Now, however, it appears that the growth in seaborne trade has almost eliminated the over-capacity in the world fleet (see Figure 1), even if the balance remains precarious.

Figure 1



Current situation

World seaborne trade rose by 6% between 1987 and 1988, thanks to the strong growth in GNP and industrial production in the industrialized countries, and to the low price of oil. This was enough to absorb nearly all of the excess shipping capacity. Tonnage laid up fell below 10 million dwt for the first time since the beginning of 1975, and now amounts to only about 1% of the world fleet. In 1988 although deliveries of new ships amounted to only 14 million dwt in 1988, the lowest figure for 25 years, the shrinkage of the world fleet was brought to a halt by a sharp reduction in the amount of tonnage scrapped (9.4 million dwt, compared with 22 million dwt in 1987 and 43 million in 1985).

The shipping markets strengthened accordingly in virtually all sectors. Tanker spot rates rose by between 25 and 100% between 1987 and 1988, and the

Table 1
Main indicators, 1980-88
Shipbuilding

(1 000 CGT) (1)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production	N/A	N/A	3 143	3 300	2 628	2 457	1 900	1 719	1 638
% of world production	N/A	N/A	21.5	24.4	17.5	17.3	15.7	18.6	19.0
Employment (1 000) (2)	273	251	229	211	195	176	159	139	N/A

(1) 1982-83: 1978 coefficient (CGRT—compensated gross registered tonnage); 1984-88: 1984 coefficient (CGT—compensated gross tonnage).

(2) New shipbuilding and repair.

Source: CESA, EC Contract/Lloyd's Register of Shipping.



charter rates for bulk carriers by 30 to 80%. Second-hand ship prices rose even more, a five-year old bulk carrier now costing four times as much as in mid-1986.

In 1988 prices increased considerably. However, prices for many types of ships are still below the 1980 levels, while, in the mean time, material costs have increased substantially.

Furthermore, due to the considerable movements in exchange rates that we have recorded over the past

years, the prices in local currencies did not improve accordingly. Between 1988 and 1986, the ECU/USD exchange rate appreciated by 20.1%, the yen by 30.9% and the Korean won by 20.3%.

In fact, it is generally accepted that in 1988 world shipbuilding reached its nadir both in terms of orders and in terms of output. Table 2 illustrates the trend in production, measured in compensated gross tonnage (CGT — which reflects shipyard activity) and its distribution among the main shipbuilding areas.

Table 2
World shipbuilding production

(1 000 CGT) (1)	1976	%	1982	%	1985	%	1986	%	1987	%	1988	%
EC	5 927	26.8	3 143	21.5	2 457	17.3	1 900	15.7	1 719	18.6	1 638	19.1
Western Europe (2)	8 286	37.5	4 285	29.4	3 089	21.8	2 439	20.1	2 169	23.5	2 127	24.7
Japan	8 349	37.8	5 811	39.8	6 498	45.9	5 085	41.9	3 795	41.0	2 953	34.3
Rest of world	5 444	24.7	4 492	30.8	4 581	32.3	4 615	38.0	3 281	35.5	3 518	40.9
of which:												
Eastern bloc	2 755	12.5	1 678	11.5	1 602	11.3	1 412	11.6	1 093	11.8	1 181	13.7
Republic of Korea	349	1.6	880	6.0	1 633	11.5	1 971	16.2	1 194	12.9	1 504	17.5
Total	22 079	100.0	14 588	100.0	14 168	100.0	12 139	100.0	9 245	100.0	8 598	100.0

(1) 1976: CGRT coefficient AWES; 1982: CGRT coefficient 1978; 1985-88 CGT coefficient 1984.

(2) Association of West European Shipbuilders: EC 12 plus Finland, Norway and Sweden.

Source: EC Contract/Lloyd's Register of Shipping.

Table 3
Ships completed by Member State

(1 000 CGT)	1987	1988
EC	1 719.1	1 637.6
Belgium	25.9	46.8
Denmark	194.4	277.2
FR of Germany	396.4	502.5
Greece	6.6	12.3
Spain	328.4	326.4
France	207.9	63.2
Italy	224.8	119.9
Netherlands	146.2	153.1
Portugal	26.3	23.0
United Kingdom	162.3	113.2

Source: EC Contract/Lloyd's Register of Shipping.

These figures show a constant decline in the output of Western European shipyards since 1976, though their share of the world total has now stabilized. Japan's industry, which underwent a comprehensive restructuring and reduced its official capacity by 20% in 1987-88, following the steep appreciation of the yen, suffered a sharp fall in its output and market share between 1987 and 1988. Korean output increased, despite the disruption caused by labour disputes. The Republic of Korea produced almost three-quarters of the world output of oil tankers. World deliveries of gas and chemical tankers were higher than in 1987, but production of bulk carriers declined sharply. The fall in output since the early 1980s affected all ship types except fishing vessels.

In 1988 new orders were slightly higher than deliveries. Table 5 shows a marked improvement in the share taken by EC shipyards and a reduction in Korea, where the industrial unrest aggravated the financial crisis facing the major shipbuilders. The four large companies reported operating losses totalling USD 464 million, and two of them came close to bankruptcy.

Table 4
Production by type, 1988

(1 000 CGT)	World	EC (%)	Japan (%)	Korea (%)
Crude oil tankers	786.6	0.0	24.5	72.4
Chemical carriers	1 475.9	15.3	47.1	31.9
Bulk carriers	1 019.8	10.0	59.0	14.7
Combined carriers	79.4	0.0	0.0	0.0
General cargo ships	887.4	10.6	26.5	5.2
Reefers	249.1	10.2	67.1	4.3
Full containers	1 047.1	33.1	33.0	14.1
Roll on/off vessels	129.1	16.7	7.4	0.0
Car carriers	572.5	4.0	51.5	37.3
LPG carriers	54.4	27.4	42.8	29.8
Ferries	355.2	28.5	34.2	0.0
Passenger ships	247.4	32.9	8.0	0.0
Fishing vessels	1 149.6	34.2	16.1	5.5
Other non-cargo vessels	544.9	31.7	11.0	6.6
Total	8 598.4	19.1	34.3	17.5

Source: EC Contract/Lloyd's Register of Shipping.

Contrary to a widespread opinion that an increasing proportion of shipbuilding takes place in developing countries, the figures demonstrate that three-quarters of world shipbuilding is carried out in industrialized countries. The two countries with dominant market shares (although reduced in 1988) are still Japan and Korea. However, in 1988 Japan still took 37% of all orders — a share which is again substantially higher than that which is generally quoted, even in Japanese reports in which the probability of a future balanced market is taken into account.

Employment

The number of persons employed by EC shipbuilding companies continued to decline. The total workforce, including those engaged in ship repairing, fell during 1988 from 139 000 to 127 000.

Table 5
New orders in world shipbuilding

(1 000 CGT) (1)	1976	%	1982	%	1985	%	1986	%	1987	%	1988	%
EC	3 127	19.6	2 404	20.8	2 175	21.1	1 581	16.7	1 971	20.2	2 260	24.8
Western Europe (2)	4 660	29.1	2 966	25.7	2 479	24.0	1 979	20.9	2 819	29.0	2 494	27.3
Japan	7 338	45.9	4 859	42.1	4 440	43.0	3 432	36.2	3 121	32.0	3 361	36.8
Rest of world	3 985	25.0	3 708	32.2	3 403	33.0	4 071	42.9	3 800	39.0	3 271	35.9
of which:												
Eastern bloc	1 896	11.9	1 069	9.3	1 414	13.7	1 875	19.8	1 059	10.9	1 068	11.7
Republic of Korea	325	2.0	1 003	8.7	807	7.8	1 352	14.3	1 943	19.9	1 203	13.2
Total	15 893	100.0	11 533	100.0	10 322	100.0	9 482	100.0	9 740	100.0	9 126	100.0

(1) 1976: CGRT coefficient AWES; 1982: CGRT coefficient 1978; 1985-88 CGT coefficient 1984.

(2) Association of West European Shipbuilders: EC 12 plus Finland, Norway and Sweden.

Source: EC Contract/Lloyd's Register of Shipping.

Table 6

Total order book by country at year's end	
(1 000 CGT)	1988
Belgium	82.0
Denmark	459.6
FR of Germany	856.4
Greece	116.8
Spain	837.7
France	379.9
Italy	904.2
Netherlands	365.1
Portugal	114.0
United Kingdom	317.1
EC	4 432.9
Finland	962.9
Norway	114.3
Sweden	39.0
Western Europe	5 549.0
Japan	3 473.9
Republic of Korea	2 342.2
Eastern bloc	3 168.2
Rest of world	3 140.2
World	17 673.5

Source: EC Contract/Lloyd's Register of Shipping.

Regulatory environment

The policy of the EC Commission has been to encourage the restructuring and reduction of capacity, while allowing national governments to support the remaining EC yards to protect them from the predatory practices of their Far Eastern

competitors. Many shipyards were closed, even efficient ones, most others have reduced their workforce.

The Commission continued to exercise control over State aids to the industry under the Sixth Directive, and to encourage further restructuring. A new programme of assistance from the European Regional Development Fund for areas affected by the decline in shipyard employment was adopted in July 1988, but a proposal for accompanying social measures to aid redundant shipyard workers has not been approved by the Council.

The over-capacity problem which affected the world shipbuilding market in recent years led yards in the Far East, in particular, to sell ships at prices close to dumping prices. Against this background, the Commission opened discussions early in 1988, first with Japan and then with Korea. These approaches were followed up within the OECD, and, at a meeting in November 1988, further arrangements were agreed concerning the detailed monitoring of capacities, production, prices and government intervention. It is hoped that this will encourage the maintenance of a more orderly market.

Outlook

Ships are an economical means of transport. Despite the growth of airborne freight and certain overland routes, they still carry about 98% of intercontinental

Table 7
Employment in new shipbuilding

	1975	1980	1981	1982	1983	1984	1985	1986	1987
Belgium	7 467	6 523	6 347	4 680	4 104	4 060	3 923	2 995	2 548
Denmark	16 630	11 400	11 350	11 800	11 200	10 300	10 200	7 000	7 000
FR of Germany	46 839	24 784	26 521	27 600	25 966	22 189	22 260	18 184	12 875
Greece	2 316	2 672	3 393	2 900	2 812	2 000	2 000	1 709	1 621
France (1)	32 500	22 200	22 200	21 600	21 000	16 940	15 058	13 700	8 940
Ireland	869	750	762	882	550	N/A	N/A	N/A	N/A
Italy (2)	25 000	18 000	16 500	13 750	12 800	12 800	12 000	11 570	9 500
Netherlands (3)	22 662	13 100	13 100	12 800	11 250	10 330	6 236	5 400	3 600
United Kingdom (4)	54 550	24 800	25 345	25 000	20 486	14 655	10 200	8 500	8 000
EC 10	120 833	124 229	125 518	121 012	110 168	93 274	81 877	69 058	54 084
Spain (5)	N/A	N/A	N/A	N/A	N/A	N/A	18 000	18 000	17 300
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	5 370	5 087	5 020
EC	N/A	N/A	N/A	N/A	N/A	N/A	105 247	92 145	76 404

(1) 1986-87: Employment in civil new shipbuilding, as well as para-naval activities (transformation, military and off-shore shipbuilding). According to this method, previous years were: 1975, 32 500; 1980, 23 700; 1985, 17 700.

(2) 1985-87 estimated. 1987: 2 780 unemployed should be added to the figure. Of these, 2 000 represent a structural over-capacity for whom no new jobs can be found.

(3) 1986-87 estimated.

(4) 1985-87: excluding Harland & Wolff (Northern Ireland), estimated as: 1985-86, 4 000; 1987, 3 500.

(5) 1987 estimated.

Source: National data.

traffic. The modern energy-saving ships, which EC shipyards produce, designed for low manning cost and with a high safety standard, are in increasing demand.

In the next few years, world seaborne trade is expected to continue to grow, though not as rapidly as in 1988. This should bring the shipping and shipbuilding market into balance, provided that not too many speculative orders are placed. In the longer term, the large volume of tonnage built in the 1970s will have to be replaced, even if its demolition is currently being delayed. In 1988 the Association of West European Shipbuilders (AWES) forecast that the required world shipbuilding output would grow to an annual average of 12.5 million CGT in the years 1990-95, and to 16.5 million CGT in the remainder of the century. Similar forecasts were produced by the Japanese and Korean authorities.

The ship-repair market has also improved, and is expected to benefit from the current tendency to keep older ships in service longer. The future prospects for the industry are more positive than they have been for many years. A production of more than 16 million CGT would imply nearly a doubling of world shipbuilding output over less than 10 years, though starting from the very low level in 1988-89. These requirements could be much in line with the then reduced world shipbuilding capacity, but only on condition that capacity cutbacks in Japan follow the pattern of European countries, and that Korea also reduces its capacity. A further requirement would be that other countries (developing and centrally planned) follow a market orientated investment policy.

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RAILWAY ROLLING STOCK

(NACE 362)

Summary

Globally, the European production of railway rolling stock has been declining constantly since 1983. In real terms it fell more than 35% between 1983 and 1988. Medium-term prospects for this sector are not very promising, despite such projects as the Channel Tunnel, and the TGV which is being introduced in a number of countries; in fact, total demand is expected to continue stagnating over the next few years for a number of reasons: a regression in goods transport by rail, a drop in demand for passenger transport material and a preference to finance infrastructure programmes instead of renewing rolling stock. However, the long-haul railways have some bright points, for example, they offer a rapid means of travel, energy conservation and low pollution. In addition a number of European countries will be introducing high-speed rail services that will be a boon to the railway rolling-stock industry.

Description of the sector

Europe manufactures all necessary railway material and engages in the following areas:

- electric and diesel locomotives;
- passenger coaches for railway lines, underground railways and tramways;
- goods wagons;
- spare parts;
- fixed railway stock;
- railway material in cast iron, iron or steel;
- electrical signalling, safety and control devices for the railway.

Europe is also active in the distribution and maintenance of material.

Statistical data are not available on fixed stock, with the exception of imports and exports. With the exception of the short section on external trade, this review will concentrate on the most important aspects of railway rolling stock (NACE 632), i.e. locomotives, coaches and spare parts.

Current situation

The Federal Republic of Germany, France, Italy and the United Kingdom each have more or less equal shares in production. Production in Spain, Belgium and Portugal is on a much smaller scale. After attaining record figures in 1983, European production, (outside the UK) and exports have been falling steadily, from ECU 2.940 billion and ECU 1 277 million in 1984 to ECU 2.286 billion and ECU 773 million in 1988.

Production and consumption

Production of railway stock is expected to experience several more years of stagnation, despite orders for new material from the French TGV and the ICE. The reasons for this are:

- the acceleration of passenger transport, encouraged by the introduction of high-speed trains, which will sharply reduce the required amount of railway material;
- rail transport of goods will continue its downward trend, in spite of a boost in combined means of transport, which only requires low value-added, and thus low-priced, rolling stock;

Table 1
Main indicators, 1981-88 (1)
Railway rolling stock

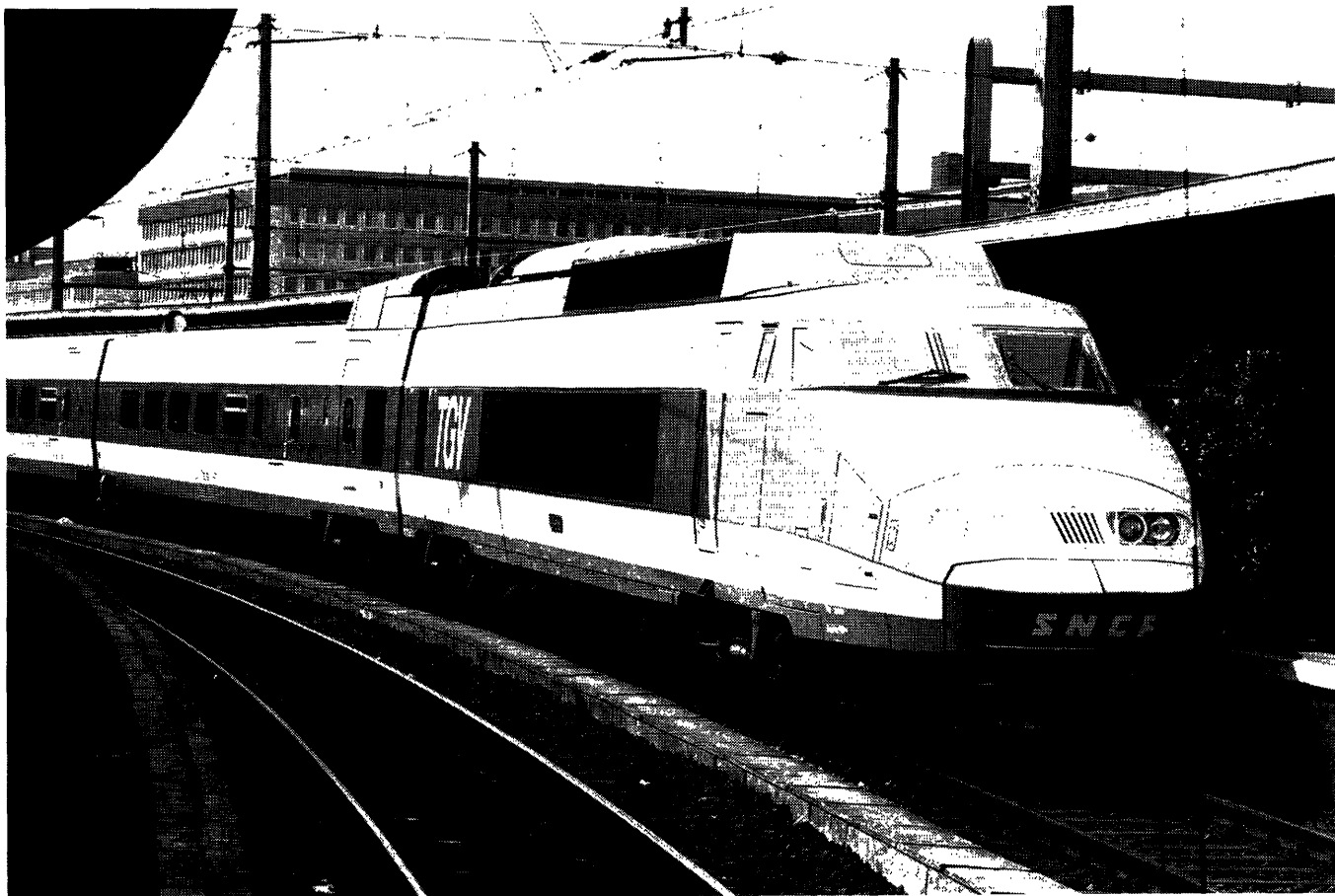
(million ECU)	1981	1982	1983	1984	1985	1986	1987	1988
Net exports (2)	452	457	517	622	467	438	384	334
Production (3)	2 522	2 797	3 101	2 940	2 769	2 699	2 343	2 276
Employment (3)	67.8	67.1	66.7	64.6	60.9	56.8	51.6	50.1

(1) Locomotives, passenger coaches, goods wagons.

(2) 1981-83 EC 10.

(3) Excluding the Netherlands and the United Kingdom. Certain railway rolling stock parts are covered in this heading.

Source: Unife, Eurostat (Comext).



- railway networks are facing enormous financing problems brought about by infrastructure work, the creation of new lines, mountain through-cuts, facilities for combined means of transport, modernization of stations, etc.

As a result, projects for purchasing and replacing of rolling stock are limited to the strict minimum.

It nevertheless looks likely that in the long term greater importance will be given to the railways, thanks to a new transport policy. Passenger rail travel is fast and safe compared with overcrowded air routes and the dangers of the motorways. Moreover, railways occupy less space, are less polluting and consume less energy than other forms of transport.

These factors point to a recovery in Europe's railway stock production in the medium term. And if the project for a high-speed network, presented by the Community of European Railways, is given shape, production will be given a significant boost. The project consists of 9 000 km of high-speed railway. The proposed network would beyond a doubt bring improvements and greater profitability to the entire system and would reinforce its position on the passenger market.

Employment

It is difficult to give an accurate estimate of employment in the railway vehicles and spare parts sectors. Traction material, for example, is produced by branches of companies engaged in a wide range of activities. Employment in the EEC has been falling steadily since 1975 and in 1988 was at some 50 000 employees, excluding the UK.

Geographical features

Most European countries developed their railway rolling stock at the same time as their railway network, with the following two exceptions:

- Luxembourg, Ireland and Greece have no small-scale assembly plants;
- the Netherlands stopped production of wagons and now imports them from neighbouring countries.

Italy has the largest number of railway rolling stock companies in the EC, followed by Germany, the United Kingdom, France and Spain.

Table 2
Production and external trade (1)

(million ECU)	1981	1982	1983	1984	1985	1986	1987	1988
Production in current prices								
EC (2)	2 522	2 797	3 101	2 940	2 769	2 699	2 343	2 276
Index	91	101	112	106	100	97	85	83
Production in constant prices								
EC (2)	3 166	3 263	3 438	3 074	2 769	2 661	2 235	2 134
Index	114	118	124	111	100	96	81	77
EC trade in current prices								
Exports extra-EC (3)	478	473	507	679	523	489	476	423
Index (4)	95	94	101	130	100	93	91	81
Imports extra-EC (3)	35	37	54	57	58	59	94	81
Index (4)	63	67	96	98	100	101	163	139
X/M	13.54	12.72	9.48	11.99	9.01	8.31	5.04	5.24
Imports intra-EC (3)	164	165	194	220	123	131	116	127
Index (4)	134	136	159	179	100	107	95	104

(1) Locomotives, passenger coaches, goods wagons.

(2) Excluding the Netherlands and the United Kingdom. Certain railway rolling stock parts are included in these headings.

(3) 1981-83 EC 10.

(4) Taking into account changes in EC membership.

Source: Unife, Eurostat (Comext).

Table 3
Trends in Community production by product (1) (2)

(million ECU)	1981	1982	1983	1984	1985	1986	1987	1988
Locomotives	503.9	725.1	803.6	704.4	770.8	676.4	687.3	642.4
Passenger coaches	1 260.6	1 518.0	1 696.5	1 585.3	1 465.5	1 430.0	1 154.1	1 217.4
Goods wagons	757.4	554.3	600.5	650.2	532.3	592.1	501.8	416.4

(1) Certain railway rolling stock parts are covered in these headings.

(2) Excluding the Netherlands and the United Kingdom.

Source: Unife

Table 4
National production by product, 1988 (1)

(million ECU)	EC (2)	Belgium	Denmark	FR of Germany	Spain	France	Italy	Portugal
Locomotives	642.2	4.5	0.0	287.4	3.3	131.9	206.2	9.0
Passenger coaches	1 217.4	38.5	1.0	328.6	106.3	314.3	423.5	5.1
Goods wagons	416.4	18.2	1.9	195.6	41.1	61.1	98.5	0.0
Total	2 276.2	61.2	2.9	811.6	150.7	507.3	728.3	14.2

(1) Certain railway rolling stock parts are covered in these headings.

(2) Excluding the Netherlands and the United Kingdom.

Source: UNIFE

Foreign trade

The EEC accounts for nearly 50% of world exports of railway rolling stock and spare parts. Its chief competitors are the United States, Canada and Japan, each holding an equal portion of the

remaining market share. Half of the 1988 positive balance of ECU 725 million resulted from spare parts and the other half from rolling stock. Trade among EEC Member States, which amounted to about ECU 280 million in 1987, is equal to about one-third of extra-Community trade. Since 1987 the

situation in the United States has changed sharply and the US is now an importer of diesel material. This is mainly due to the fact that half of all US producers have shut up shop and moved to Canada. Japan's market share has risen owing to a boost in US sales of underground railway material in 1987 and showed a positive balance of ECU 400 million. During the same period, Japan's imports were insignificant.

Exports of railway stock such as signalling, safety and control equipment as well as cast-iron, iron and steel railway components, showed a positive balance in this period of ECU 260 million, down from the 1983-84 period, when the corresponding figure was ECU 340 million.

The rolling stock industry in general has a positive balance of about ECU 1 billion.

Structure of the industry

The opening of public procurement to include transport and other excluded sectors will have consequences that for the time being are difficult to foresee. Some concentration and streamlining will no doubt take place in railway companies. In fact, several large groups have already restructured, such as the GEC-Alsthom group that is mainly active in France, Belgium, the UK, Spain and the Federal Republic of Germany, and ASEA Brown Boveri that has a solid foothold in the Federal Republic of Ger-

many, Italy, Switzerland, Sweden, Norway and the UK. In addition, the German group Siemens has achieved a top position on the UK market through the acquisition, in association with GEC, of a significant stake in the English group Plessey. A number of other national and international mergers, takeovers, associations and restructuring of lesser extent have taken place or are currently being negotiated in Europe.

One of the principal aims of opening public procurement in the EC to competition is to allow all competitors to participate in contract awarding procedures launched by public entities in the EC. With this in mind, the European Commission intends to encourage the introduction of EC standards because such standards will mean that specifications will be harmonized, thereby furthering equal opportunity for bidders throughout the EC.

Today in the EC there are:

- 39 locomotive (electric and mechanical) manufacturers;
- 54 manufacturers of passenger coaches and goods wagons;
- 24 manufacturers active in both locomotives and coaches and wagons.

The size of these companies varies widely, from 50 to 8 000 employees.

Table 5
External trade by product (1)

(million ECU)	1981	1982	1983	1984	1985	1986	1987	1988
Exports extra-EC								
Locomotives	86	118	130	232	153	94	212	265
Passenger coaches	247	272	275	281	309	254	188	83
Goods wagons	145	83	101	166	61	141	76	77
Parts	424	379	471	598	527	422	423	348
Imports extra-EC								
Locomotives	7	10	7	8	4	13	11	13
Passenger coaches	13	17	23	23	24	18	38	1
Goods wagons	16	10	23	25	30	27	45	66
Parts	59	85	63	76	81	61	80	78
Imports intra-EC								
Locomotives	53	60	40	12	21	16	12	20
Passenger coaches	62	83	129	180	80	73	68	59
Goods wagons	48	22	25	28	22	42	36	48
Parts	144	150	125	150	138	162	161	188

(1) 1981-83 EC 10; 1984-88 EC 12.

Source: Eurostat (Comext).

Technological developments

The future of railway services and industry will depend to a large extent on the amount of time it takes a passenger to travel from one point to another, especially between international destinations. In order to remain competitive, wide-ranging structural changes will have to be introduced and research will have to be conducted on how to lighten rolling stock, with the incorporation of aeronautical techniques. The introduction of on-board computerized networks in trainsets, the application of telecommunications and microprocessors in signalling systems are a few examples of far-reaching changes.

In order to exceed 500 km/hour, the conventional rail-wheel system may be replaced by electromag-

netic levitation. Germany's Transrapid project has made great advances in this new technique.

The introduction of modern techniques in underground railway systems has led to the full automation of their operation, e.g. the AL and Dockland systems. Others, for example M Bahn in Berlin, will be operational some time in the near future.

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THE AEROSPACE INDUSTRY

(NACE 364)

Summary

The European aerospace industry is second in the world behind the United States, but way in front of Japan. Military aeronautics continue to hold a predominant position in this sector with about 60% of production, but this share is characterized by a diminishing trend. Civil aeronautics on the other hand, have achieved considerable growth in the 1980s and, thanks largely to an expansion of its product range, was even able to take full advantage of the very good world economic developments in this field. In the medium term, the growth of the European aerospace industry should come mainly from civil aviation. The 1980s were marked by advances in international cooperation, especially with the United States. That said, European firms continue to be smaller and less profitable than their US competitors.

Description of the sector

The aerospace industry consists of two markets, namely military aeronautics and civil aeronautics. As regards the latter, there are five categories of products:

- commercial jets,
- commuters (small, commuting planes equipped with turboprop engines for regional connections),
- helicopters,
- aeroplane engines,
- space equipment (launch vehicles and satellites).

Current situation

In 1988, the European aerospace industry generated a turnover of ECU 39 billion, a 9.7% growth in comparison with 1987, and a 5.8% growth in real terms.

At a consolidated EC level, i.e. excluding the sales to other EC aerospace companies, the turnover of the aerospace sector amounts to ECU 31.6 billion.

This trend confirms the increasing importance of the European aerospace industry on the world market, which currently ranks second behind the Americans and way ahead of the Japanese.

The relative weight of the aerospace industry continues to grow in Europe, where it has risen from 0.6% of the gross domestic product (GDP) in 1972 to 1.04% in 1987, for a relative weight less than half that of the US (2.1% of GDP) and four times greater than the Japanese aerospace industry (0.25%).

Production and consumption

From a technical point of view, production is traditionally shared by four big segments:

- airframes (of planes, helicopters and missiles),
- engines (essentially turbo-props and turbo-jets),
- equipment (essentially electronic and hydraulic),
- space equipment (launchers and satellites).

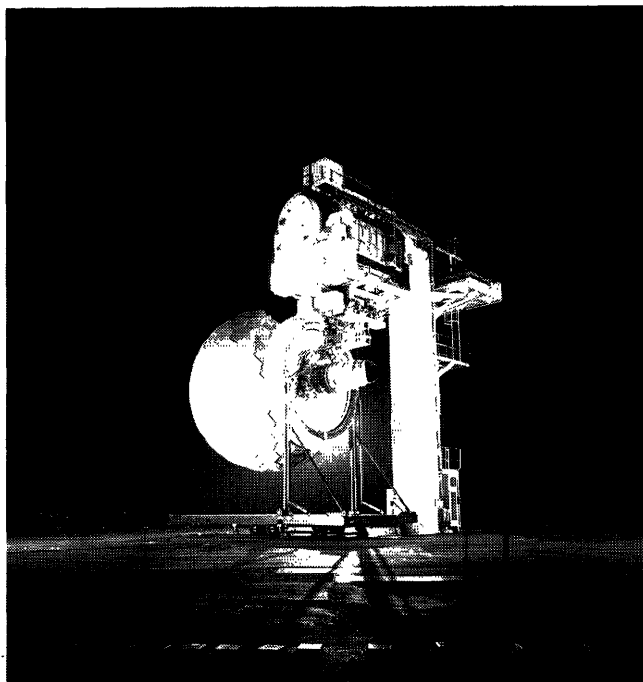


Table 1
Main indicators, 1980-88
Aerospace industry

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption (1)	N/A	15 668	16 147	17 947	20 199	23 927	27 489	28 840	N/A
Net exports (1)	N/A	-1 531	576	445	1 323	807	22	-40	N/A
Production (2)	14 137	16 723	18 392	19 269	21 522	24 734	27 511	28 800	31 600
of which civil production (3)	4 241	4 983	5 536	6 262	6 866	8 286	10 152	10 771	N/A
Employment (1 000)	472	500	483	481	464	480	488	488	489

(1) Civil production only.

(2) Consolidated production at Community level. 1987/88 estimated.

(3) Estimates.

Source: Professional associations and DG III. Synthesis and estimates by Euroconsult.

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production in current prices									
EC (1)	14 137	16 723	18 392	19 269	21 522	24 734	27 511	28 800	31 600
Index	57	68	74	78	87	100	111	116	128
USA (2)	42 005	58 071	67 801	84 052	98 614	118 982	102 621	95 080	98 570
Index	35	49	57	71	83	100	86	80	83
Japan (2)	910	1 319	1 843	2 167	2 805	3 255	N/A	N/A	N/A
Index	28	41	57	67	86	100			
Production in constant prices									
EC (1)	19 424	20 498	21 208	21 369	22 755	24 734	27 361	27 864	29 471
Index	79	83	86	86	92	100	111	113	119
EC trade in current prices									
Exports extra-EC (3)	N/A	2 767	4 151	4 468	6 297	6 911	6 183	5 984	N/A
Index		40	60	65	91	100	89	87	
Imports intra-EC (3)	N/A	4 298	3 575	4 022	4 974	6 104	6 161	6 024	N/A
Index		70	59	66	81	100	101	99	
X/M	N/A	.64	1.16	1.11	1.27	1.13	1.00	.99	N/A

(1) 1987/88 estimated.

(2) Census of manufactures and Eurostat estimates.

(3) 1981-85 EC 10; 1986-87 EC 12.

Source: Professional associations and DG III. Synthesis and estimates by Euroconsult.

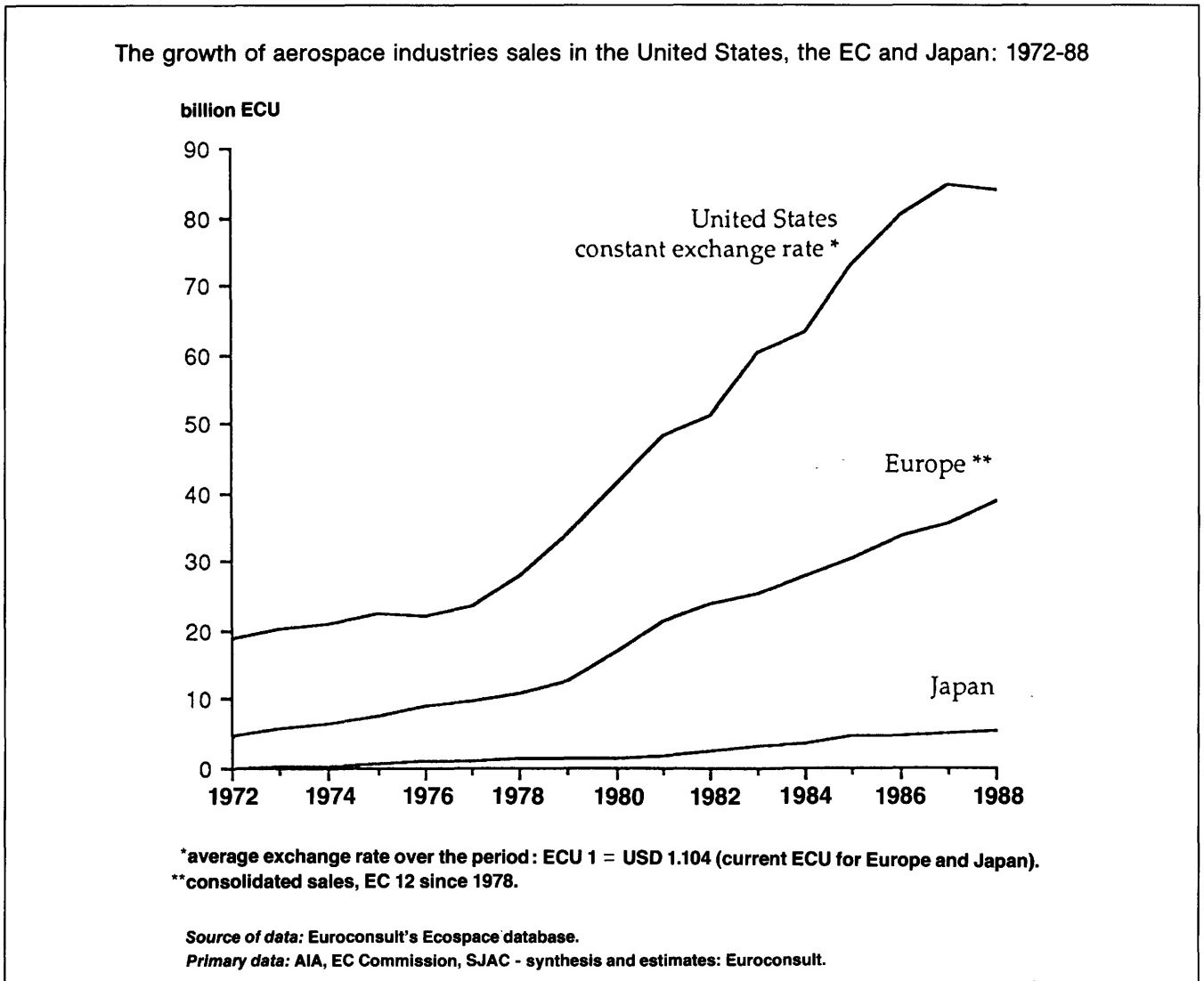
Table 3
Production trends by product (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Breakdown by segment:									
airframes	11 043	13 589	15 386	16 295	17 218	18 177	18 712	19 480	N/A
engines	3 998	5 028	5 642	5 249	5 829	6 649	7 181	7 470	N/A
equipment	4 710	6 017	6 346	7 504	8 195	8 704	11 871	12 470	N/A
space	643	775	1 046	1 132	1 310	1 922	2 186	2 580	N/A
Breakdown by market:									
military	14 276	17 834	19 871	20 371	22 170	23 562	25 210	26 300	N/A
civilian	6 118	7 575	8 548	9 808	10 382	11 890	14 740	15 700	N/A
% civilian	30.0	29.8	30.1	32.5	31.9	33.5	36.9	37.4	N/A
Total	20 394	25 409	28 419	30 179	32 552	35 452	39 950	42 000	46 000

(1) Non-consolidated production: the figures therefore differ from those given elsewhere.

Source: Professional associations and DG III. Synthesis and estimates by Euroconsult.

Figure 1



The distribution of production has changed regularly since the beginning of the 1980s, showing the following trends:

- regular reduction in the relative weight of airframes (46.3% of the production in 1987, compared with 54% in 1980);
- levelling-off of the share of engines (17.8% in 1987 compared with 19.6% in 1980);
- regular increase of the relative weight of equipment (29.7% in 1987 compared with 23% in 1980) due essentially to the considerable growth of airborne electronics;
- the emergence of space production (6.1% in 1987 compared with 3.1% in 1980) concerning chiefly the Ariane rocket and application satellites.

Military aeronautics

Although still widely dominant, the production of military equipment continues its relative decline. It went from 70% of total production in 1980 to 62.6% in 1987 simply because of greater sustained growth in civil production. This trend should continue at least until the early 1990s due to the double effect of the continued expansion of civil aeronautics and the confirmed respite in the military sector, both on the domestic and the export market.

The major part of the European aerospace production thus still pertains to military equipment, i.e. chiefly fighter and training aircraft, military helicopters and all types of missiles.

Indeed, military production accounted for most of the growth of the European aerospace industry until 1982. A calm has reigned since as a result of East-West detente and a levelling-off in the export mar-

kets, especially in the Middle East. This lull is also linked to the transition between two generations of equipment. More specifically, the production programmes for several big weapons systems have either reached or are reaching maturity, especially in the

field of fighter (Tornado, Mirage F 1 and 2000, Harrier) and training (Alfjet, Hawk) aircraft. A period of stagnation in production is forecast before the recovery due to the production of a new generation of weapons systems, in particular the EFA and

Table 4
Development of European production of civil transport aircraft (1)

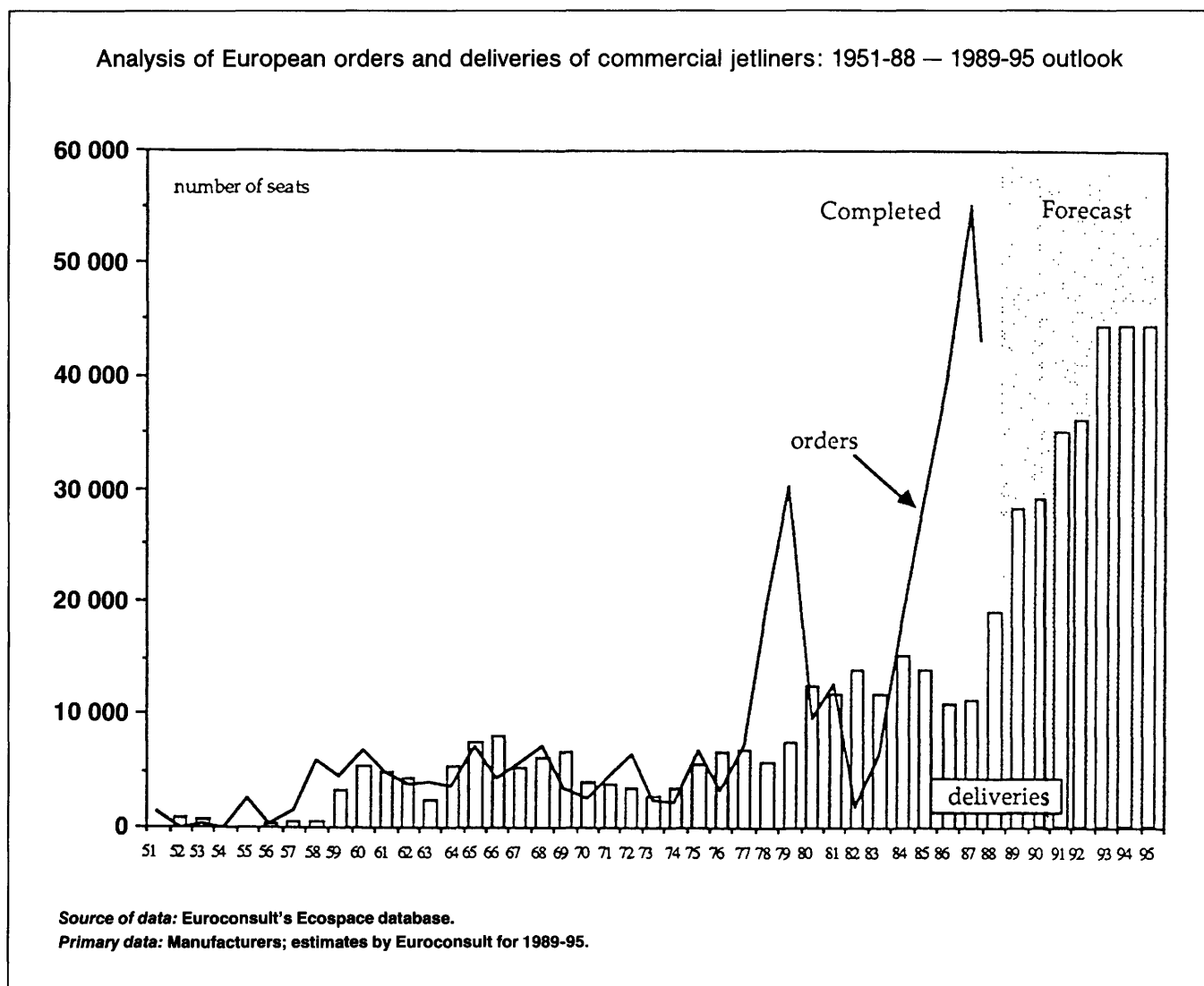
	1980	1981	1982	1983	1984	1985	1986	1987	1988
Deliveries of commercial jets (number of units)									
Short and medium-range wide-body:									
Airbus A 300	37	37	46	19	19	16	10	11	17
A 310	—	—	—	17	29	26	19	21	28
Short and medium-range narrow-body:									
British Aerospace B 111	3	2	2	1	—	—	—	—	—
B 146	—	—	—	8	10	20	24	23	22
Fokker F 28	13	12	10	17	16	13	13	1	0
F 100	—	—	—	—	—	—	—	—	11
Airbus A 320	—	—	—	—	—	—	—	—	16
Total deliveries	53	51	58	62	74	75	66	56	94
Orders for commercial jets (number of units)									
Short and medium-range wide-body:									
Airbus A 300	36	15	3	0	11	24	7	29	21
A 310	12	10	0	6	15	29	17	27	24
A 330	—	—	—	—	—	—	—	12	13
Long-range wide-body:									
Airbus A 340	—	—	—	—	—	—	—	68	3
Short and medium-range narrow-body:									
British Aerospace B 146	—	4	4	24	6	25	14	30	40
Fokker F 28	18	12	20	8	9	21	2	2	0
F 100	—	—	—	—	8	30	47	1	32
Airbus A 320	—	—	—	—	51	39	146	58	116
Total orders	66	35	29	38	96	168	233	227	239
Deliveries of turbo-prop passenger aircraft (number of units) (2)									
ATR 42	—	—	—	—	—	2	29	40	44
British Aerospace HS 748	7	9	3	7	6	5	1	1	1
ATP	—	—	—	—	—	—	—	—	8
Fokker F 27	15	15	16	17	10	13	16	1	0
F 50	—	—	—	—	—	—	—	6	32
Casa/Nurtanio CN 235	—	—	—	—	—	—	2	13	12
Saab 340	—	—	—	—	12	26	37	33	28
Short 330	24	19	12	3	2	0	1	—	—
360	—	—	2	28	30	25	14	20	16
Total deliveries of turbo-prop aircraft	46	43	33	55	60	71	100	115	141
Total orders for turbo-prop aircraft	54	44	222	169	58	117	82	151	216

(1) EC 12 + other European countries.

(2) Aircraft over 20 seats, including Saab 2000.

Source: Manufacturers.

Figure 2



Rafale fighters, currently in the development phase with scheduled deliveries rather stretched out owing to reduced military budgets.

The same renewal phase of the generation of weapons systems applies to missiles and helicopters, with a levelling-off in production before the forecast recovery due to the new generation of systems.

Civil aeronautics

The situation is exactly the opposite in civil aeronautics where market conditions are exceptionally good due to the sharp rise in air transport and the need to renew the first generation of commercial jet airlines delivered some 20 years ago.

This sharp rise in the market is taking place as European industry has widely expanded the line of products to include all types of commercial aircraft, from

light transport planes with fewer than 20 seats to long-range jumbo jets.

As a result, the European industry is capitalizing fully on the strong growth of the market in this sector, with nonetheless a certain lag as regards the adaptation of its production apparatus. The latter is in a period of fast growth, and in the commercial area, the European industry is currently in the midst of a genuine shift in the scale of production.

Commercial jets

Up until 1980, deliveries of commercial jets had remained below 8 000 seats per year. From 1980 until 1988, the production of the first-generation Airbus planes brought deliveries to a level ranging from 12 000 to 15 000 seats per year. In 1988 deliveries reached 20 000 seats. They should continue to progress to nearly 30 000 seats in 1990 and more than 40 000 seats in 1993.

This constitutes the confirmed return of the European industry on the world market of major civil aviation. In terms of the number of seats ordered and delivered, 15 years ago Europe accounted for only 4% of the world market. These last four years however, the European industry has succeeded in securing 25% of world orders, a level towards which its deliveries should gradually verge for the years to come.

In 1988, 94 European commercial jets were delivered. This year was marked by the first deliveries of the A 320, which completes the Airbus line on the very high-growth market segment of medium-range, 150-seat aircraft. In addition, the first Fokker F 100 planes were delivered in the equally very active market of 100-seat planes. The first A 330 and A 340 planes will be delivered in the early 1990s and will thus expand the line of European jumbo jets to very big capacity and the long-range aircraft market.

The increase in the production of the Airbus line concerns most of the major European aerospace companies, especially (for the cell) Aerospatiale of France, MBB and Dornier of the Federal Republic of Germany, British Aerospace in the United Kingdom, Casa in Spain, Fokker in the Netherlands and Sonaca in Belgium.

But the production of European commercial jets is not limited only to the Airbus line, but also includes aircraft of 100 seats or fewer, i.e. British Aerospace BAe 146 and Fokker 100, the market for which is also in a period of high growth.

Furthermore, the European industry participates in the growth of the production of American civil aircraft by Boeing and McDonnell Douglas, with which the Italian industry is closely associated, as are other European industries, especially those of Spain and the United Kingdom.

Commuters

Commuters represent a very high-growth segment. As regards orders, the world market went up by 36% in 1988 by comparison with 1987 to 18 323 seats, 66% of which were ordered from European manufacturers. As to deliveries, the world market went up by 23% in 1988 to 11 050 seats, 65% of which were supplied by the European industry which thus dominates this market by far at the world level and is present in all aircraft categories.

The major European companies concerned are Aerospatiale and Aeritalia, which cooperate on the ATR 42 and ATR 72 programmes, Fokker with the F 20 and F 50, British Aerospace with the ATP, Short Brothers with the Short 330 and 360, Saab with the Saab 340 and 2000 and Casa which manufactures the CN 235 in cooperation with the Indonesian firm Nurtanio and has drawn together with Aerospatiale and Aeritalia for the development of a new aircraft.

The European industry is also present in the business jet sector, with about one-third of the world market. In this segment, the market is just coming out of a long recession caused by the oil crises, and is now growing again, especially in its top-market line, for which the European industry is particularly well placed.

Helicopters

Four companies manufacture lines of helicopters in Europe: Aerospatiale, MBB, Westland and Agusta. The European helicopter industry is the world's number one exporter with more than one-third of the American civil market, a market which represents the major part of the world's fleet of helicopters.

After quasi-continuous growth up until 1982, the helicopter market went into a period of recession from which it is only now coming out both in the

Table 5
European production of helicopters

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Sales of helicopters by the leading companies (1)	1 340	1 498	1 630	1 940	1 713	1 787	2 153	2 141	2 100
Index	75	84	91	109	96	100	120	120	118
Deliveries (number) (1)	622	642	752	525	456	320	363	392	N/A
civilian	307	338	377	227	209	212	252	216	N/A
military	315	304	375	298	247	108	111	176	N/A
Employment (number)	24 195	22 521	23 063	22 944	22 911	22 410	21 909	19 400	N/A

(1) Aerospatiale, Agusta, MBB, Westland-unconsolidated sales.

Table 6
European production of engines (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Sales of engines:									
Current value	3 998	5 028	5 642	5 249	5 829	6 649	7 181	7 470	7 690
Index	60.1	75.6	84.9	78.9	87.7	100.0	108.0	112.3	115.7
Deliveries: (2)									
CFM 56 (3)	0	13	161	175	196	275	338	352	411
RB 211	151	195	148	65	43	98	71	76	74
Total	151	208	309	240	239	373	409	428	485
Employment (1 000)	102.5	112.0	95.0	91.6	82.0	83.1	81.5	81.5	79.7

(1) Engines for space systems included.

(2) Deliveries of large civilian aircraft engines (thrust greater than 10 T.) — number of units.

(3) Carried out in cooperation with the United States: 50% Snecma, 50% GE, civilian versions only.

Source: DG III and estimates by Euroconsult for the years 1987/88 based on industrial data.

military and the civilian sectors. Deliveries of European helicopters reached a peak in 1982 with 752 aircraft and a low in 1985 with only 320. Since then, recovery has been slow, with 363 helicopters delivered in 1986 and 392 in 1987, 216 of which for the civil market. The drop in the number of jobs, which started in 1982, has continued on a regular basis and has not been checked by the slight recovery these last few years considering the increase in productivity. Employment in the major companies concerned dropped from 23 000 to 19 400 persons. Prospects are better now with the recovery of the market, especially exports.

Engines

Since 1980, the European aircraft engine industry has sustained regular growth comparable to that of the cell industry, but with an even greater re-stabilization in the civil sector.

Growth prospects in the military engine sector are rather ill-favoured in the short term, in contrast with the civil engine sector carried by the sharp increase in the market of commercial planes.

During the last five years, deliveries of civil turbo-jet engines have more than doubled, from 239 units in 1984 to 485 in 1988. This rise in the production of civil engines is not directly linked to that of commercial jets produced by the European industry which up to now were equipped chiefly with American engines. It has to do especially with equipping American planes with engines manufactured or co-produced in Europe: the Rolls Royce RB 211 and the CFM 56, built jointly by General Electric of the US and Snecma of France. This situation has nonetheless meant growth with a rise in the production of the A 320 equipped with CFM 56 and with the future use of RB 211 engines for certain Airbus A 330 planes.

Table 7
European space production

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Consolidated sales	467	514	537	684	861	1 291	1 410	1 600	1 750
Unconsolidated sales	643	775	1 046	1 132	1 310	1 922	2 186	2 580	2 850
Breakdown									
R&D + governments	230	242	351	450	471	734	475	N/A	N/A
Commercial Europe	332	455	603	555	728	1 071	1 289	N/A	N/A
Exports	82	77	91	127	111	117	423	N/A	N/A
Employment (estimates)	12 685	11 764	13 720	13 902	15 612	17 401	19 847	21 000	22 000
European satellites launches	0	2	2	1	3	3	2	2	6
Launches of Ariane	1	2	1	2	4	4	3	2	7

(1) 1987/88 estimated.

Source: Professional associations and DG III. Synthesis and estimates by Euroconsult.

The large orders placed for engines for both American and European aircraft and the good prospects of this market will mean sustained growth for the years to come.

Commercial space equipment

The purely space-oriented production of the European aerospace industry continues to represent only a minor part of overall production, but is expanding rapidly: 6.1% in 1987 compared with 3.1% in 1980.

The consolidated turnover of the European space industry more than tripled in the period from 1982 to 1987, going from ECU 537 million to ECU 1.6 billion. At the same time, employment went up from 13 720 to 21 000 jobs.

An important change occurred in the European space industry starting in 1986 as, for the first time, the volume of business of the European commercial market exceeded the market of space agencies concurrently with the development of export markets.

This development of the commercial market is linked to the production of application satellites, for example. Seven European application satellites were put in orbit from 1980 to 1984, 17 from 1985 to 1989; and 20 are scheduled from 1990 to 1994. But the high growth, especially in exports, is above all due to sales of launching services by the European firm Arianespace which consists of the major European companies involved in the production of the Ariane rocket launcher. Eleven satellites were launched by

Ariane from 1980 to 1984, 36 were or will be from 1985 to 1989, and 60 are slated for 1990 to 1994.

The activity linked to the programmes of national space agencies, especially that of the European Space Agency is also on a good track within the framework of scientific and experimental programmes as well as those pertaining to future launchers (Ariane 5), the space station (Columbus) and the space shuttle (Hermes).

Employment

Regular increases of productivity and the development of labour structures towards more qualification have led to virtually constant growth in the number of jobs in European aerospace industry. Employment remained stable in 1988 with 489 000 jobs, compared with 927 000 jobs in the United States and 35 000 in Japan. This stability has been a feature of the European aerospace industry for more than 15 years in contrast with the fluctuation in the number of jobs of the American industry in relation to market conditions.

Overall, in terms of apparent labour productivity, the turnover per worker in Europe remains inferior to that of the American industry, with a steady improvement trend nonetheless. Whereas it represented only 37.5% of that of the American industry in 1972, it reached 85.8% in 1987 at a constant exchange rate.

Table 8
External trade in civil aerospace products

(million ECU)	1981	1982	1983	1984	1985	1986	1987
Exports:							
airframes (1)	2 115.6	3 030.7	2 790.9	3 961.6	3 704.1	2 956.4	2 651.3
engines	351.3	756.6	1 284.0	1 873.1	2 647.2	2 653.0	2 804.7
equipment and others	299.8	363.9	392.6	462.2	559.6	573.4	527.9
Total	2 766.7	4 151.2	4 467.5	6 296.9	6 910.8	6 182.8	5 983.8
Imports:							
airframes (1)	2 491.9	1 453.8	1 491.1	1 721.4	2 660.3	2 816.0	2 633.3
engines	1 326.0	1 564.9	1 877.8	2 500.2	2 637.8	2 543.6	2 635.4
equipment and others	479.9	556.0	653.3	752.0	805.4	801.0	754.8
Total	4 297.8	3 574.8	4 022.1	4 973.5	6 103.6	6 160.5	6 023.5
Balance:							
airframes (1)	-376.3	1 576.9	1 299.8	2 240.2	1 043.8	140.5	18.0
engines	-974.7	-808.3	-593.8	-627.1	9.4	109.4	169.3
equipment and others	-180.1	-192.1	-260.6	-289.8	-245.9	-227.6	-227.0
Total	-1 531.1	576.4	445.4	1 323.3	807.2	22.3	-39.7

(1) Excluding United Kingdom.

Source: Eurostat (Comext).

Foreign trade

There are no coherent statistics available at the European level concerning foreign trade in military equipment, and consolidated statistics of extra-EC trade in the civil sector were reviewed thoroughly and more restrictively in 1987. The considerable growth of various aircraft leasing formulae used by international financial companies inside and outside the EC in particular complicates the compilation of reliable Community data.

The new extra-EC foreign trade figures have been expanded to all 12 Member States, and thus to include new countries which though they have a very small civil aeronautics production, are nonetheless major consumers due to their sizeable tourist market. They reveal a strong improvement in civil aeronautics trade from 1980 to 1984, going from a deficit of ECU 1.5 billion to a surplus of ECU 1.3 billion. Since then, the balance has dropped, and there was even a slight deficit of ECU 40 million in 1987.

This setback should be only temporary. It is essentially linked to the time required for the European production apparatus to adjust to the recovery of the market. The purchases of European companies have actually taken off these last few years. In 1987, 159 commercial jets were delivered to EC companies compared with 81 in 1986. Deliveries of European commercial jets in the world accounted for only 56 aircraft in 1987 compared with six in 1986. With the delivery of 94 European aircraft, 1988 should mean a recovery of trade to be further confirmed with a rise in production that is expected to exceed 200 aircraft a year within two years.

The most robust growth in exports per technical segment concerns engines, which exceeded cells in value in 1987, chiefly due to the sales of RB 211 and CFM 56 engines to US manufacturers.

The equipment segment on the other hand continues to be structurally in deficit of ECU -227 million in 1987.

Balance of trade figures vary widely from country to country. France and the United Kingdom have traditionally shown a high surplus. Italy is registering a slight, stabilized surplus, while the Federal Republic of Germany continues to show a deficit.

Geographically speaking, the EC is a net exporter to all countries except the United States, the main and virtually only supplier with which the balance of trade remains negative at a relatively stable level of a little more than ECU 2 billion per year on average since 1980, and ECU 2.1 billion in 1987.

Europe continues to be the major export market of the US aerospace industry, especially for commercial aircraft, with ECU 2.4 billion in deliveries in 1987.

International cooperation

Even more than the rise in the foreign trade of finished products, the internationalization of the European aerospace industry is characterized by the development of cooperation. Indeed cooperation is increasing rapidly between European countries through a growing integration process of the European aerospace industry which is currently in an acceleration phase thanks to an increase of agreements. This cooperation extends also to non-European countries.

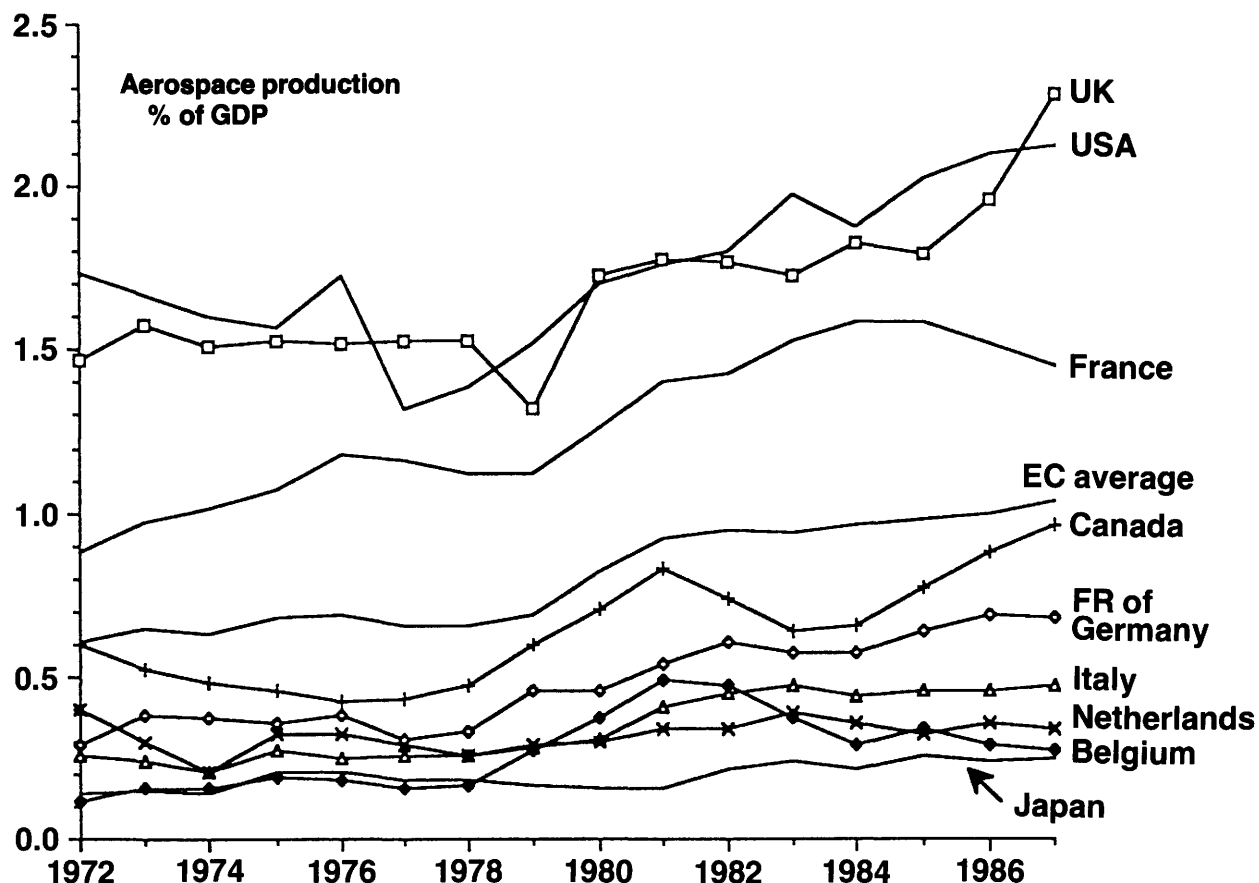
The US aerospace industry is Europe's major partner on a large variety of military and civil programmes. Cross investments in the different programmes have expanded most rapidly in the civil sector. The participation of US industry in the Airbus aircraft is already as high as 25 to 30% depending on the plane, through the supply of engines and equipment. This participation is going to be expanded even more substantially on the new models. More specifically, in order to meet the need for a more flexible production capacity and to take precautions against the fluctuations of the dollar, the major European companies which are partners in Airbus Industrie concluded major subcontracting agreements in 1988 with big US (Textron, Allied-Signal) and Canadian (Bombardier) aerospace companies for the A 330 and A 340 programmes worth a total of more than USD 3 billion. Conversely, the European industry is involved in most of the major US civil programmes, *inter alia*, the Boeing 767 and 757 and the McDonnell Douglas MD 80 and MD 11, through holding stakes and important subcontracting agreements.

As regards engines, transatlantic cooperation agreements are predominant over their intra-European equivalents: the CFM international consortium between Europe and the United States for the CFM 56, and IAE between the United States, Europe and Japan for the V 2500 engine. The cooperation with the United States is also developed in the space sector for international telecommunications satellites and scientific projects as well as for an international space station.

These important cross-investments attenuate changes of competitive positions for the finished products of

Figure 3

Relative importance of aerospace industries in the national economies of the 10 leading manufacturing countries: 1972-87



Source of data: Euroconsult's Ecospace database.

Primary data: DG III of the EC Commission, professional organizations.

the US and European aerospace industries as interdependence has risen sharply.

The international cooperation of the European industry is not limited to the United States, but concerns also, though to a much more limited extent, Japan, mainly through the multilateral programmes already mentioned, but also through bilateral agreements such as the Germano-Japanese helicopter.

But the particular feature of the internationalization of the European aerospace industry consists above all in the very wide cooperation network with third-world countries, involving as it does all countries with a significant aerospace industry. This is the case, for example, with the Italian-Brazilian fighter and the Hispano-Indonesian transport planes. Licensing agreements have been concluded with numerous countries to manufacture military planes, but for civil aircraft: BAC 111 in Romania, Do 228

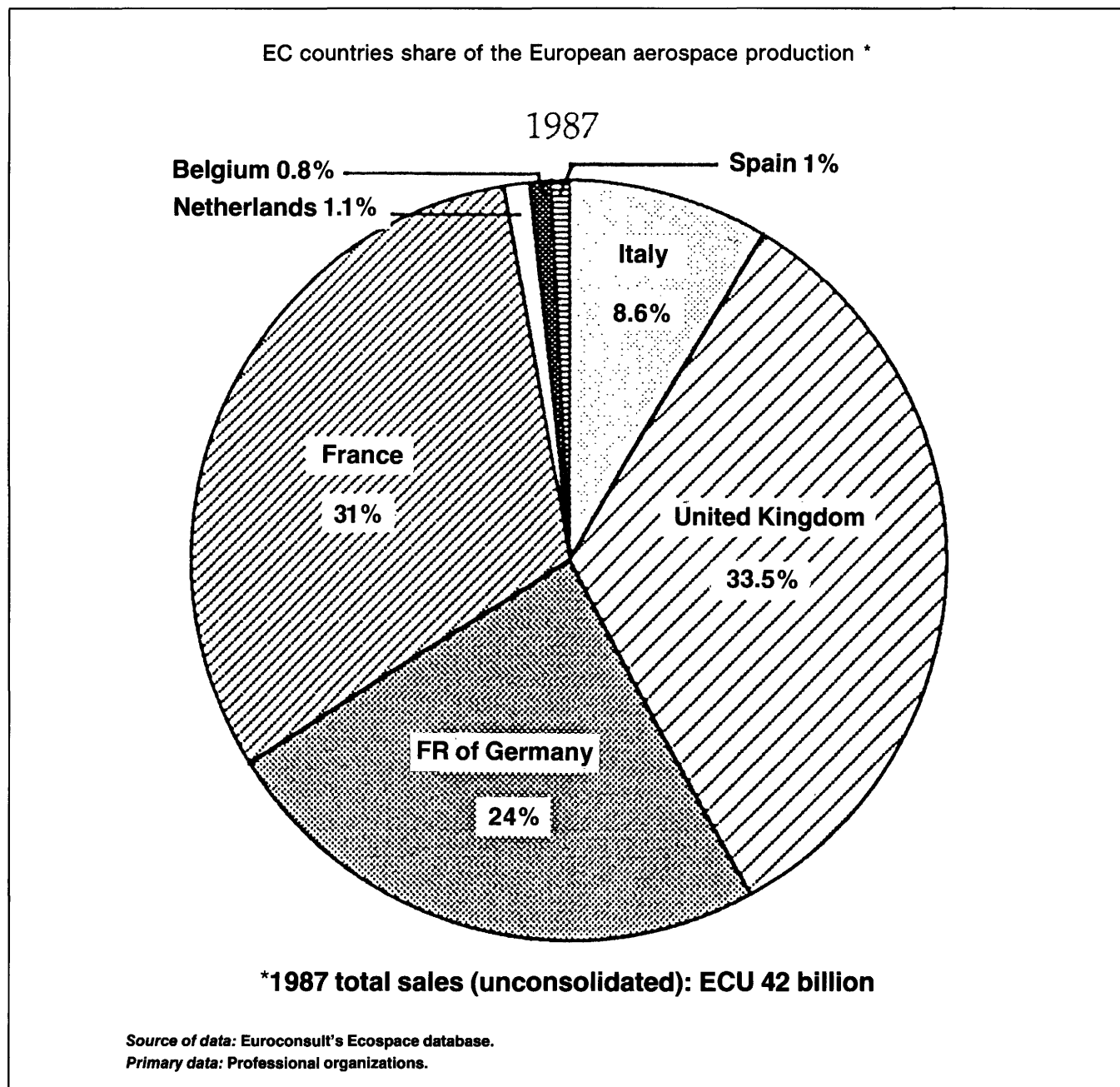
in India and European helicopters in more than a dozen countries. There are important cooperation agreements in the space sector as well, especially with India, China and Brazil. This opening is continuing with more subcontracting agreements in the civil aeronautics sector (in China, the Republic of Korea and Yugoslavia).

Geographic characteristics

In Europe, aerospace production is concentrated in four countries, namely the United Kingdom, France, Germany and Italy.

In terms of turnover, the United Kingdom and France, with 33.5 and 31% respectively of the European production in 1987 manage to maintain their traditional lead in this sector in Europe. Their

Figure 4



dominance continues to abate gradually, however, with the rise of the German and Italian industries which accounted for 24 and 8.6% respectively of the European production in 1987.

Three other countries, the Netherlands, Belgium and Spain with more recent industries, each account for about 1% of European production. They are developing their production chiefly through programmes of wide international cooperation and also national programmes for regional transport planes and training aircraft.

As regards the Netherlands, the level reached in 1987 is exceptionally low because production of

first-generation aircraft came to an end and was replaced by production of second-generation aircraft which is expected to generate a high rate of growth in turnover in the years to come.

Although Sweden is not a member of the EC, its industry works in close cooperation with European industry. Its turnover in 1987 amounted to ECU 1.22 billion (ECU 1.25 billion in 1988) for 14 000 employees, accounting for 2.8% of European production.

Wide differences exist in the Community in terms of the relative weight of the aerospace industry in the economy as a whole. In the United Kingdom, this

weight is very considerable and has increased substantially in the last few years. It reached 2.5% of GDP in 1987, i.e. one percentage point greater than that in the United States. On the contrary, in Belgium, the relative weight of this sector is 10 times lower with 0.27% of GDP and about the same as that of Japan.

No country is close to the EC average established between the two countries that are heavily involved, namely the United Kingdom and France, and all of the other countries together for which the relative weight of the aerospace industry is half as much. The Federal Republic of Germany is gradually outdistancing the group of secondary countries, but the relative weight of the aerospace industry is still only 0.68% of GDP, three times lower than in the United Kingdom. The rapid development of German aerospace production does not actually bring with it a commensurate increase of its weight in the economy because of the strong growth of that country's other industrial sectors.

The overall inferior industrial performance of France and the United Kingdom on the other hand, give the blossoming aerospace industries of these countries a relatively greater importance.

Structure of the industry

The European aerospace industry is organized around major contracting companies. In 1988, 16

(million ECU)	Sales	Employees
United Kingdom:		
British Aerospace	5 993	87 500
Rolls Royce	2 919	40 900
Westland	530	9 163
France:		
Aerospatiale	3 996	36 000
Dassault	2 520	13 318
Snecma	1 427	13 482
Matra	1 002	5 800
FR of Germany:		
MBB	3 430	38 774
AEG	1 106	9 885
Dornier	748	8 190
MTU	706	7 787
Italy:		
Aeritalia	1 290	16 000
Agusta	718	9 500
Fiat Aviazione	430	4 800
Netherlands:		
Fokker	879	11 000
Spain:		
Casa	561	10 652
Sweden:		
Saab	722	7 620

Source: Euroconsult.

European companies generated an aerospace turnover of more than ECU 400 million.

Table 10
Relative importance of the European, US and Japanese aerospace companies (1)

First 17 US companies	1987 sales (million ECU)	First 17 European companies	1987 sales (million ECU)	First four Japanese companies	1987 sales (million ECU)
1 Boeing	13 400	British Aerospace	5 768	Mitsubishi	1 891
2 McDonnell Douglas	10 514	Aerospatiale	3 596	Kawasaki HI	756
3 General Electric (2)	10 500	MBB	2 943	IHI	583
4 Lockheed	9 794	Rolls Royce	2 914	Fuji HI	234
5 UTC (3)	7 381	Dassault	2 246		
6 General Motors	5 500	Snecma	1 355		
7 Northrop	5 280	Aeritalia	1 062		
8 General Dynamics	4 952	Matra	950		
9 Raytheon	4 746	AEG	949		
10 Rockwell	4 427	Dornier	776		
11 Allied Signal	4 101	Saab	750		
12 Martin Marietta	3 547	MTU	630		
13 Textron	3 382	Agusta	614		
14 Grumman	2 173	Westland	540		
15 LTV	1 205	Fokker	452		
16 Sundstrand	869	Fiat Aviazione	428		
17 Cessna	409	Casa	356		

(1) Aerospace activity only.

(2) Power systems + flight systems.

(3) Jet engines + aerospace.

Source: DG III, EC Commission, and companies.

Table 11
Profitability of the major European aerospace companies

(%)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Net profit/turnover	1.5	1.5	-0.8	-0.6	2.1	2.9	2.0	0.1	1.6

The companies are AEG, Aeritalia, Aerospaziale, British Aerospace, Casa, Dassault, Dornier, Fokker, MBB, Rolls Royce, Snecma, Matra, MTU.

Losses for 1982 and 1983 are due to the the results of a single company. For the remaining companies, profitability was at 0.5% in 1982 and 1.3% in 1983.

Source: Companies' annual reports.

The size ratio between the major European contracting companies and their US competitors is still disadvantageous, but it has been reduced in the last few years, from an average ratio of 4:1 in 1985 to 3:1 in 1988.

The difference in size between US and European contracting companies has been reduced in part by the drop in the value of the dollar and the successive concerted actions within the national aerospace industries of the bigger European countries which led to the emergence of the current national leaders. Nevertheless, except for British Aerospace, the process of concentrating national aerospace qualifications around national leaders has not yet been completed. The successive takeover by Daimler Benz of Dornier, MTU, AEG and MBB, if approved, should give birth to a group of a similar size in the Federal Republic of Germany. In France, the industrial structure of this sector is still developing.

In Japan, where this industry is still marginal, aerospace production is carried out solely within large, diversified groups, where it remains minimal (less than 10% of the turnover).

The profitability of the European aerospace firms is on the average lower than that of their US competitors as a result of shorter series which entail a lesser depreciation of R&D costs and a lesser effect on the learning curve. The situation has improved, however, as European industrial might has grown, and the level of profitability of the major European aerospace companies in 1985 was close to that of the US aerospace industry (2.9% of the net profit/turnover compared with 3.1%). In 1986 and especially in 1987, the steep drop in the value of the dollar had a strong

effect on the profitability of European aerospace companies which invoice about half their turnover in dollars. For 1987, the net profit margin dropped to 0.1%.

The situation bounced back in 1988 to 1.6% of the turnover, both as a result of measures taken to increase productivity and an increase in production and the improved stability of the dollar. During the same period, the profitability of the US aerospace industry was sustained at a very high level, from 4.1% in 1987 to an estimated 4.8% for 1988.

Technological development

Technological development is very important in the aerospace industry where R&D activities represent more than 15% of the turnover.

Military aerospace activity takes up most R&D efforts. Military R&D works pertain to specific areas with military applications (electronic counter-measures, stealth, exceptional manoeuvrability, resistance in extreme combat conditions, etc). But in the main, basic research works have a dual end, both military and civil. Whence the importance of the production of military equipment as a support mechanism for innovation in the civil sector.

The most active area at present mainly concerns the constituent technologies of products which are grouped in six major areas:

- aerodynamics and flight mechanics with utilization of new supercritical wing profiles and the ongoing search for flight optimization (active monitoring);

Table 12
Profitability of the US aerospace industry

(%)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Net profit/turnover	4.3	4.4	3.3	3.5	4.1	3.1	2.8	4.1	4.8

Source: AIA.

- structures and structural materials with the introduction of new designs made possible by the development of new constituent materials: aluminium-lithium alloys, organic and metal composites, high-performance polymers;
- propulsion with research on more fuel-efficient, higher performance engines, especially propfans, and improved thermodynamic cycle, thanks to the use of very high-performance equipment: ceramics, super alloys, monocrystalline blades, etc. with concurrent improvement of acoustics with active and passive internal and external noise reduction systems;
- on-board electronic equipment and avionics with active control and 'fly-by-wire' controls commands, the increased use of opto-electronics and the optimization of man-machine interface in the cockpit, as well as the development of advanced navigation systems;
- CAD-CAM, with the development and use of the most sophisticated computer-aided design and management of design-production interface systems;
- production technologies with, *inter alia*, increasing computerization of concepts and systems for improved flexibility and the development of new designs and quality assurance and testing systems, especially non-destructive testing, which are fundamental in the sector.

Many of these technologies, though they are launched in the aerospace sector, have much wider fields of application and gradually spread to other sectors of industry (e.g. CAD, new materials, navigation, turbo-propulsion, etc.).

The recognition of this pivotal technological role that the aerospace industry plays is evidenced by the proliferation of technical cooperation agreements between aerospace companies and companies in other sectors, notably in the automobile industry.

In the other direction, technology transfers to the aerospace sector involve especially the area of production technologies, as cost control becomes essential, given the rise of production and stiffening competition. Here once again, the aerospace sector enjoys privileged relations with automobile makers.

As regards the civil aeronautics industry specifically, long-term research work is focused on the development of second-generation supersonic aircraft and convertible aircraft with the combined advantages of planes and helicopters.

Long-term research work also pertains to all elements relative to safety, the reduction of operating costs and greater respect for the environment.

Research funding

Given the fast technological changes which affect virtually all components and constituent systems of aerospace production, the capacity for maintaining an important R&D effort constitutes and will continue to constitute a key competitive element in the European aerospace industry in the years to come.

Traditionally, a sizeable part of research and development costs in this sector has been covered by governments because of the dominant share of military activity. The last 15 years, however, have been marked by a trend of progressive disengagement on the part of major European governments from funding aerospace R&D, as public funding in France, the United Kingdom and the Federal Republic of Germany has gone from an average of 75% of costs in 1971 to 58% in 1985. This trend contrasts with that in the United States, where the commitment of the government remains stronger. From 79% in 1971, it went down to 72% in 1982, and climbed back up to 76% in 1985. Public support for aerospace R&D is relatively greater in Europe for civil programmes in contrast with the United States where it concerns chiefly the military sector, though in fact it involves numerous mixed programmes with both military and civil applications.

Public funding for aerospace R&D, which was very low in Italy up until the end of the 1970s, has grown rapidly to draw nearer to the levels in other major European countries, though it still remains lower (42% in 1985) and involves smaller amounts. This period also witnessed the emergence of public funding for aerospace R&D in Japan, which though at a low level, signalled a will to enter this field.

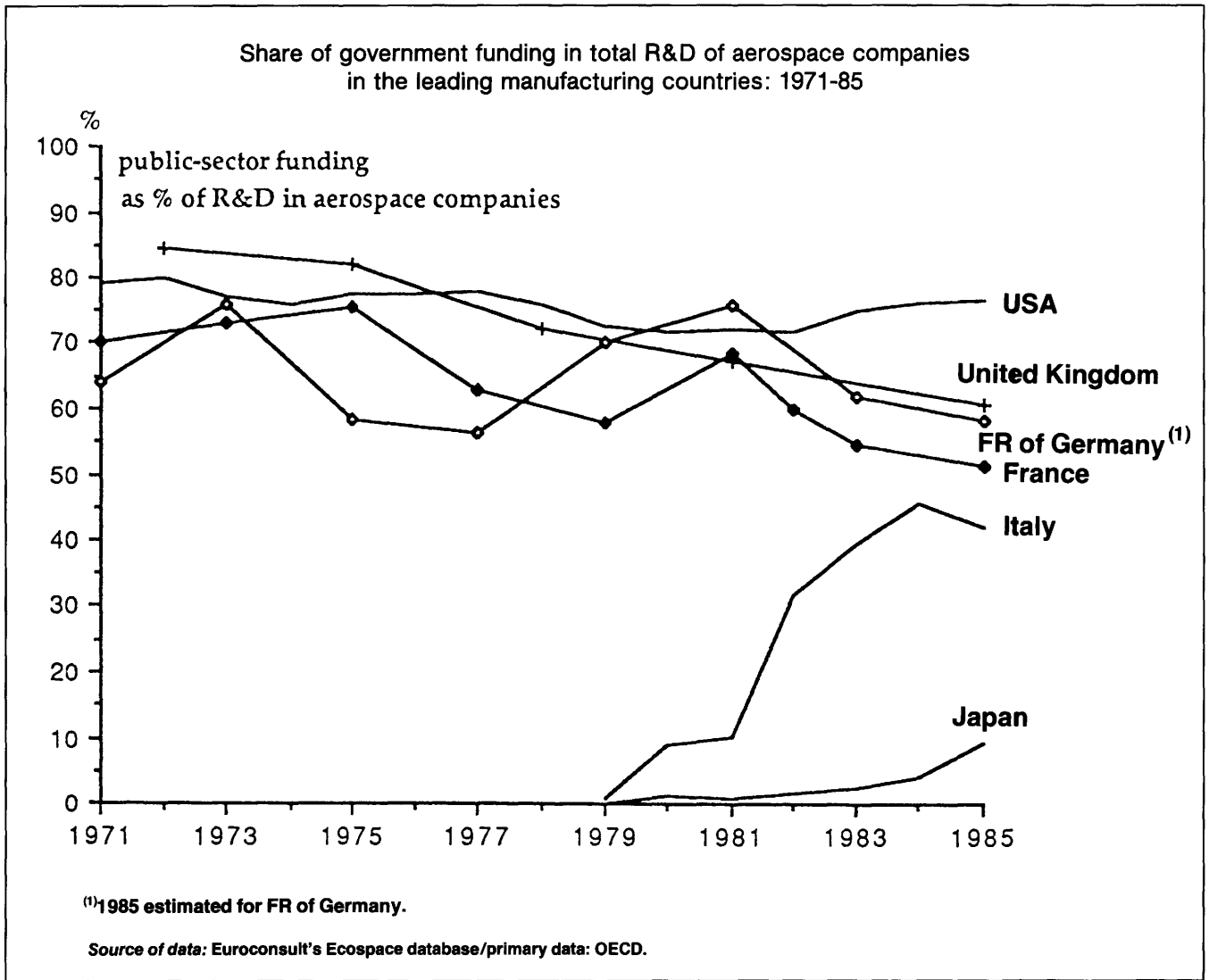
Currently, there is a respite in public funding for aerospace R&D, both in the United States and in Europe within the framework of reducing military spending.

Yet, the relative share incurred by the aerospace industry as regards the funding of R&D remains clearly higher in Europe than in the United States, considering the sizeable difference in the absolute values of military budgets.

The impact of 1992

The completion of the single European market of 1992 will have only a small impact on the European aerospace industry, as there are virtually no existing limits on the trade of aerospace equipment in Europe. For that matter, for a long time now, this sector has played an important initiating role in the industrial and technological integration of Europe,

Figure 5



with big cooperation programmes such as those of Airbus Industrie, Panavia, Arianespace or the European Space Agency.

The prospect of the integrated single market on the other hand, has an impact on the strategies of industrial groups which, in addition to even greater cooperation, are committed to a more intensive integration process.

Environmental protection

This area is dominated by the concern for noise reduction. Together with reducing energy consumption, it leads to rapid developments in engine technology that make it possible to introduce increasingly restrictive regulations concerning the aircraft noise at airport districts. The most noisy aircraft has thus been banned from flying in Europe since 1 January 1988.

Competition and increasingly stricter regulations will make it possible to reduce the nuisance caused by commercial aircraft noise considerably in the 1990s. This is linked to the technological advancement of planes, and those produced by the European industry are at the cutting edge of technological advancement.

The other main line relative to environmental protection concerns the reduction of polluting emissions from jet engines, an area where progress is constantly being made, with in particular, regular increase of combustion temperatures. For the long term, research work is conducted on non-polluting propulsion of H2O2-type engines.

Outlook

The overall growth prospects of the European aerospace industry continue to be defined in terms of

growth which should be around 5% per year in volume for 1989 and 1990. This growth will nonetheless be much greater in civil aerospace, while the traditionally more profitable military sector will continue to stagnate. This re-orientation of the activity to the civil sector constitutes the main challenge the European aerospace industry is facing. In five years, from 1987 to 1992, its production capacity in this sector will have actually quadrupled, going from 10 000 to 40 000 seats per year, and as companies concerned are currently committed to considerable investments.

Now experience has shown that the activity in the civil sector was much more prone to fluctuations than its military counterpart. After the current boom period, the European companies concerned will find themselves confronted with the problem of regu-

lating this activity among themselves. Up until now, the US industry, the only real competitor which still dominates this market, has shown that it could absorb the shocks of the strong fluctuations in the civil market and cover a part of its costs thanks to a military market nearly two-and-a-half times the size of the European industry.

The European industry must take up the challenge and show that it too can face the problems of regulation of this activity without having the support of as vast a military market.

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INSTRUMENT ENGINEERING

(NACE 37)

Summary

In 1988, the instrument engineering sector produced ECU 20 382 million and contributed approximately 1% to the EC's manufacturing industry production. Employment for the sector stood at 309 322. Production and employment are roughly equivalent in size to the EC cotton industry and also to the EC knitting industry. Instrument engineering is a blend of scientific discovery and research and the role of technology has had a significant effect on the trends within the sector. In particular, the industry will continue to evolve as the use of electronics becomes more important in instrumentation.

The economic importance of the industry in the EC economy

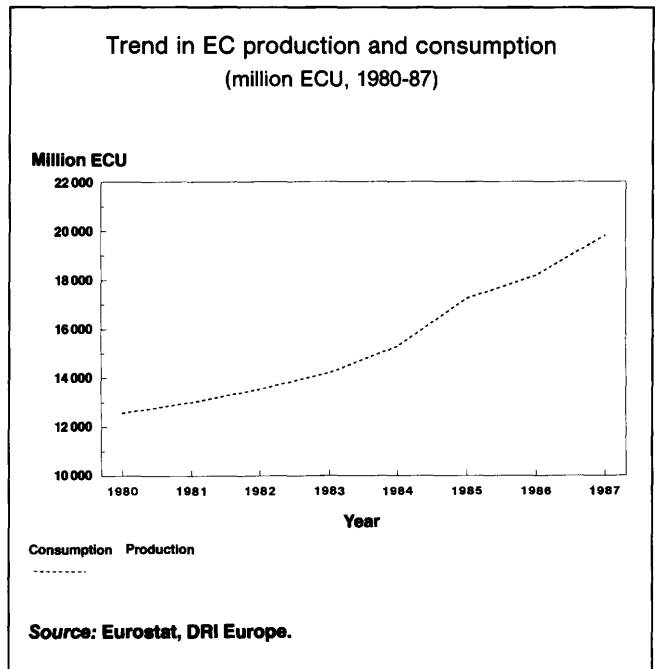
Current situation

Confidence in the economy over the last several years and increased investment spending as Europe prepares itself for 1992 has had a positive impact on the market for instrument engineering. As companies strive to reduce costs, to monitor and improve product quality and to improve competitiveness, the demand for precision instruments as a means to achieve these ends has increased. Production for the sector expanded at a compound average annual rate of 7% between 1980 and 1988. Much of this strength has been in the two largest components of instrument engineering — medical equipment and measuring, precision and control instruments.

Production of medical and surgical equipment and apparatus led the sector with average annual growth of 10% fuelled by better than average price increases (over 6% compared to an average of 5% for the instrument engineering sector overall) and the increased demand for medical testing for disease around the world. Measuring, precision and control instruments expanded at an average annual rate of 8% between 1980 and 1988, as industry responded with increased investment spending to the issues of

the coming decade: competitiveness, product quality and environmental protection.

Figure 1



Declines in value of EC production of clocks and watches over the last eight years has pulled down the growth performance of the instrument engineering sector as a whole. In fact, where clocks and watches once contributed 15% to overall instrument engineering production (in 1980), it now accounts for only 8% of total production. Much of this decline in watch and clock production can be explained by the increase in demand for cheaper digital watches and by the declining popularity of the more expensive mechanical ones. This produced a fall of 4% in the price level of this sector between 1980 and 1988, which has depressed the value of production of clocks and watches.

Trade

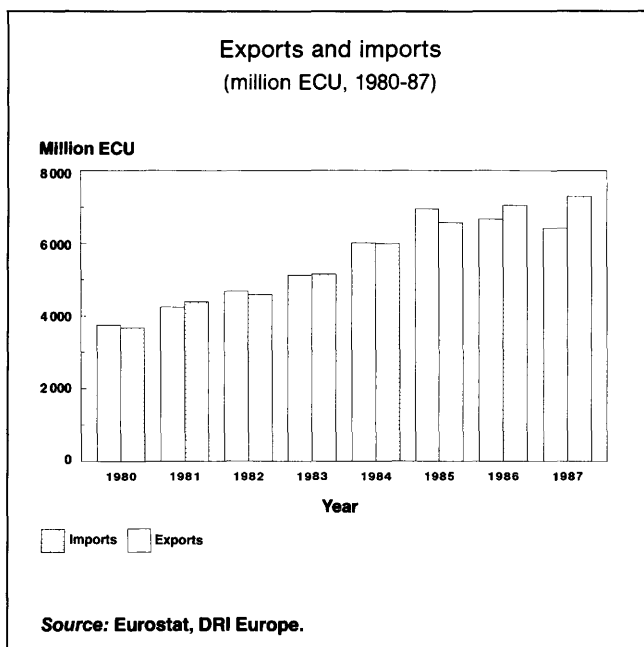
Imports made inroads into all of the subsectors of instrument engineering over the last eight years. Although export growth increased by an average



annual rate of 13% between 1980 and 1985, the overall level of exports fell in both 1986 and 1987 producing a compound average annual growth rate between 1980 and 1987 of less than 8% compared to overall import growth of 10%.

In medical equipment the pace of export growth almost matched that of import growth and the sector actually increased its proportion of goods for export from 28 to 34% of total production. Optical and photographic equipment, which has the highest export intensity of the instrument engineering group, also increased the proportion of its goods exported to 55% of production in 1987 from 51% in 1980.

Figure 2



Despite the improvements in export intensity in both of these sectors, the net export position of instrument engineering fell into deficit from a slight surplus in 1980.

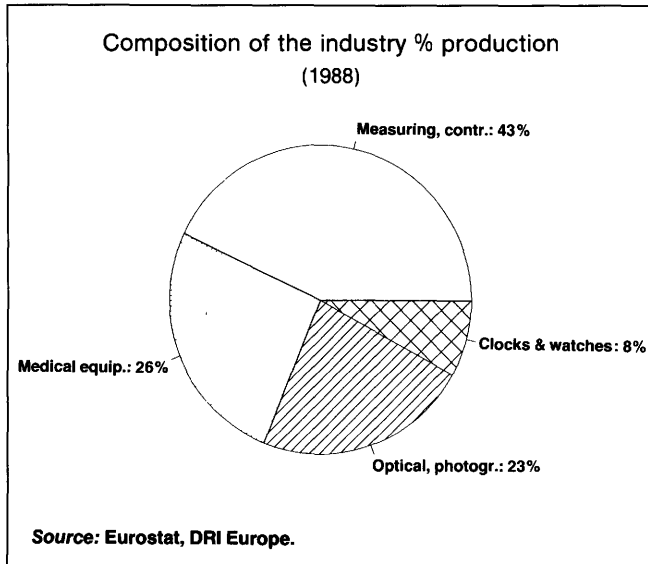
Description of the industry

Instrument engineering (NACE 37) includes the manufacture of:

- measuring, checking and precision instruments and apparatus (Nace 371);
- medical and surgical equipment and orthopaedic appliances (NACE 372);
- optical instruments and photographic equipment (NACE 373);
- clocks and watches (NACE 374).

As shown in Figure 1, over 40% of the total sector's production is generated by the manufacture of measuring, precision and control instruments. Medical and surgical equipment account for 26% of the instrument engineering industry followed by optical and photographic equipment with 23% and clocks and watches trailing with 8% of production.

Figure 3



This overview provides a brief summary of recent trends in production and trade, and the overall outlook for the sectors described above. Except for medical and surgical equipment, each of these sectors is described in more detail in the subchapters of Chapter 14. Chapter 14.2 provides a detailed look at medical dressings and disposable devices.

Industry structure

Instrument engineering is made up of a very diverse group of firms which range from very small manufacturers employing less than 20 people to the very large employing over 500. Innovation and the development of niche markets in the industry is often associated with the smaller firms which have the flexibility to invest in specific problems. Larger firms, however, have greater resources upon which to draw for research and many have established a large market presence in Europe (Zeiss, Bausch and Lomb).

Geographic features

The Federal Republic of Germany dominates the instrument engineering industry with 42% of total EC production. The United Kingdom is second overall (20% of total production) with particular strength in measuring and control instruments and France follows with strong production in clocks and watches and optical and photographic equipment.

Outlook

The rate of increase in the production of instrument engineering is expected to taper off as overall economic conditions and investment spending growth moderate. The level of employment, which declined in both 1987 and 1988, should improve slightly in the near term given that much of the industry's rationalization took place in the early 1980s.

Investment in medical and surgical equipment is a function of both government expenditure on health and demographic factors such as the ageing of the population. Although government expenditure is expected to decline, an ageing population will increase the demand for medical expenditures and the net effect is likely to be positive albeit modest growth. Industrial measuring products face a brighter future as industry continues to automate its production processes which in turn increases the requirements for monitoring and measuring equipment. Instrument engineering also has opportunities ahead in developing niche markets, for example, in optical instruments such applications as laser-based equipment. European producers have largely lost the consumer market for photographic equipment and clocks and watches to Far Eastern producers.

As environmental issues continue to gain importance around the world, opportunities also exist for measuring and analysis equipment for gases and vapours and apparatus for investigating harmful effects on man, animals, plants, soil and food.

DRI Europe

MEASURING, PRECISION AND CONTROL INSTRUMENTS

(NACE 371)

Summary

Over the past decade, many mechanical precision instruments have lost ground to those which have electronic components. Much of the recent strength in the industry is a reflection of the strong capital investment that the EC has experienced in recent years. In 1988, the industry employed 127 815 people and produced goods valued at ECU 8 712 million.

Description of the sector

The manufacture of measuring, precision and control instruments (NACE 371) consists of the following products:

- gas meters, water meters and other liquid supply meters;

- measuring, checking or automatically controlling instruments and apparatus;
- navigational, hydrological, geophysical and meteorological instruments;
- drawing and mathematical calculating instruments;
- precision measuring instruments;
- precision balances, laboratory apparatus and teaching equipment;
- other precision instruments and apparatus.

These instruments are used in a broad range of industries such as petroleum, chemicals, food processing, drugs, pharmaceuticals and utilities.

Table 1
Main indicators, 1980-88 (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption (2)	4 168	4 224	4 313	4 685	5 299	6 336	6 903	7 331	N/A
Net exports (2)	574	680	696	667	649	728	675	594	N/A
Production (2)	4 742	4 904	5 009	5 352	5 948	7 064	7 578	7 925	8 712
Employment (number) (3)	151 507	141 871	129 374	123 008	123 469	132 157	133 318	131 124	127 815

(1) Estimated.

(2) 1980 EC 9; 1981-85 EC 10.

(3) Excluding Luxembourg; 1980, 1985-88 excluding Portugal.

Source: Eurostat (Inde, Bise).

Table 2
Production by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	104	77	75	102	111	122	125	127	138
Denmark	21	21	23	53	52	64	55	49	50
FR of Germany	2 266	2 378	2 261	2 229	2 452	2 856	3 223	3 377	3 674
Greece	5	5	6	N/A	N/A	N/A	N/A	N/A	N/A
Spain	127	114	116	129	130	143	450	189	181
France	207	222	222	226	253	515	524	536	567
Ireland	195	224	253	270	313	339	331	336	368
Italy	541	582	459	695	710	697	822	859	929
Netherlands	139	165	172	189	213	242	230	232	192
Portugal	N/A	N/A	12	12	12	N/A	N/A	N/A	N/A
United Kingdom	1 269	1 231	1 538	1 583	1 839	2 223	2 101	2 203	2 595

Source: Eurostat (Inde).

Table 3
Imports extra-EC (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Belgium, Luxembourg	23	24	26	27	36	63	55	42
Denmark	17	18	21	24	28	33	34	35
FR of Germany	150	160	175	182	213	260	293	262
Greece	N/A	6	7	7	7	10	10	9
Spain	N/A	N/A	N/A	N/A	N/A	N/A	40	36
France	77	91	111	105	110	118	102	117
Ireland	6	8	9	10	9	9	9	8
Italy	44	48	52	51	69	64	63	78
Netherlands	50	58	58	60	79	84	83	73
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	8	9
United Kingdom	98	131	174	222	269	279	218	205

(1) Partner country: 1980 extra-EC 9; 1981-85 extra-EC 10; 1986/87 extra-EC 12.

Source: Eurostat (Bise).

Table 4
Exports extra-EC (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Belgium, Luxembourg	16	12	13	13	21	22	20	27
Denmark	25	29	29	44	36	43	37	27
FR of Germany	439	500	565	575	636	721	744	747
Greece	N/A	0	1	1	1	0	0	0
Spain	N/A	N/A	N/A	N/A	N/A	N/A	18	21
France	204	194	214	222	249	278	234	212
Ireland	7	6	7	7	10	20	16	16
Italy	88	118	110	130	150	169	155	136
Netherlands	39	45	56	63	77	87	81	68
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	2	1
United Kingdom	269	352	360	352	359	393	338	338

(1) Partner country: 1980 extra-EC 9; 1981-85 extra-EC 10; 1986/87 extra-EC 12.

Source: Eurostat (Bise).

Table 5
Employment by country

	1980	1981	1982	1983	1984	1985	1986	1987(1)	1988(1)
Belgium (2)	2 618	1 725	1 576	1 271	1 270	1 242	1 225	1 194	1 178
Denmark	680	603	580	981	1 027	1 204	954	863	904
FR of Germany	67 215	65 071	56 417	49 275	48 892	52 958	54 533	53 986	52 376
Greece (3)	318	246	383	417	418	431	432	426	N/A
Spain (4)	4 942	4 612	4 375	4 540	3 782	3 094	3 086	3 010	N/A
France	5 052	4 526	4 421	4 070	4 019	7 125	6 953	6 795	6 685
Ireland (1)	5 979	5 851	5 655	5 319	5 142	4 920	4 887	4 808	4 706
Italy	13 964	14 088	10 512	15 421	12 991	12 255	11 988	11 524	11 176
Netherlands (5)	3 254	3 148	3 025	N/A	4 725	4 884	4 943	4 951	5 765
Portugal	N/A	N/A	843	820	820	N/A	N/A	N/A	N/A
United Kingdom	47 485	42 001	41 587	40 894	40 383	44 044	44 317	43 567	41 589

(1) Estimated.

(2) 1984-88 estimated.

(3) 1983-87 estimated.

(4) 1986/87 estimated.

(5) 1986-88 estimated.

Source: Eurostat (Inde).

Current situation

Until the 1970s, measuring, precision and control instruments were largely mechanical. Now, three fundamental evolutions have changed the technological environment of the industry:

- the use of sensors;
- the introduction of electronics;
- the association of peripheral equipment (such as data processing systems).

These new technologies have stimulated the constant development of a range of new products with multiple applications, particularly in industrial processes and packaging. As a result, in the weighing industry alone, the share of mechanical machines has fallen to less than 10%.

Production and consumption

Production has steadily increased since 1980 to reach ECU 8 712 million in 1988. Growth in 1988 was particularly strong, reaching 10%, double the rate of growth in the preceding year.

Imports account for approximately 10% of domestic consumption and the rise in demand over the period 1980-88 has been met primarily with increased production within the EC.

Trade

Imports, which have doubled in value between 1980 and 1987, have increased at a considerably faster rate than exports which expanded by less than 50% over the same time period.

Exports, which account for approximately 20% of production, steadily increased in value from 1980 to 1985, but fell in both 1986 and 1987. Although growth in the value of exports over 1980-87 expanded at an average annual rate of 8% in the Federal Republic of Germany, growth in the other major exporters was considerably less, averaging only 3% annually in the United Kingdom and less than 1% in France.

Employment

Employment has declined over the past eight years, in fact, there were 24 000 fewer people employed in the industry in 1988 than in 1980. The level of employment has improved, however, since a low of 123 000 in 1983 and now stands at a level of just under 128 000.

Industry structure

The EC weighing industry alone (less than a fifth of total production in the measuring, precision and control instruments industry) employed over 22 000 people in at least 400 firms in 1987. Firms range in size from those with only a handful of employees to the largest firms employing some 1 500 people. Certain firms specialize in the manufacture of one or two products while others manufacture a wide range of machines. The trend seems to be towards diversification so as to cover a wider section of the market.

Geographic features

The Federal Republic of Germany, the United Kingdom and Italy produce just over 80% of measuring, precision and control instruments. France and Ireland together produce 11% of production and the Netherlands, Spain, Belgium and Denmark account for 6% of EC production. (The contribution of Greece and Portugal is estimated at less than 3%.)

Of the three largest manufacturers, the UK has experienced the greatest percentage increase in output between 1980 and 1988. The UK sector's growth in 1988 of 18% was, in large part, responsible for the industry's overall expansion of 10% in this year.

Outlook

Prospects are good for some specialized products such as navigational and aeronautical equipment, given the expected strength in the aircraft industry as an ageing first generation of airliners is replaced and air transport services continue to expand. The increasing concern with the environment and demand for environmental monitoring will also contribute to growth in the measuring, precision and control instrumentation market.

The weighing instruments industry, which comprises analytical, chemical and precision balances, scales for retail trade and industrial and commercial uses, has also come to depend more and more on electronic techniques. The technical standardization of machines within the EC should enable trade to develop considerably in the future.

DRI Europe

This sector is represented at the European level by Cecip, Comité européen des constructeurs d'instruments de pesage

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OPTICAL INSTRUMENTS AND PHOTOGRAPHIC EQUIPMENT

(NACE 373)

Summary

New and improved processes and technological advances continue to change and provide growth opportunities for the optical and photographic equipment industry. The industry serves a wide range of activities including amateur and professional photography, medical diagnostics, photofinishing and graphic arts.

Description of the sector

The manufacture of optical instruments and photographic equipment includes the following products:

- spectacles, including lenses, frames and mountings, and equipment for use by opticians;
- optical precision instruments;
- photographic and cinematographic equipment.

Current situation

The adoption of new technology continues to provide growth opportunities for the optical and photographic industry. For example, cameras which offer features such as autofocus, auto-rewind and auto-flash, and products such as the disposable camera, have gained considerable popularity with the consumer.

Producers in the Federal Republic of Germany have long been well-known market leaders in optical con-

sumer goods. The market is becoming more competitive, however, and some European producers have experienced difficulties in adapting to the ever-changing technology. One such casualty is Minox, a large producer of lenses, microfilm instruments and still cameras which was dissolved last year after a period of substantial losses.

Production and consumption

Production in the EC expanded by a strong 8% in 1988, driven by a large gain of 18% in UK production and a 9% gain in production in the Federal Republic of Germany. Despite this strength in production, consumption expanded at an annual average rate of 10% between 1980 and 1987 suggesting that imports made further inroads into the European market over this time period.

Trade

Over half of the EC's production of optical and photographic equipment is exported. According to the European Federation of Precision Mechanical and Optical Industries, the Federal Republic of Germany exports approximately 70% of its production. Despite this high export intensity, however, the EC has continued to post a net trade deficit throughout 1980-88.

This deficit has worsened in the last three years. The rising success of Japanese producers in the manufacture of photographic equipment of varying levels of

Table 1
Main indicators, 1980-88

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987 ⁽³⁾	1988 ⁽³⁾
Apparent consumption ⁽¹⁾	2 859	3 038	3 244	3 503	3 912	4 483	5 198	5 525	N/A
Net exports ⁽¹⁾	- 252	- 552	- 409	- 636	- 654	- 675	- 1 085	- 1 215	N/A
Production ⁽¹⁾	2 607	2 486	2 835	2 867	3 258	3 808	4 113	4 310	4 667
Employment (number) ⁽²⁾	79 359	72 915	70 579	69 420	71 439	74 136	74 385	73 092	71 249

⁽¹⁾ 1980 excluding Greece, Spain, Portugal and Netherlands; 1981-85 excluding Spain, Portugal and Netherlands; 1986-88 excluding Netherlands.

⁽²⁾ Estimated; excluding Netherlands; 1981 excluding Portugal.

⁽³⁾ Estimated.

Source: Eurostat (Inde, Bise).

Table 2
Production by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Denmark	58	58	66	79	97	89	105	117	121
FR of Germany	1 086	1 068	1 119	1 115	1 271	1 431	1 572	1 649	1 792
Greece	2	2	2	2	2	2	2	1	1
Spain	77	87	80	78	84	105	109	138	132
France	646	628	719	754	911	1 189	1 198	1 226	1 295
Italy	218	223	261	432	500	590	627	655	709
Portugal	9	11	14	15	17	19	20	20	22
United Kingdom	599	518	668	485	478	509	481	504	594

Source: Eurostat (Inde).

Table 3
Imports extra-EC (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Belgium, Luxembourg	51	58	60	70	97	77	84	98
Denmark	38	42	42	56	67	70	81	84
FR of Germany	599	726	706	807	909	1 080	1 055	1 151
Greece	N/A	6	7	9	11	12	10	11
Spain	N/A	N/A	N/A	N/A	N/A	N/A	135	150
France	274	319	354	384	429	499	506	557
Ireland	10	11	11	16	17	18	50	14
Italy	156	202	217	208	257	292	263	297
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	21	25
United Kingdom	377	516	573	635	690	746	689	646

(1) Partner country: 1980 extra-EC 9; 1981-85 extra-EC 10; 1986-87 extra-EC 12.

Source: Eurostat (Bise).

Table 4
Exports extra-EC (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Belgium, Luxembourg	13	13	27	56	47	35	23	24
Denmark	43	43	38	39	47	57	62	63
FR of Germany	654	717	782	791	888	1 073	1 024	981
Greece	N/A	0	0	0	0	0	0	0
Spain	N/A	N/A	N/A	N/A	N/A	N/A	13	19
France	184	197	237	296	415	442	396	340
Ireland	5	12	30	50	68	58	43	47
Italy	150	150	174	199	252	301	275	271
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	3	3
United Kingdom	311	330	374	359	341	317	234	240

(1) Partner country: 1980 extra-EC 9; 1981-85 extra-EC 10; 1986-87 extra-EC 12.

Source: Eurostat (Bise).

Table 5
Employment by country

	1980	1981	1982	1983	1984	1985	1986	1987(1)	1988(1)
Denmark	1 176	1 249	1 218	1 284	1 447	1 452	1 639	1 747	1 831
FR of Germany	32 558	32 193	29 537	27 208	27 479	28 685	29 143	28 851	27 990
Greece (2)	159	138	134	131	131	136	136	134	134
Spain (3)	2 355	2 498	1 884	1 637	1 517	2 615	2 608	2 544	2 544
France	19 164	16 596	17 296	17 191	18 631	19 014	18 605	18 182	17 888
Italy	7 514	6 975	6 878	10 193	10 674	10 594	10 820	10 401	10 087
Portugal (4)	1 175	N/A	1 200	1 163	1 192	1 145	1 101	1 075	1 078
United Kingdom	15 258	13 266	12 432	10 613	10 368	10 495	10 333	10 158	9 697

(1) Estimated.

(2) 1984-87 estimated.

(3) 1986-87 estimated.

(4) 1986-88 estimated.

Source: Eurostat (Inde).

sophistication has broadened the market appeal of their products and has, no doubt, contributed to the EC's trade deficit.

Employment

The number of employees has been fairly stable over the past few years after experiencing sharp declines in the first three to four years of the 1980s. The industry employed just over 70 000 people in 1988.

Industry structure

According to the German precision mechanical and optical industry, the industry has its base in small to medium-sized companies. Small manufacturers have been responsible for many of the technological achievements and inventions in the industry. Approximately 20% of the establishments employ

fewer than 20 people and a further 25% employ between 50 and 200 people. Larger manufacturers, those with over 400 employees, also have a considerable presence in the industry and account for just under half of all establishments. One of the largest companies in Europe is Carl Zeiss, a company which produces enlargers, slide projectors, shutters and lenses for projectors, movie cameras and still cameras.

Outlook

The rising cost of camera production and the strength of the yen against other world currencies has caused many Japanese producers to move offshore. Low-end autofocus cameras are increasingly being made in Asian countries and thus imports of equipment from these countries will continue to rise.

DRI Europe.

MEDICAL DRESSINGS AND DISPOSABLE DEVICES

(NACE 439.74, 472.2, 481.25)

Summary

This sector has shown steady growth since 1980, both inside and outside the EC. Export trends are usually short-lived and tend to depend on exchange-rate fluctuations and new technological developments. The industry has been restructuring significantly with a view to gearing up for the post-1992 period. Exports to the USA and Japan are expected to increase steadily. The import trend is also upwards for certain products from the Far East and other developing areas.

Definition of the sector

Although medical dressings and disposable devices are covered by several NACE codes that do not really belong to the instruments sector, they were included in this chapter because they are closely associated with medical instruments, equipment and orthopaedic appliances (NACE 372), which are discussed briefly in the overview of this chapter. In fact, Eucomed, the European Confederation of Medical Supplier Associations, covers both groups of medical products.

Product groups considered in this section and referred to in the statistics are:

- pharmaceutical-impregnated/coated wadding, gauze bandages and similar articles used for medical or surgical purposes
- first-aid boxes and kits
- contraceptive sheaths

- surgical and medical examination gloves
- non-retail medical, surgical and hygienic articles made from paper pulp, paperboard or cellulose wadding
- renal dialysis equipment
- transfusion apparatus
- plastic and non-plastic syringes
- hypodermic needles
- other needles, cannulae and catheters.

In addition to these sectors, Eucomed covers:

- single-use instruments, apparatuses, equipment, implants, appliances, substances, objects and combinations thereof
- non-powered implants
- mechanical contraceptive devices
- certain accessories to active powered devices
- infusion and transfusion devices.

Current situation

Disposables are now increasingly manufactured in Europe, the dependence on imports from the USA of earlier years having been largely reversed. Nevertheless, many of the larger EC-based disposable-device manufacturers are US-owned enterprises. The latter moved in either by establishing their own manufacturing subsidiaries or acquiring established businesses from European owners.

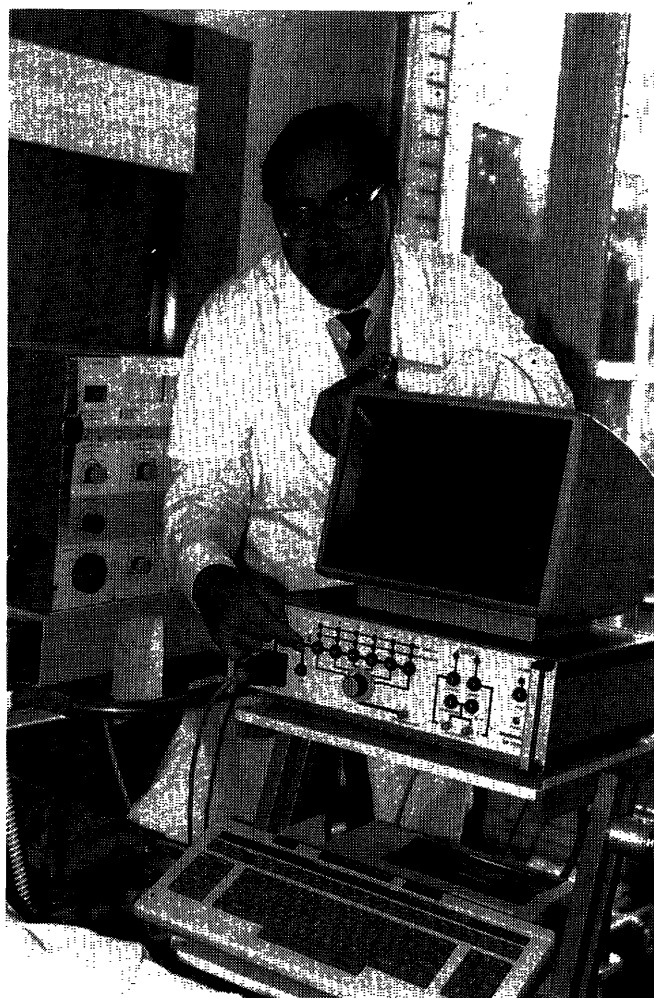
A number of Community companies in the medical disposables field have developed from small, family-owned and often conservatively run firms, many of

Table 1
Main indicators, 1980-87
Medical dressings and disposable devices

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Apparent consumption	955	1 078	1 197	1 323	1 480	1 793	2 040	2 121
Net export earnings	24	10	-12	-19	-35	-67	-84	-50
Production	979	1 088	1 185	1 304	1 445	1 726	1 956	2 071
Estimated employment index ⁽¹⁾	98	94	91	93	95	100	102	103

(1) Does not include vending-only companies.

Source: Campbell Management Consultants.



which have tended to be relatively less adaptable and competitive, both in EC and world markets. This, in turn, has facilitated US inroads into what is still a rather fast-developing business area.

Wadding, gauze bandages and similar articles

The number of European companies involved in the manufacture of gauze products has been steadily shrinking over the past two decades. In addition to competition from the newly industrialized countries (NICs) and China, the increasing tendency towards replacement of gauze by non-woven dressings has further depressed prospects for EC producers. In 1987 imports of gauze into the EC from China and the Asian countries (in particular, the Republic of Korea and Taiwan) was over 2 000 tonnes. Another important source of gauze is Eastern Europe (mainly Yugoslavia). Imports in 1987 from the other western European countries of the European Free Trade Association (EFTA) amounted to less than 500 tonnes.

However, imports from China have started to level off, after peaking in 1985. Overall imports of gauze from outside the EC are also declining, after a high of 4 202 tonnes in 1985; in 1987, they reached 3 482 tonnes.

Mandatory high standards for medical dressings in the Federal Republic of Germany and the United Kingdom has reduced the pressure on local gauze producers.

Other factors favour domestic manufacturers elsewhere in the EC and curb imports. In France, for instance, producer prices are low. In Spain, companies manufacture dressings that differ considerably in quality and execution from those of other countries. Spanish hospitals are accustomed to using domestically produced goods and, therefore, favour local manufacturers. Italy, on the other hand, depends heavily on imports. (In 1987 it imported 1 226 tonnes of gauze from China alone.)

Imports aside, the gauze dressings market in Europe is shrinking and gradually being replaced by non-woven and spun lace non-woven products. France is the most advanced market in this respect. However, quality in France has declined in recent years with producers of non-woven goods eyeing business in the hands of gauze producers and the latter following suit by cutting back on costs and quality.

The FR of Germany is the leading producer of medical bandages in the EC and a major exporter. Overseas sales account for about half of total production. Other large-scale manufacturers and exporters of bandages include the United Kingdom and France. The USA is an important importer of certain specialized bandages, e.g. polyurethane splinting bandages and auto-adhesive bandages.

The EC producers' market for adhesive dressings and other articles with an adhesive layer is particularly concentrated, with five companies accounting for more than 85% of Community sales.

There is at present an increasing tendency for these major international companies to produce in the Far East and import into Europe. High-tech resins have replaced traditional natural resins over the past two decades. At present, a synthetic hypoallergenic adhesive resin is used in more than 90% of all surgical tapes and dressings sold in the EC.

Substantial quantities of articles made from wadding are imported from regions such as the Mediterranean countries, the NICs and eastern Europe. Some of the latter are also routed through EFTA countries, for example Austria.

Total exports of waddings and bandages in 1987 were worth ECU 308 million, and imports about ECU 280 million. The EC has been running a more or less steady surplus in this sector since 1980, but the Community's surplus with outside trading partners has been rapidly shrinking, having dropped from ECU 49 million in 1980 to only ECU 3.5 million in 1987. In 1988 this surplus expected to turn into a deficit.

Latex products: contraceptives and gloves

Latex contraceptive sheaths and surgical gloves are imported in considerable quantities from the NICs, the USA and Austria. Between 1986 and 1987 imports of contraceptive sheaths more than doubled in value. Exports also grew by a significant amount, but almost all of these were concentrated within the EC, resulting in a near five-fold increase in the extra-Community trade deficit.

Leading EC exporters of contraceptive sheaths are the FR of Germany, the Netherlands and the United Kingdom. Overall, the EC runs a trade deficit in contraceptive sheaths of more than ECU 8.6 million.

The largest exporters of surgical gloves in the EC are the FR of Germany and the Belgo-Luxembourg Economic Union (BLEU). The EC is heavily dependent on imports of this product (over ECU 63 million). In this sector also, the EC has been running a large and steadily rising trade deficit since 1980. At present this deficit is over ECU 50 million.

Paper and cellulose-based medical articles

Products made from paper pulp, paper and paperboard or cellulose wadding and used for surgical, medical or hygienic purposes are largely manufactured locally in the EC. Raw materials come mainly from Scandinavia.

Non-Community suppliers comprise less than 20% of total imports by volume, or a little over 30% by value. The major production areas in the EC for these articles are France, the FR of Germany, the Netherlands and the UK.

The Netherlands is, by a considerable margin, the leading exporter, accounting for more than 40% of the total value of EC exports. Nearly all of these exports are produced by a single Swedish-owned company.

The EC has been a net exporter of products in this group since 1983. Exports amounted to ECU 53 million in 1987, and imports ECU 36 million. The bal-

ance of trade with non-EC countries has been steadily rising, and was worth about ECU 6 million in 1987. However, the Community has a growing deficit with the USA, which reached more than ECU 3 million in 1987.

Dialysers and dialysis disposables

Dialysers and dialysis disposables such as bloodlines are produced in several EC countries. These include France, Italy, the FR of Germany and Belgium. Leading sources of imports outside the EC (accounting for 27% of all imports) are Sweden, the USA and Japan.

The high yen has reduced Japanese exports of dialysis disposables over the past two years and Japanese products have been losing ground in a growing market. Imports from Japan fell from 612 tonnes in 1986 to 445 tonnes in 1987 (ECU 16.5 million to ECU 14.2 million). Imports from the USA have also dropped from their 1982 peak of nearly ECU 30 million and, in spite of the considerable weakening of the dollar since 1986, fell from ECU 15 million to a little over ECU 14 million in 1987.

In general, the past few years have been marked by a sharp rise in intra-Community trade in this field. Non-EC countries account for only 27% of imports, compared to 40% in 1982. Meanwhile, the EC's deficit with other countries has decreased to less than ECU 1.5 million, from over ECU 20 million in 1982.

Transfusion apparatus

Transfusion apparatus consists mainly of bags and bag assemblies, and tubing, out of which administration kits are assembled. These products are supplied mainly by EC-based companies. However, certain raw materials are imported from Malaysia. There are also imports of finished goods from Japan and the USA, which together account for some two-thirds of the EC's imports from other countries.

The EC's exports of transfusion apparatus of non-Community markets have been rising rapidly since 1980, and at ECU 46 million, now outweigh imports by ECU 16 million. Total exports to outside EC markets in 1987 were worth ECU 46 million, compared to ECU 13 million in 1980.

However, the EC continues to record negligible exports to Japan, having run a consistent and rising deficit in this sector since 1980. Exports to the USA were worth ECU 7 million the past year, compared to a peak in 1983 of nearly ECU 8 million. Imports from the US were a little under ECU 7 million.

Syringes

The EC is a major producer of syringes, which are manufactured by US, Japanese and European-owned companies. Both exports and imports have grown rapidly since 1980, and are presently worth ECU 61 million and ECU 38 million, respectively.

The main countries with manufacturing operations are Denmark, Ireland, the FR of Germany and Belgium, and to a lesser extent Italy and Spain. Ireland accounts for about 45% of exports of plastic syringes, nearly all of which are sold within the EC. The largest exporter to markets outside the Community is the FR of Germany. Leading importers of syringes are France (plastic) and Italy (non-plastic). Most of these imports are from within the Community. Extra-EC imports of syringes come mainly from Switzerland, although the goods originate in eastern Europe. Since 1980, the EC has run a steady deficit in syringes with the USA and to a lesser extent with Japan.

Disposable syringes have virtually replaced re-usables over the last decade. Their export-market share has, however, remained steady since 1980, at about 66%. Although the rate of replacement has levelled off in recent years, further increases in the use of disposables due to the growing threat of AIDS are expected in the medium run.

Hypodermic needles

The EC is highly dependent on imports of hypodermic needles from Japan, running a massive deficit (averaging ECU 24 million for each of the past five years) with that country. There are only five important producers in the EC, two of them US-owned with production facilities, one is in southern Ireland and one in Northern Ireland. BLEU accounts for more than half of all intra-Community exports.

Japan provides a third of total imports by EC countries, and more than 70% of extra-Community imports. The USA is also a major supplier, although imports have declined over the past two years to around ECU 5 million, from a peak in 1983 of over ECU 12 million.

Other needles, cannulae and catheters

This segment includes several different types of products, ranging from intravenous devices to drainage tubes and catheters. Some of them incorporate needles, while others do not. Needles are produced in the EC by several companies. They are also

imported from the USA and Japan. Although the EC's exports of needles have been rising in recent years, it continues to run large trade deficits with both the USA and, Japan (ECU 63 million and ECU 14.5 million respectively).

There are a little over 20 important producers in the EC, and they are located in France, the UK, Italy, Belgium, Ireland, Denmark, Spain and the FR of Germany. Six of these companies are US-owned, while one is Japanese. The US-owned companies are based mainly in Ireland and the UK. EC companies have also been moving manufacturing operations abroad, to the Far East and Scandinavia.

Table 2
Medical dressings and disposable devices by category, 1987

(million ECU)	EC prod. value (1)	Imports extra-EC	Exports extra-EC	Net exports
Adhesive dressings, gauze, bandages and first-aid boxes	805	102	136	34
Sheath contraceptives	20	15	6	-9
Gloves	17	63	13	-50
Medical non-woven articles	193	11	17	6
Dialysers	270	50	49	-1
Transfusion disposables	362	30	46	16
Plastic syringes	135	28	40	12
Other syringes	45	10	21	11
Other needles, cannulae and catheters	190	151	92	-59
Total	2 037	460	420	-40

(1) Estimated.

Source: CMC estimates, Eurostat (Bise).

Consumption

Consumption of medical disposables and dressings in the EC has been showing steady growth in recent years, mainly due to two factors: an ageing population and a slow but firm trend towards the use of disposables. While population forecasts indicate that demand will increase further over the next decade, cost containment moves in the health care sector have been focused more on reducing unit prices than on consumption itself.

The largest growth in consumption in the past 10 years has occurred in intravenous therapy products, non-woven disposables, disposable syringes and needles, latex gloves for surgical use and contraceptive sheaths. The two latter products continue to

experience accelerating growth in consumption owing to widespread concern about the AIDS virus.

Markets are showing strong positive growth in four of the five major EC countries (the FR of Germany, Italy, France and Spain). The United Kingdom is implementing cutbacks in the medical disposables market as a result of cost containment efforts in the National Health Service. The market in all other countries is growing, with the exception of Ireland. In recent years, unit prices of medical disposables in Ireland have been much higher than the EC average. To curb financial pressures, hospitals have found ways to reduce prices of supplies. This has been facilitated by hospital tenders, as well as the presence of many new entrants into the market.

There have also been reports of dumping certain goods on the French market, with particular reference to product lines expected to be discontinued.

Trade

The EC market for medical dressings and disposable devices has been growing substantially, with production more than doubling to ECU 2.1 billion between 1980 and 1987. Just over a third of the production goes into net exports, while a similar percentage of EC consumption is supplied by imports.

In 1980-87 both exports and imports of all categories of goods in the industry rose.

Exports to markets outside the EC increased from ECU 207 million to ECU 443 million, and imports from ECU 183 million to ECU 493 million. Along with intra-EC trade, total exports rose from 442 mil-

lion ECU to ECU 1 179 million, and imports from ECU 456 million to ECU 1 223 million.

The Community has been running a small overall trade deficit in recent years (around ECU 50 million in 1987). This reflects a steady increase in imports from the EC's two largest trading partners, the USA and Japan, which accounted for over half of all imports in 1987.

From 1980 to 1987, the EC continually recorded trade deficits with the USA and Japan (ECU 110 million and ECU 50 million respectively in 1987).

Performance varies according to the sectors. The EC has been consistently recording trade surpluses in a number of sectors. In others, it has persistently run a deficit. Among the latter are contraceptive sheaths, surgical gloves, dialysis equipment, hypodermic needles, and cannulae and catheters.

During the past three years, a few sectors, including transfusion apparatus, have seen a turnaround in performance, with impressive gains in exports. However, several showed the reverse, with one-time surpluses dwindling steadily, e.g. wadding and gauze bandages.

Imports of disposable medical products from the NICs have also begun to appear in significant quantities on the EC market. These are still largely low-technology items, for which the NICs have an edge in terms of labour costs. Such products mainly include gauze used for dressings, and latex surgical gloves, as well as contraceptive sheaths.

Export volumes for the entire medical dressings and disposables market went up by just over 2% from

Table 3
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Production in current prices								
EC	979	1 088	1 185	1 304	1 445	1 726	1 956	2 071
Index	57	63	69	76	84	100	114	120
Production in constant prices								
EC	1 349	1 366	1 376	1 439	1 514	1 726	1 895	1 963
Index	78	79	80	84	88	100	110	114
EC trade in current prices								
Exports extra-EC	207	257	293	323	374	422	415	443
Index	49	61	70	76	89	100	98	105
Imports extra-EC	183	247	305	342	409	489	499	493
Index	37	51	63	70	84	100	102	101
X/M	1.13	1.04	.96	.94	.91	.86	.83	.90

Source: Campbell Management Consultants.

1986 to 1987. Since 1980 the volume of Community exports has risen by 114%. During the same period, exports to Japan increased by 60%, and to the USA by 450%.

Products exhibiting the sharpest growth in export markets are non-wovens, plastic syringes and catheters, and cannulae. The strongest negative trends are shown by wadding, exports of which fell by 500 tonnes between 1986 and 1987. This was almost entirely due to a drop in imports from OPEC countries, as a result of a Saudi Arabian-German joint-venture company specializing in converting wadding products, set up in Riyadh.

Employment

More than 100 000 people are employed in the manufacture of medical equipment and dressings in the EC. Numbers grew by 10 to 15% from 1982 to 1987. US and Japanese companies, which together employ more than a quarter of the EC's workforce in this sector, have expanded by concentrating on high-growth, high-technology products made from non-woven and plastic materials.

Manpower levels in the industry have been growing over the past decade as a result of growth on the domestic markets and expanding export markets.

Approximately half the manpower figure is accounted for by the FR of Germany and 20% by the United Kingdom and Ireland combined. The other three large EC countries, i.e. France, Italy and Spain, have turned out poorer export performances, mainly due to a tendency for domestic companies to concentrate on the home market. This has resulted in relatively lower manpower levels than in the FR of Germany and the United Kingdom, both of which are strong exporters to world markets. At present, major developments are underway in France, with US, German and British corporations buying and seeking to rationalize French factories.

Wages tend to vary considerably. At one end of the scale, labour rates are as high as an average of ECU 30 per hour. The companies paying these wages are involved in producing higher-priced, higher-profit plastic disposables. At the other end of the scale, labour rates are less than ECU 10 per hour. The companies paying these rates are typically involved in producing gauze products and in packaging.

Investment in research and development

In general, R&D for new materials tends to be spun off into the medical-devices industry. A minority of international companies are, however, directly involved in seeking new materials that offer improved characteristics for medical use. Often, major chemical producers also develop new materials, which they sell to several companies, which in turn convert these. European dressings and disposable-devices manufacturers have been very quick to learn of new product developments and rapidly adapt to new materials.

Structural and geographic features

The world medical-devices and dressings market has been growing steadily. In general, larger numbers of people throughout the world have better access to health care than ever before, resulting in greater expenditure in the sector. European investors have tended to fare well in these growing markets due to diligent marketing efforts, based on self-financed venture studies and government support. Owing to continued R & D inputs, the technology is sophisticated. This in turn has allowed the EC to retain a competitive edge over countries where wages are lower, particularly the NICs.

There are more than 100 end-product manufacturers of medical dressings and disposable devices in the EC. Over 20 of these companies have manpower levels over 1 000. Others are small and medium-sized enterprises.

The number of companies in the EC, which presently account for more than a 75% share of the medical-dressings and disposable-devices market, is tending to decline. Several large international companies, many of them from the USA, have bought out smaller firms. This process is now also developing in the opposite direction; a number of EC companies have been making acquisitions in the USA as well as in the Community and elsewhere, with the aim of consolidating their position in the world market.

The EC medical-dressings and disposable-devices market is fragmented into 12 separate submarkets. Each national market tends to pose its own obstacles as far as importing companies are concerned. This applies not only to differences in the hospital environment from one country to another, but also to persistent disparities in manufacturing and sterilization standards.

The major international companies maintain marketing subsidiaries or distribution agents in each of the EC countries. This has been necessary because of the imperatives of language, fiscal and other business environment-related factors. After 1992 many of these marketing subsidiaries are expected to be phased out altogether as their strategic importance diminishes.

Outlook

All in all, the future looks promising for EC manufacturers of medical dressings and disposable devices. The internal EC market is growing, as are export markets. US-owned companies are getting increasingly involved in manufacturing within the EC, and are gearing up to strengthen their positions after the completion of the internal market in 1992.

The only sector where future performance looks dismal is cotton gauze and waddings, where non-wovens are expected to replace these products to an even greater extent. With the progressive dismantling

of trade and other barriers in the EC, the major companies will be able to look forward to greater economies of scale and perhaps plough back some of the benefits into further developing export markets. It is estimated that production within the EC will grow by as much as 20% overall between 1989 and 1992, with growth expected to be split more or less evenly between exports on the one hand, and the internal market on the other.

Imports from the Far East and other developing countries with latex production capacities are expected to increase very significantly over the next five years as a direct result of the AIDS-related increase in the consumption of surgical gloves and contraceptives sheaths.

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CLOCKS AND WATCHES

(NACE 374)

Summary

Over half of the consumption of watches and clocks in the EC is supplied by imports, primarily from Switzerland and the Far East. Production in the EC has, in fact, declined over the last eight years in the face of increased competition from cheap battery watches.

Description of the sector

This sector covers NACE 374 which includes watches and clocks, instrument panel clocks, time recorders, and parts thereof. Both mechanical and electronic watches are included in this sector and, where possible, we comment on each separately, given that the trends in price, production and demand can be quite different.

Current situation

Clocks and watches are constantly evolving as the latest technology is applied to improve and expand their features. At the Basle Fair in 1989, for example, the world's first ultrasonic time instrument was exhibited. This clock, without gears, pivots or wheels, was the result of collaboration between a Japanese and a Swiss company.

Despite this new technology, many of the most exclusive watches are produced with mechanical movements. Some of these watches are of the greatest complexity and their dials indicate not only the time, but the day, month, phases of the moon, and even the position of the stars.

Table 1
Main indicators, 1980-88 (1)
Clocks and watches

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	2 316.2	2 249.3	2 341.0	2 150.2	1 814.4	1 845.6	2 099.4	2 223.5	2 476.1
Net exports (2)	-512.2	-525.7	-488.2	-571.9	-593.4	-565.1	-712.4	-771.9	-1 008.9
Production	1 804.0	1 723.6	1 852.8	1 578.3	1 221.0	1 280.5	1 387.0	1 451.6	1 567.2
Employment (1 000)	55.6	50.3	45.2	33.5	25.2	24.3	24.2	23.6	23.1

(1) Excluding Belgium, Denmark, Ireland, Luxembourg, the Netherlands and Portugal.

(2) Greece estimated in 1980; Spain estimated from 1980 to 1985.

Source: Eurostat (Inde, Bise, Comext).

Table 2
Clocks and watches
Production

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987 (1)	1988 (1)
EC (2)	1 804.0	1 723.6	1 852.8	1 578.3	1 221.0	1 280.5	1 387.0	1 451.6	1 567.2
FR of Germany	918.6	870.2	919.8	949.5	544.0	617.1	640.2	661.0	713.0
Greece (3)	1.8	1.7	1.8	1.5	1.2	1.2	1.4	1.4	1.5
Spain (3)	25.8	24.1	16.3	15.2	14.5	10.8	11.3	14.2	13.7
France	468.2	452.5	455.6	457.7	464.1	455.2	517.6	540.0	579.0
Italy	203.6	188.1	190.8	68.7	109.1	110.5	121.4	130.0	144.0
United Kingdom	186.0	187.0	268.5	85.7	88.1	85.7	95.1	105.0	116.0
USA (4)	1 086	1 270	1 212	1 200	1 387	1 195	1 167	1 017	887
Japan (4)	3 000	4 091	3 674	4 531	5 001	5 635	6 663	6 846	9 334

(1) Estimated.

(2) Excluding Belgium, Denmark, Ireland, Luxembourg, the Netherlands and Portugal.

(3) Greece estimated in 1980 and from 1983 to 1988; Spain estimated from 1986 to 1988.

(4) Census of Manufactures and Eurostat estimates.

Source: Eurostat (Inde).



Production and consumption

In order to analyse production and trade trends (see Table 2), it is essential to take into account the difference in price trends for electronic and mechanical clocks and watches. The price trend for mechanical watches has been upwards during the 1980s while electronic watches have actually decreased in price over the last six to eight years. Thus, a country's production performance in nominal terms depends to a large extent on the composition of its output between electronic and mechanical watches. Although it is well accepted that the popularity of electronic watches has increased over the last few years, the change in the proportion of electronic to mechanical watches is difficult to measure.

Trade

In view of its unique position in the horological industry, Switzerland has been included in our analysis. Although preliminary figures for 1988 indicate that, in number, Japanese exports of watches (237 million units) exceeded that of Switzerland (72 million), Switzerland takes the leading position in terms of value. Approximately half of the value of the EC's imports of clocks and watches are from Switzerland (see Table 3). Between 1980 and 1987, imports to the EC from Switzerland nearly doubled in ecus compared with the 25% increase in imports from Japan

and Hong Kong, which together account for 40% of the EC's imports of clocks and watches.

Growth in EC exports to the USA, Japan and Hong Kong outpaced the rate of growth in exports to Switzerland between 1980 and 1987. Exports to Switzerland have tapered off in the last few years reaching a peak of ECU 230 million in 1985 and falling to ECU 210 million in 1987. This corresponds to an overall decline in the value of the EC's exports since 1985 and reflects a shift to the export of electronic watches, which have decreased in price over the last few years.

Employment

The manufacture of clocks and watches has clearly polarized to Switzerland and to the Far East, and it is inevitable that the employment figures in Table 5 reflect this. Employment in 1988 is but half of that in 1980 although the sharp annual declines that the industry experienced in the early 1980s have given way to more moderate rates of attrition in the last few years.

Geographic features

Within the EC, the largest manufacturers of watches and clocks are the Federal Republic of Germany,

Table 3
Clocks and watches
EC imports (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Origin								
Extra-EC	1 081.2	1 164.1	1 097.6	1 171.5	1 433.3	1 502.5	1 677.9	1 717.8
USA	15.4	21.0	21.9	18.8	19.2	19.7	17.8	20.8
Japan	222.2	261.5	244.7	298.3	360.6	370.5	364.8	283.7
Switzerland	420.6	482.0	488.7	498.5	631.8	701.7	782.3	831.5
Hong Kong	311.5	291.9	243.9	246.5	287.1	280.4	363.9	380.0
Intra-EC	344.5	354.3	367.5	388.8	442.7	465.1	511.9	525.1
Belgium/Luxembourg	11.7	16.9	16.2	21.0	30.3	26.7	35.0	32.7
Denmark	1.6	2.4	2.1	1.9	1.3	1.3	1.6	2.3
FR of Germany	170.2	178.8	192.8	203.5	224.0	248.1	272.6	277.6
Greece	0.0	0.0	.1	0.0	.1	0.0	0.0	0.0
Spain	2.3	2.2	2.2	3.2	3.8	3.9	4.3	4.9
France	77.4	74.5	65.1	64.5	74.5	84.9	94.8	105.1
Ireland	5.5	6.4	5.8	4.9	5.8	8.4	4.6	2.3
Italy	30.7	25.3	25.5	26.4	30.4	31.8	39.0	42.4
Portugal	1.2	1.4	1.6	1.4	1.5	2.0	2.5	2.1
United Kingdom	26.6	23.9	30.1	23.7	29.2	28.6	30.0	29.7

(1) 1980 EC 9; 1981-3 EC 10; 1984-7 EC 12.

Source: Eurostat (Comext).

Table 4
Clocks and watches
EC exports (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Destination								
Extra-EC	481.5	559.4	531.8	526.8	669.7	753.7	749.2	733.1
USA	71.3	101.4	86.0	79.4	124.1	165.7	142.9	117.5
Japan	5.8	10.0	8.8	11.9	19.4	18.7	14.9	19.5
Switzerland	128.9	147.5	153.6	174.9	203.0	229.8	226.0	210.4
Hong Kong	32.3	41.8	28.0	31.9	37.4	49.4	61.6	83.8
Intra-EC	398.9	400.8	423.0	434.4	462.0	480.1	524.8	540.9
Belgium/Luxembourg	35.2	33.9	33.9	45.0	44.6	42.9	46.1	46.1
Denmark	12.3	10.4	9.3	10.3	11.3	12.6	12.5	11.6
FR of Germany	65.8	56.1	56.6	65.3	63.7	68.8	74.8	78.9
Greece	4.8	6.3	6.7	6.9	7.2	8.3	7.0	6.0
Spain	25.0	22.4	25.2	23.5	23.1	24.1	30.6	35.4
France	71.3	83.9	104.5	89.3	96.9	91.4	109.7	120.2
Ireland	7.9	8.5	6.9	7.3	7.9	10.5	8.7	7.5
Italy	54.4	48.5	51.5	53.3	61.7	70.2	75.1	82.1
Portugal	6.7	7.3	7.0	5.6	5.6	6.4	8.9	11.9
United Kingdom	62.4	75.0	77.8	86.6	95.4	98.0	100.8	94.7

(1) 1980 EC 9; 1981-3 EC 10; 1984-7 EC 12.

Source: Eurostat (Comext).

Table 5
Clocks and watches
Employment

	1980	1981	1982	1983	1984	1985	1986	1987 (1)	1988 (1)
EC (2)	55 627	50 330	45 234	33 546	25 170	24 288	24 155	23 643	23 105
FR of Germany	24 851	22 586	20 337	18 618	9 854	10 303	10 062	9 961	9 664
Greece (3)	44	43	48	52	52	54	54	53	53
Spain (3)	815	681	590	585	469	280	279	272	272
France	13 087	11 616	10 448	9 999	10 046	9 058	9 353	9 077	8 993
Italy	7 798	7 179	5 521	1 588	2 274	2 129	2 024	1 946	1 887
United Kingdom	9 032	8 225	8 290	2 704	2 475	2 464	2 383	2 334	2 236
USA (4)	23 000	20 500	16 800	14 600	13 400	11 800	11 800	11 800	10 817

(1) Estimated.

(2) Excluding Belgium, Denmark, Ireland, Luxembourg, the Netherlands and Portugal.

(3) Greece estimated in 1980 and from 1983 to 1988; Spain estimated from 1986 to 1988.

(4) Census of Manufactures and Eurostat estimates.

Source: Eurostat (Inde).

followed by France which account for 45% and 37% of the industry respectively. Over the past eight years, however, Germany's market share has declined in terms of the value of its production while France is the only country for which output has expanded (see Table 4). The difference in the trends between these two countries is also reflected in the employment figures in Table 5. In Germany, only 40% of the number of people employed in 1980 in the manufacture of watches and clocks remained in

1988 compared to France, which employed 70% of the level achieved in 1980.

DRI Europe

This sector is represented at the European level by:
CIBJO: International Confederation of Jewellery, Silverware, Diamonds, Pearls and Stones
Address: Dunstan's House, Carey Lane, London EC2V 8AB, United Kingdom
Tel: (44 1) 726 43 74; Telefax (44 1) 726 48 37

THE FOOD, DRINK AND TOBACCO INDUSTRY

(NACE 411-429)

Economic importance of the industry in the EC economy

The food and drink industry is one of the leading industries in the Community, employing some 2.2 million people and with a production of ECU 331.3 billion in 1988. The tobacco industry employs 106 000 persons and its production amounts to ECU 36.6 billion in 1988.

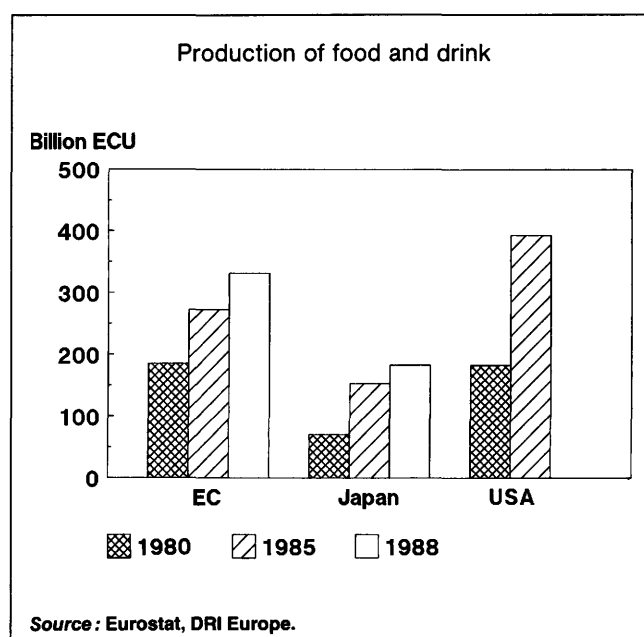
Production has followed a positive trend during the 1980s. Between 1985 and 1988, it grew by 21%. Although the EC was the world's largest producer in 1980, the situation has changed, and in 1985 the USA was the leader with ECU 392.8 billion. Japan has also experienced strong growth throughout the 1980s but is still far behind the EC with a production of ECU 182.3 billion in 1988.

The major EC producers of food and drink are also the largest consumer markets: France with 20.4% of total production, the Federal Republic of Germany 19.6%, the United Kingdom 18.9%, Italy 13.8% and Spain 9.7% (the respective shares of those countries in EC GDP being 19.9% for France, 25.4% for the Federal Republic of Germany, 17.1% for the United Kingdom, 17.4% for Italy and 7.2% for Spain).

Employment in the food and drink sector accounted for 2.1% of total EC employment in 1988. The four largest contributors to employment are the United

Kingdom which accounts for 22.3% of the total of the industry, the Federal Republic of Germany 19.2%, France 15.9% and Spain 14.4%. The share of the food and drink sector in total employment is higher in smaller countries like Ireland, the Netherlands, Denmark and Spain.

Figure 1



The external balance of trade of the food and drink sector has been positive throughout the 1980s. Its

Table 1
Main indicators, 1980-88 (1)
Food and drink

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	184 696	199 997	222 416	242 107	262 629	270 122	298 344	308 004	328 225
Net exports (2)	554	3 694	1 709	409	2 007	2 340	2 455	3 289	3 007
Production	185 250	203 691	224 125	242 516	264 636	272 462	300 799	311 293	331 232
Employment (1 000)	2 044	2 023	1 966	1 946	1 936	1 898	2 260	2 232	2 208

(1) 1980 EC 9; 1981-85 EC 10.

(2) 1988 excluding Greece.

Source: Eurostat (Inde, Bise, Comext).

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC (1)	185 250	203 691	224 125	242 516	264 636	272 462	300 799	311 293	331 232	352 838
Index (2)	69.0	75.1	82.4	88.4	96.6	100.0	98.5	101.9	108.4	115.5
USA (3)	182 651	242 040	284 553	320 452	377 203	392 795	N/A	N/A	N/A	N/A
Index	46.5	61.6	72.4	81.9	96.0	100.0	N/A	N/A	N/A	N/A
Japan (3)	70 455	98 346	103 424	124 277	145 506	152 925	168 159	166 351	182 583	N/A
Index	46.1	64.3	67.6	81.3	95.1	100.0	110.0	108.8	119.4	N/A
Production in constant prices										
EC (1)	244 608	244 518	249 351	260 409	269 636	272 462	304 928	322 946	365 344	341 232
Index (2)	91.6	90.4	91.9	96.1	98.7	100.0	99.8	105.7	119.6	111.7
EC trade in current prices										
Imports extra-EC (1)	13 393	15 003	16 383	17 681	20 065	19 775	17 148	16 549	N/A	N/A
Index (2)	68.3	75.9	82.8	89.4	101.5	100.0	82.2	79.3	N/A	N/A
Exports extra-EC (1)	13 899	18 431	18 089	18 151	21 233	22 315	19 699	19 654	N/A	N/A
Index (2)	63.6	82.6	81.1	81.3	95.2	100.0	83.3	83.1	N/A	N/A
X/M (1)	1.04	1.23	1.10	1.03	1.06	1.13	1.15	1.19	N/A	N/A
Imports intra-EC (1)	21 849	25 683	29 166	31 257	34 908	38 461	40 187	41 501	N/A	N/A
Index (2)	56.8	66.8	75.8	81.3	90.8	100.0	104.5	107.9	N/A	N/A

(1) 1980 EC 9; 1981-85 EC 10.

(2) Taking into account changes in EC membership.

(3) Census of Manufactures and Eurostat estimates.

Source: Eurostat (Inde, Bise).

level fluctuated in the early 1980s but has been steadily increasing since 1984. It stabilized at ECU 3.1 billion in 1988. Since 1985, EC exports and imports have shown a parallel decreasing trend, a little more pronounced for imports, which amounted in 1988 to ECU 16.5 billion, while exports reached ECU 19.6 billion.

Exports originated for the most part from the Netherlands, France and the Federal Republic of

Germany. The main importers were the Federal Republic of Germany, the United Kingdom and France.

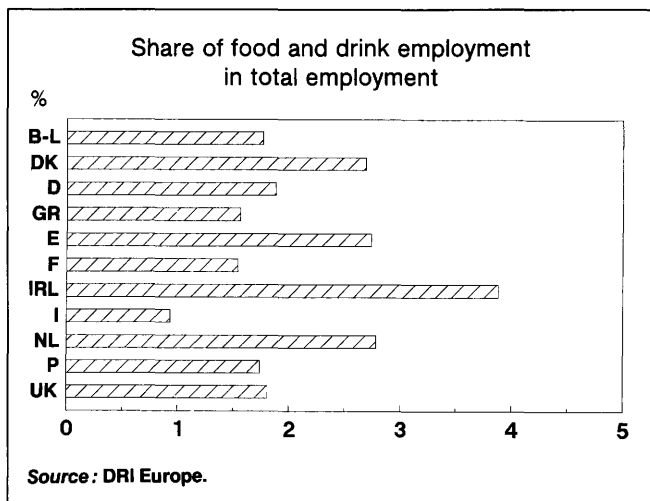
One characteristic of foodstuff is that only a few products are marketed at long or even middle distances. There are many obstacles to marketing far from the place of manufacture: transport and storage costs, the relative fragility of the products, particularly in terms of freshness, adaptation to the

Table 3
Production

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
EC	210 711	229 328	251 772	270 222	295 282	305 533	300 799	311 293	331 232	352 838
Belgium, Luxembourg	7 853	8 575	9 367	9 999	10 823	11 766	11 782	11 715	12 872	13 818
Denmark	6 709	7 614	8 505	9 532	10 551	10 902	11 194	10 976	11 483	12 108
FR of Germany	45 895	48 224	53 386	56 462	59 676	60 646	62 822	62 820	65 099	65 340
Greece	2 208	2 854	2 966	2 981	3 375	3 720	3 202	2 892	3 282	3 505
Spain	21 081	23 025	24 595	24 441	27 039	29 234	29 215	29 674	32 291	34 433
France	41 693	46 860	50 441	53 692	55 996	59 495	60 537	63 107	67 720	72 946
Ireland	4 522	4 905	5 587	6 155	6 635	7 274	7 289	7 807	8 548	9 078
Italy	20 371	22 532	24 428	31 737	38 611	37 469	38 397	41 029	45 636	47 724
Netherlands	17 352	18 813	20 123	21 543	23 041	23 622	21 434	21 035	17 366	18 535
Portugal	2 172	2 612	3 052	3 265	3 607	3 837	3 809	3 989	4 450	4 746
United Kingdom	40 854	43 314	49 323	50 415	55 927	57 569	51 118	56 249	62 485	70 605

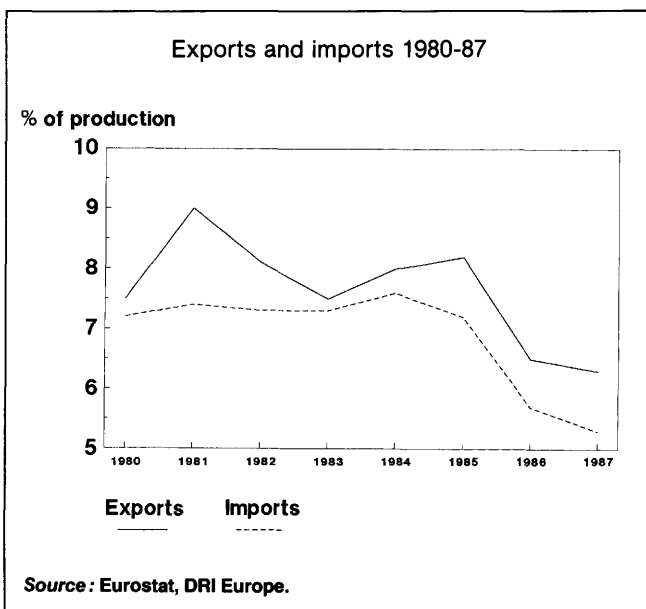
Source: Eurostat (Inde).

Figure 2



tastes of the target population, national regulations, tariff and non-tariff barriers. This explains why the food and drink industry is in general stronger in densely populated industrialized regions with extensive transport facilities than in regions with high agricultural production levels. This is also why it is important to build new production units, or have a stake in third markets through direct investment or shareholdings in existing companies.

Figure 3



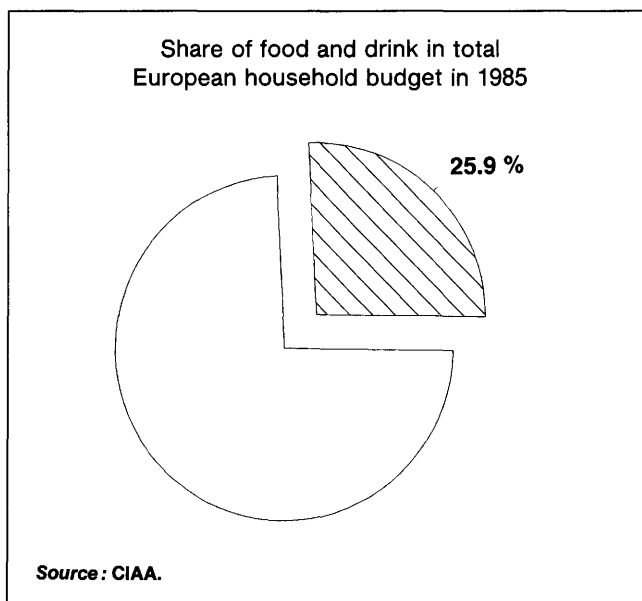
Among the 70 largest European companies, there are 13 firms from the food and drink industry. These represent 17% of the total turnover. Their average annual turnover growth is, however, rather low (6.8%). The slow demographic growth especially in Europe is one reason for this. Investment represents 19.8% of the added value of those 13 firms in 1988. This is a 3.4 point increase compared to 1983. Net

margins of these major firms of the food and drink sector have strongly increased since 1984, to stabilize at 7.3% of turnover. This net income in percentage of turnover was 5.8% in 1988. This is the same as for the 19 major US food and drink companies. For the six major Japanese firms of the sector, net income only represented 1.3% of turnover.

Description of the industry

The scope of the food and drink industry includes all activities involved in the processing of agricultural products with the exclusion of farming, but it includes fish and meat processing. It is covered by NACE class 41/42, groups 411 to 428. Tobacco, which is NACE code 429, is often considered separately.

Figure 4



With a population of 320 million consumers, the EC is a vast and varied market for the food and drink industry. Consumer demand for food, drink and tobacco products accounts for approximately 70% of total domestic demand. Food and drinks are the largest single item of household expenditure on goods and services: in 1985, it represented 25.9% of total European household budgets, slightly lower than previous years. However, it varies widely from country to country: it reached 40.3% in Greece, 39.7% in Portugal, and 30.7% in Belgium, while in France, it was only 16.6%.

Within the food and drink industry, the share of different products in total production was the following in 1988: slaughtering 18.3%, dairy products 17.9%, compound feed 7.8%, vegetable and animal fats

Table 4
Employment

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987 ⁽¹⁾	1988 ⁽¹⁾	1989
EC	2 563.6	2 477.2	2 402.9	2 373.9	2 350.8	2 308.5	2 259.8	2 232.0	2 208.3	2 202.6
Belgium, Luxembourg	72.8	70.6	70.4	69.5	69.9	68.4	67.1	66.4	64.5	64.3
Denmark	65.2	64.4	64.2	65.0	66.8	69.8	71.4	71.2	70.3	70.2
FR of Germany	482.5	475.4	456.3	444.7	436.5	432.4	430.6	430.1	430.6	430.6
Greece	49.7	49.7	49.0	47.0	50.2	55.7	55.4	56.4	56.4	56.3
Spain	382.1	365.9	348.8	342.6	332.3	331.1	330.3	322.0	322.0	321.3
France	400.7	392.9	395.8	394.9	377.8	366.6	354.6	355.6	340.9	340.2
Ireland	51.7	50.2	48.0	47.4	46.5	43.8	43.3	42.8	41.9	41.8
Italy	215.8	209.1	204.6	225.5	233.5	225.5	211.7	203.5	197.4	197.6
Netherlands	122.5	122.8	116.8	113.5	112.6	113.2	112.9	112.3	133.3	133.0
Portugal	88.2	88.0	87.8	85.8	82.0	79.4	75.1	72.7	74.8	74.7
United Kingdom	632.5	588.3	561.2	538.0	542.6	522.5	507.5	499.1	476.2	472.6

(1) Estimated.

Source: Eurostat (Inde).

Table 5
Extra-EC exports (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
EC	13 898.8	18 430.9	18 088.6	18 152.1	21 232.5	22 314.5	19 698.6	19 653.6
Belgium, Luxembourg	725.1	1 051.4	925.2	865.5	1 165.8	1 104.1	864.6	698.9
Denmark	1 199.0	1 589.4	1 568.7	1 785.4	2 390.1	2 520.8	2 314.3	2 230.9
FR of Germany	2 272.6	2 943.1	2 853.6	2 641.9	2 959.3	3 106.4	2 931.9	2 871.7
Greece	N/A	369.5	347.5	378.8	448.0	416.4	288.8	260.0
Spain	N/A	N/A	N/A	N/A	N/A	N/A	895.8	1 378.2
France	3 731.7	4 708.8	4 152.6	4 169.9	4 830.3	4 901.5	4 067.7	3 854.9
Ireland	469.4	622.6	726.2	827.0	916.4	1 006.9	882.7	971.5
Italy	1 049.0	1 686.9	1 673.8	1 518.9	1 893.7	2 312.7	1 771.8	1 553.0
Netherlands	2 335.9	2 993.5	3 211.3	3 327.1	3 739.3	3 739.4	3 031.3	3 167.9
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	207.4	188.0
United Kingdom	2 116.1	2 465.7	2 629.7	2 637.6	2 889.6	3 106.3	2 442.3	2 478.6

(1) 1980 Greece, Spain and Portugal included as third countries; 1981-85 Spain and Portugal included as third countries.

Source: Eurostat (Bise).

Table 6
Extra-EC imports (1)

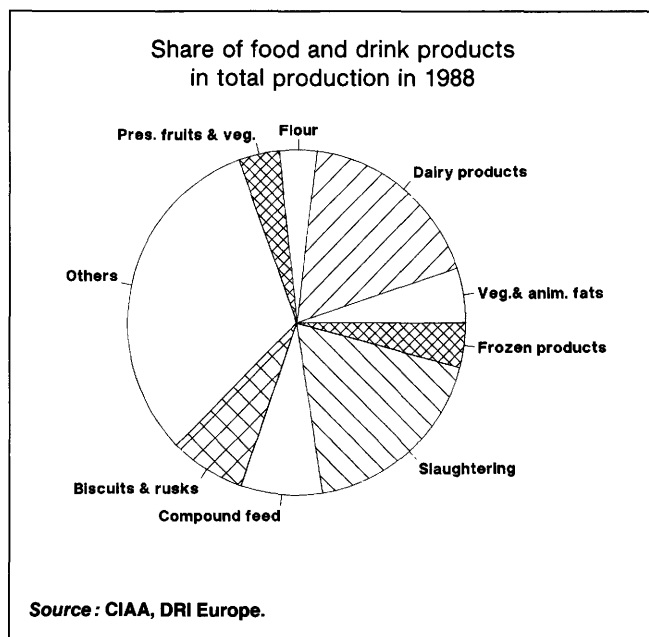
(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
EC	13 392.5	15 003.2	16 383.1	17 681.2	20 064.9	19 775.0	17 147.9	16 549.4
Belgium, Luxembourg	611.8	718.4	854.4	992.3	1 129.6	1 080.6	830.7	760.6
Denmark	493.7	559.5	579.0	709.3	768.1	734.4	760.0	697.7
FR of Germany	3 222.9	3 590.7	3 896.6	4 224.8	4 615.3	4 554.8	3 808.7	3 677.2
Greece	N/A	117.4	160.0	162.3	171.7	179.3	147.8	161.4
Spain	N/A	N/A	N/A	N/A	N/A	N/A	683.5	744.9
France	2 296.7	2 597.4	2 683.3	2 864.7	3 193.7	3 044.2	2 606.8	2 626.3
Ireland	139.7	152.7	131.1	147.7	146.4	160.5	143.5	146.2
Italy	1 403.5	1 441.9	1 769.6	1 847.6	2 166.3	2 570.7	1 914.2	1 939.4
Netherlands	1 673.4	1 909.9	1 987.8	2 385.6	2 750.8	2 618.4	1 966.0	1 889.5
Portugal	N/A	N/A	N/A	N/A	N/A	N/A	214.9	240.5
United Kingdom	3 550.8	3 915.3	4 321.3	4 346.9	5 123.0	4 832.1	4 071.8	3 665.7

(1) 1980 Greece, Spain and Portugal included as third countries; 1981-85 Spain and Portugal included as third countries.

Source: Eurostat (Bise).

5.1%, preserved fruits and vegetables 3.9%, frozen products 4.2%, biscuits and rusks 7.2%, flour 3.6% and others 32% (this includes poultry, olive oil, ice-cream, margarine, bread, alcohol and spirits, brewing and malt, soft drinks, sugar, coffee, tea and vinegar).

Figure 5



Industry structure

The European food and drink industry is made up of a mixture of firms and sectors with very different structural and operational characteristics. This variety is due to the diversity of market demand, market size and the technologies and traditions particular to each country and each sector.

In general, the food and drink industry remains highly fragmented in Italy, Spain and Portugal and is more concentrated in northern Europe. However, this concentration process is already well underway in southern Europe, but it often comes from outside. This low degree of concentration of the Mediterranean food industry entails dangers for these countries as giant groups are built in the UK, France and the Federal Republic of Germany.

According to *European Economy*, March 1988, which gives some results of the studies undertaken on the costs of non-Europe, the 'Cecchini report', the share of large enterprises (employing more than 500 people) in total turnover of the sector is 48.2% in Belgium, 46.7% in the Federal Republic of Germany, 44.4% in France and 43.1% in the Netherlands.

The major European food companies and their market concentration are presented in Table 8. Unilever and Nestlé are respectively number one and two in the world. However, the industry trend towards global consolidation is dominated by American companies which fill the other 8 places in the world top 10.

Both Unilever and Nestlé have more than 200 food processing plants in the EC. Between 1983 and 1988, Unilever sold 90 plants and bought 100.

In fact, this is just one example of the structural change in the European food and drink industry, which is now in full force. Companies are changing hands and new alliances are being forged at a record rate. Two kinds of 'groups' have developed: conglomerates (as for example Hilldown Holdings, Hanson, Beatrice) and more oriented and specialized groups (such as BSN, Ferruzzi, RJR Nabisco, Philip Morris). They are raising phenom-

Table 7
Share of food and drink in total household budgets

(%)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC (1)	25.3	26.7	26.8	26.7	26.4	25.9	N/A	N/A	N/A
Belgium	30.3	29.6	30.1	30.9	31.0	30.7	30.5	N/A	N/A
Denmark	25.0	25.4	25.1	24.7	24.7	23.6	23.0	22.7	N/A
FR of Germany	24.0	23.6	23.1	22.4	22.3	21.9	N/A	N/A	N/A
Greece	40.1	42.1	42.6	42.8	41.3	40.3	39.9	N/A	N/A
France	17.1	17.0	16.9	16.8	17.0	16.6	16.3	16.0	18.7
Italy	26.1	25.5	25.5	24.9	24.1	23.4	23.6	N/A	21.3
Luxembourg	23.0	22.9	24.0	24.5	23.6	23.3	22.5	N/A	N/A
Netherlands (2)	17.8	18.3	18.4	18.1	18.2	18.0	18.0	N/A	N/A
Portugal	N/A	39.3	39.9	39.8	40.2	39.7	38.8	38.6	N/A
United Kingdom	23.9	23.1	22.5	22.3	22.0	21.5	20.9	N/A	N/A

(1) Excluding Spain and Ireland.

(2) Netherlands 1985-86: CIAA estimates.

Source: CIAA.

Table 8
Major European food companies, 1988

Company	Country	Approximate market capitalization (billion ECU)
Unilever	UK/Netherlands	12.75
Nestlé	Switzerland	9.75
BSN	France	3.90
Cadbury Schweppes	UK	3.30
ABF	UK	1.95
RHM	UK	1.95
United Biscuits	UK	1.80
Hillsdown	UK	1.80
Suchard	Switzerland	1.65
Source Perrier	France	1.50
S&W Berislord	UK	1.20
Dalgety	UK	1.05
Unigate	UK	0.90
Northern Foods	UK	0.90
Tate & Lyle	UK	0.90
Booker	UK	0.90
St Louis	France	0.90
Beghin-Say	France	0.90
Bongrain	France	0.75
Hazlewood	UK	0.60
Salvesan	UK	0.60
Wessanen	Netherlands	0.45
Hero	Switzerland	0.45

Source: CIAA.

enal sums to buy subsidiaries, while they auction off some of their unwanted plants. The market must now be considered on a world scale as internationalization has become an essential part of the industry's strategy. This is partly linked to the need to diversify because of the exchange rate and raw material price fluctuations (e.g. sugar, coffee etc.).

Recently, the pace of mergers and acquisitions has accelerated. To give only some of the numerous examples: R.J. Reynolds merged with Nabisco, Guinness acquired Arthur Bell and Distillers, Philip Morris bought General Foods, Cadbury Schweppes acquired Chocolat Poulain and Basset Foods (for ECU 240 million), Seagram bought Martell (for ECU 760 million), United Biscuits acquired Ross Young, Buitoni was sold to Nestlé as well as Rowntree (for ECU 6.4 billion) and Côte d'Or, Kronenbourg merged with Maes, BSN bought HP and Lea and Perrins UK sauce business (ECU 270 million), Pillsbury was bought by Grand Metropolitan (ECU 4.4 billion).

This phenomenon is not particular to EC companies: the Japanese drink group Suntory took over Louis Roger Cognac, Mitsubishi Corporation bought the Dutch Princes canned food and Trex brands fats and oils, Guinness launched a joint venture with South Korea's largest spirits company Jiro.

The move into the European food market by Japanese companies is motivated by the fear of restrictions on 'outsiders' after 1992. Their strategy is therefore to buy a domestic producer in a market where there is no significant current import share.

What is often more important to acquire is control of well-known brand names, which are very valuable items as it takes more and more time and money to build one. This is particularly true for the confectionery industry.

The long list of mergers and acquisitions in the industry results in an extraordinary degree of concentration on a world scale, especially in the drink business since Canadian Seagram bought the French Martell group in March 1988. (Alongside the UK giants Guinness, Allied Lyons and Grand Metropolitan are the French Pernod-Ricard and Moët-Hennessy groups).

Attractive acquisitions have become rare. The need to increase market shares and the associated global competition has pressured companies to move to higher value-added products and to expand into the rapidly growing Far East markets. Large advertising budgets, extensive world-wide distribution networks and clear brand identification seem to be logical but are very expensive to maintain, hence the incentive to increase size. At a time when the European market becomes unified and Far Eastern markets open up, size and brand names are prerequisites for the essential large-scale production.

Two types of strategies are adopted by most European food producers. The first one is the focusing of activities around one main product as many companies in the drink and tobacco industry have done (Coca-Cola, Perrier, Marlboro). The second one is to try to expand the company's share of the market through acquisition, whatever the product (e.g. BSN of France). This strategy is more expensive but explains the high level of mergers which have taken place in the last five years.

Another phenomenon is a movement towards centralization in product line (up and down markets). Diversification remains, however, an important target. Industrial, financial and commercial links between companies enable them to take advantage of economies of scale and of a better knowledge of foreign markets. Slow growth in consumer expenditure on food has led firms wishing to sustain their growth rates to diversify and specialize in products now preferred by the consumer, such as prepared dishes, diet products, frozen food, etc.

It should be mentioned that retail distributors are now occupying a key role in the food and drink sector. Directly in contact with the consumer, they are able to adapt their behaviour quickly to market needs and play an important role in consumer information, advertising and in the marketing of food-stuffs. Important purchasing cooperatives were built over the last few years, e.g. in the Federal Republic of Germany and France. Another phenomenon which worries many food and drink manufacturers is the growing strength of retailers' own brands (e.g. Carrefour in France, FDB in Denmark and Ahold in the Netherlands).

Risks and opportunities

More than 200 non-tariff barriers between Member States were identified in the food and drink sector by the Cecchini report (*European Economy*, March 1988, EC Commission). These are mainly packaging and labelling regulations (e.g. health registration numbers), specific import restrictions (e.g. sanitary laws in the UK or Spain), content or denomination regulations (e.g. for beer), specific ingredient restrictions (e.g. for softdrinks), fiscal discrimination (e.g. beer in the UK and margarine in Italy). The costs to the food and drink industry resulting from non-tariff barriers was estimated in a range of ECU 500 to 1 000 million annually, not taking into account the inevitable restrictions in consumer choice. Savings which would follow the elimination of trade obstacles represent 2 to 3% of the total value-added of the sector.

Direct benefits from the removal of these services should have three different origins:

- use of less expensive ingredients (e.g. in the fabrication of pasta in Italy);
- reduction of packaging and labelling costs;
- elimination of bureaucratic and administrative restrictions of imports (e.g. imports of spirits in Spain).

The measures expected to bring the largest benefits are the removal of regulations concerning oils and fats, chocolate, ice-cream, pasta, saccharine, beer and plastic containers.

Moreover, indirect benefits are expected from the increase of competition, which will reinforce the restructuring of the industry.

More cross-border mergers and takeovers will probably take place within the coming years and the sur-

vivors will have to broaden their horizons beyond their national markets. EC companies operating in the common market do not, in the majority of cases, have an EC-wide strategy. Only about the 10 largest firms do, together with a presence in the five largest EC countries. Most of Europe's largest food companies still have an Anglo-Dutch base (except Nestlé). American firms are strongly placed to exploit the potential of the Community market.

One very important fact to consider is that the future expansion of the food and drink industry will be geographical as well as in product variety. Consumer habits and desires are continuously changing. Cultural values and socio-economic conditions are widely diversified and in evolution. To understand local needs and potential, a collaboration between researcher and marketer is essential. Competitive strategies for new products are best built upon the needs underlying the particular food in each region than upon the product itself.

The general development in consumption is towards more elaborate processed products with a higher technological and service element. The three dominant forces driving demand in the food markets are:

- higher-quality or perceived higher-quality products (natural, light products such as low-fat milk, fresh poultry, high-fibre products, wholewheat bread, products with fewer additives);
- higher-convenience products (ready meals such as breakfast cereals for example, microwavable, chilled meals);
- high-variety products (exotic food, such as fresh juices and fruits).

Future developments in food technology will be clearly monitored both by consumer watchdogs and the retail trade for all artificial E-numbered additives and preservatives.

Consumer choice is expected to increase at the level of individual Member States as consumer habits internationalize.

One important technological issue is the 'modified atmosphere packaging' (products sealed in containers in which the available air space is filled with various gas mixtures). This can prolong certain products' life and diminish wastage rates on meat, vegetables and other chilled products. According to Christopher Parker in the *Financial Times*, February 1988, 'food and packaging companies are busy seeking to enhance the benefits of packing fruits, vegetables and bakery goods in nitrogen or carbon

dioxide through the development of plastic impermeable materials'.

In that respect, the proportion of investment for environmental protection represents more than 3% of the total investment of the food and drink sector.

In 1986, this figure was 2.8% in the Federal Republic of Germany and 1.8% in the Netherlands. In the USA, it reached 2.5% in 1987.

Such investments and their real impact on pollution is of course very specific to products within the food and drink industry. It sometimes helps to reduce costs such as deodorization of vegetable oil or recycling of Kieselgur in brewing. In other cases, it leads to cost increases (e.g. the automation of the washing in sausage production).

In most cases, however, it tends to improve product quality and lead to better hygienic conditions.

Outlook

The future of the food and drink industry is conditioned, not only by future trends in consumer demand and purchasing power, but also by the ability of certain large groups to absorb recent acquisitions and turn them into profitable units, taking account of the sometimes excessive prices that had to be paid for them.

External factors such as income development, inflation, customer habits and, in the long run, demographic changes will also continue to play an important role for the industry.

Production of the four largest EC countries amounted to ECU 240 940 million in 1988, or 72.7% of the total EC production. A compound growth rate

of 2.3% (in volume) is expected for production between 1989 and 1995 for these four countries considered as a whole. For apparent consumption, the equivalent rate is forecast to reach 2%.

However, the expected evolution will vary widely from country to country: the French and the Italian food sectors usually perform better than the German and the British ones. The structural changes and reorganization of the industry that have taken place in recent years and months will reinforce this tendency.

Somewhat higher growth rates are projected in France, which is a major exporter of food products and is the most trade-specialized of the four countries considered here (3.3% for production and 2.2% for apparent consumption are expected as compound rates between 1989 and 1995) and Italy, where exports still account for a low but rising share of domestic production (a 3.1% growth is projected for production and 3.0% for apparent consumption). The share of the food and drink sector will probably increase in the Federal Republic of Germany, as production is expected to grow by 2.3% per year between 1989 and 1995 and apparent consumption by 1.7%. The external position of the food and drink sector of the United Kingdom, which is already negative, is on the other hand expected to deteriorate. Production is only forecast to grow by 0.2% and apparent consumption by 1% between 1989 and 1995.

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and

DRI Europe

VEGETABLE AND ANIMAL OILS AND FATS

(NACE 411)

Description of the sector

The vegetable and animal oils and fats industry comprises three major types of activity, corresponding to three distinct production stages. In the first stage, oilseeds and fruits are processed into either crude oils and fats or protein meal and cakes, and fish into crude fish oil and meal.

In the second stage, processing of crude oils and fats of vegetable and animal (land or marine) origin renders them suitable for eating as well as technical purposes.

In the third stage, margarine, biscuits, confectionery, mayonnaise, bottling, etc., are manufactured from processed edible oils and fats for consumer end-users.

In the Arctic and Antarctic zones, 'oils and fats' effectively means fats. In the tropical regions, it effectively means oils. Using the same equipment, in addition to the aforementioned activities, some plants also process lard and tallow (about 1.5 million tonnes per annum) and, in some cases crude olive oil and residue olive oil as well.

giving rise to the following estimated production breakdown:

- crude vegetable oils and fats: 6.5 million tonnes
- protein meal: 16.5 million tonnes

Depending on the type of raw material used, the added value ranges from ECU 25 to 75 per tonne of seeds or fruits. Half of the seeds are supplied by the EC agriculture, while half are imported from other countries, especially the USA, Brazil and Argentina.

In addition to oilseed crushing, the oils and fats industry also processes some 6.5 million tonnes of crude oils and fats of vegetable and marine origin (excluding olive oil) per annum.

The largest portion of crude oils and fats processed in the EC is supplied by the domestic crushing industry, but palm oil, as well as most of the coco, palm kernel and groundnut oil that is required is imported from third countries (mainly Malaysia, Indonesia, the Philippines, New Guinea, Senegal, Ivory Coast, and other African countries nearby).

Depending on the type of raw material used, the added value ranges from ECU 50 to 200 per tonne of crude oils and fats.

Domestic production accounts for 75%, and 50% of the EC consumption of crude oils and fats, and protein meal. The figure for processed oils and fats is close to 100%.

Production

The oils and fats industry crushes some 25 million tonnes of oilseeds and fruits (excluding olives)

Table 1
Main indicators, 1980-89 (1)
Vegetable and animal oils and fats

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	11 706	13 072	14 224	15 805	19 495	18 415	18 543	18 519	19 957	N/A
Net exports	-2 474	-2 985	-3 440	-3 845	-4 170	-3 467	-2 892	-2 282	-3 034	N/A
Production	9 232	10 087	10 784	11 960	15 325	14 948	15 651	16 237	16 923	17 901
Employment (number)	47 950	47 612	46 407	45 186	43 193	40 968	54 676	53 986	53 940	53 835

(1) 1980 EC 9; 1981-85 EC 10.

Source: Eurostat (Inde, Bise, Comext).

Table 2
Production by type of oilseed in 1987 and 1988

(1 000 tonnes)	Oilseeds		% share		Raw oils and fats		% share		Oilcake		% share	
	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988	1987	1988
Groundnut	28	55	.1	.2	13	26	.2	.4	14	28	.1	.2
Soya bean	13 747	12 423	59.8	54.2	2 434	2 174	39.6	34.4	10 915	9 938	66.9	62.7
Colza/rape	4 661	5 726	20.3	25.0	1 879	2 233	30.6	35.3	2 720	3 206	16.7	20.2
Sunflower	3 415	3 843	14.9	16.7	1 466	1 614	23.9	25.6	1 787	2 113	10.9	13.3
Others (1)	492	458	2.2	2.0	86	82	1.4	1.3	556	366	3.4	2.3
Coconut	95	71	.4	.3	57	45	.9	.7	33	25	.2	.2
Palm nuts and other laurics	96	61	.4	.3	45	28	.7	.4	42	32	.3	.2
Linseed	391	249	1.7	1.1	138	92	2.3	1.5	252	149	1.5	.9
Castor	50	49	.2	.2	23	23	.4	.4				
Total	22 975	22 935	100.0	100.0	6 141	6 317	100.0	100.0	16 319	15 857	100.0	100.0

(1) Excluding olives, maize germs and grape and tomato pips.

Source: Fediol.

The EC oils and fats industry has a relatively small work-force given the nature of the technical operations involved and the need to reduce processing costs. The industry is capital intensive and requires considerable investment.

Depending on the type of oilseeds and fruits that are crushed, the crushing capacities vary between 25 000 tonnes and 1.5 million tonnes per annum.

The range of capacities for the processing of crude oils and fats is far smaller.

Oils and fats are used, in decreasing order:

- for human consumption, roughly 75%
- in compound foodstuffs, especially in calf feed, roughly 12.5%
- for technical purposes, in the manufacturing of paint, varnish, soap, etc., roughly 12.5%.

Protein meal and cakes are used solely for animal consumption, either directly or indirectly in compound foodstuffs.

The EC oils and fats industry is one of the most important outlets for the EC agricultural sector. It virtually monopolizes domestic production of oilseeds (around 11 million tonnes):

	1987/88	1988/89
• rapeseed	5.8 million tonnes	5.3 million tonnes
• sunflower seeds	3.85 million tonnes	4.2 million tonnes
• soyabeans	1.88 million tonnes	1.6 million tonnes

It is the major outlet for crude fish oils from EC fisheries (130 000 tonnes), processes the majority of land animal fat production, i.e. crude lard and tallow, and fulfils the protein-meal requirements of the breeding sector.

Table 3
Oilseed production by country, 1987 (1)

(1 000 tonnes)	Oilseed process	% share	Crude oils and fats	% share	Protein meal	% share
EC	22 975	100.0	6 141	100.0	16 319	100.0
Belgium, Luxembourg	2 112	9.2	539	8.8	1 564	9.6
Denmark	250	1.1	83	1.3	162	1.0
FR of Germany	6 071	26.4	1 728	28.1	4 257	26.1
Greece	619	2.7	108	1.8	471	2.9
Spain	3 446	15.0	805	13.1	1 294	7.9
France	2 118	9.2	763	12.4	2 463	15.1
Italy	2 262	9.8	488	7.9	1 793	11.0
Netherlands	3 572	15.6	820	13.4	2 633	16.1
Portugal	1 022	4.5	256	4.2	759	4.6
United Kingdom	1 503	6.5	551	9.0	923	5.7

(1) The respective oils and meals' contents vary according to seed varieties: for soya, for example, these contents are respectively 17.5 % and 80 %; for copra they are 64 % and 33 %.

Source: Fediol.

In view of the variety of raw materials processed and the geographic location of the industrial facilities, the industry is able to maintain regular supplies in the required quantities and qualities, as well as cope with sharp rises or falls in demand for oil and protein meal.

In order to meet a fluctuating demand, the oils and fats industry has large capacities, which can exceed the yearly average demand for oil or meal.

Production of oil and meal is complementary: one cannot be produced without the other. Meeting demands for oils and fats can result in a protein meal surplus; conversely, meeting demand for protein meal can give rise to an oil surplus.

In recent years, a greater increase in demand for protein meal rather than for oil and fat consumption has resulted in exports of soyabean oil and rapeseed oil despite increasing obstacles encountered on the international market, stemming either from the importing countries or the unfair competition of other exporting countries.

Trade

The industry is highly competitive and efficient. It is also advantageously placed regarding both its supply of raw materials (it is not totally dependent on any single source) and consumer markets, whether with respect to oils or meals. It is characterized by efficient technology and considerable know-how, as well as dynamic trade and quality policies, which are focused on domestic and external markets. But, despite its efficiency, the EC oils and fats industry is experiencing increasing hardship.

The difficulties encountered are not due to a weak competitive position relative to foreign competitors or the decreasing demand for oils and/or meals but rather to measures taken by public authorities, sometimes within the EC, more often in foreign countries, in which case they are the most harmful.

Customs duties for oils and fats range from 0 to 15%, according:

- to the geographical origin of the product
- to whether they are intended for human consumption or technical purposes
- to the degree to which they are processed.

Protein-meal imports are duty-free.

Oils and meals can be imported freely: there are no quotas or other measures to which they are subject, whether indirectly or directly.

As a result, on the domestic market, the prices of products derived from oilseeds (i.e. oils and meals) are those of the world market.

Since the domestic oilseed production only represents between 40% and 50% of the volume of seeds processed within the EC, the crushing industry must turn to external sources for its supplies, i.e. either to industrialized nations for soyabeans, sunflower seeds, linseeds and occasionally rapeseed, or to developing countries for groundnuts, copra, palm kernel, castor beans, etc.

Over and above domestic production, substantial quantities of oils and fats are imported, partly in competition with the home production (groundnut oil, coconut oil, palm kernel oil, linseed oil, fish oil, etc.) partly because these oils cannot be produced in the EC like palm oil.

Industrialized countries such as the USA, Canada, Sweden and Poland export raw material (oilseeds) as well as manufactured products (oil and meal).

A growing tendency in developing countries, which were originally raw material exporters, to produce oil themselves for local consumption and exports alike, has caused a falling of the prices of oils and meals.

Table 4
Overall results of the European oils industry, 1987 (1)

(1 000 tonnes)	Industr. prod.	Imports extra-EC	Exports extra-EC	Apparent consump.
Vegetable products				
Fluid oils	5 995	438	2 045	4 388
Lauric oils (2)	94	802	19	877
Linseed oil	138	8	40	106
Castor oil	23	72	4	91
Palm oil	N/A	915	14	901
Total	6 250	2 235	2 122	6 363
Protein meal	16 319	17 963	2 410	31 872
Marine products				
Fish oil	132	359	28	663
Fish meal	450	923	284	1 089

(1) Except olive oil.

(2) Coconut and palm kernel.

Source: Fediol.

This is illustrated as follows by the course of the market share of imports from developing countries.

- seed: fell from some 33% in 1956 to 3.3% in 1987
- for oils and fats (including olive oil): reached some 96% in 1987.

This type of policy is mainly carried out by Argentina and Brazil in the soya, sunflower, groundnut and flax sectors, and by the Philippines and Malaysia in the copra and palm kernel sectors.

As a result, EC industries which used to specialize in groundnut, copra, palm kernel and castor processing have had either to cut back their activities considerably in these sectors or stop them altogether. Only the crushing of oilseeds (soyabeans, rape and sunflower seeds) from industrialized countries has been in step with internal demand.

The policy of developing countries of pushing exports of processed product not only affects oilseeds in relation to oil and meal, but also crude oil in relation to processed oils. This is the case in Malaysia, which not only stopped the export of oilseed like palm kernel, but also that of crude palm oil to the benefit of processed palm oil.

These practices are not without a negative impact on the refining, hydrogenation and fractionation of palm oil in the EC.

In the light of these difficulties, those involved in the EC industry are aware of the need for continuing dialogue between all parties and for an increased mutual respect of present and future agreements and commitments under the relevant international rules.

For several years, highly subsidized dairy products such as butter and skimmed-milk powder have created a serious imbalance, mainly in the vegetable oil market, but also occasionally in the protein meal market. There are still subsidies for butter and skimmed-milk powder, but the amounts and numbers of these have been reduced in connection with the reforms in the dairy sector.

Another factor is the system of taxes levied in Belgium, France and Luxembourg, where the VAT rate on margarine is about three times the rate adopted for competing products like butter.

Outlook

The future of the EC industry is directly affected by policies practised in the various geographic oilseed production and processing areas. Major geographical areas such as the following set their own policies:

- the EC
- countries with a centralized economy like the USSR, Poland, etc.
- other industrial nations like the USA, Canada, Sweden, etc. with occasional impacts on foreign trade
- more or less developed countries such as Argentina, Brazil, Malaysia, Indonesia and the Philippines, which have well-defined production targets and changing export policies.

The consumption of oils and meals in the EC shows great stability if not a decreasing trend in the case of meals. The demand for edible oils and fats seem to have reached a stable level, at least per capita. The drop in household consumption has been compensated by an increase in intermediate consumption of edible oils and fats. As a result, consumption is evolving only in accordance with population growth, which is relatively stable. Demands arising from technical applications could increase if technology and research progress.

For foodstuffs (oils and meals) no increase is foreseeable. Animal feed consumption depends, on the one hand, on the demand for meat, dairy and poultry products. On the other hand, oilseed products have to compete with other foodstuffs like corn-gluten feed, peas and beans, green fodder, etc.

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OLIVE OIL

(NACE 411.2)

Summary

Olive-oil production is a complex activity. Two qualities of olive oil are produced — virgin and refined — depending on the quality of the olive. Olive pomace oil is manufactured from olive pomace obtained from crushed olives.

Current situation

Olive-oil is produced in two ways, according to the quality of the raw material.

The first production technique consists of simply crushing the fruit, which is known as olive pressing, then filtering the product obtained. High-quality olives are necessary for this technique and the olive oil obtained, virgin olive oil, is accordingly of very high quality; with low acidity and a pleasant flavour, it is biologically the best vegetable oil. Subsequent reprocessing of the final by-product after the crushing operation produces olive pomace oil, and this by-product still contains a little oil. This oil is extracted by means of the solvent hexane. Refining the resulting raw oil yields neutral pomace oil, which, blended with virgin oil, yields olive pomace oil.

Since it is difficult to obtain high-quality raw material, a second production technique is used (see below). This difficulty arises mainly from the fact that olive plantations are scattered. There are alternatives:

- delay delivery of olives to the few large factories (in this case, the quality of the oil decreases in relation to storage time)
- increase the number of small installations close to olive plantations (in this case, competitiveness drops sharply and oil production costs soar).

One possible solution is the construction of warehouses specially adapted to olives. Current techniques are not entirely satisfactory in that they do not eliminate parasite attacks.

The second production technique is industrial. It consists of crushing, refining and if necessary, blending oils of different origins. Refining is the traditional processing technique for liquid oils and involves neutralization, decolorization, deodorization and demargarination. This process yields neutral oil as well as fatty acids. Neutral oil has the same biological qualities as virgin oil except for the flavour and is thus blended with a greater or lesser percentage of virgin oil before being put on the market.

These two production techniques explain the differences in price between virgin and non-virgin oils.

Regulatory environment

Community regulations are designed to:

- give producers a guaranteed income (production subsidies)

Table 1
Main Indicators
Olive oil

(1 000 tonnes)	EC		Third countries		World	
	1986/87	1987/88	1986/87	1987/88	1986/87	1987/88
Production (1)						
Olive oil	1 190	1 531	424	270	1 614	1 698
Edible olive marc oil	96	129	5	6	101	120
Total	1 286	1 660	429	276	1 715	1 818
Consumption (1)						
Olive oil	1 326	1 335	435	438	1 761	1 773
Edible olive marc oil	100	101	51	23	151	124
Total	1 426	1 436	486	461	1 912	1 897

(1) 1987/88 provisional figures.

Source: Fedolive.

- underpin the Community market (intervention price)

Table 2
Olive oils and edible olive marc oil, 1986-87

(1 000 tonnes)	Virgin and refined	Edible olive marc oil	Total
Stocks 1.11.86	577	89	666
Production	1 190	96	1 286
Imports extra-EC	20	0	20
Total supply	1 787	185	1 972
Consumption	1 326	100	1 426
Exports extra-EC	92	54	146
Stocks 31.10.87	369	31	400

Source: Fedolive.

- facilitate the marketing of the product within the EC (consumption grants)
- assist exports (export compensation).

Industry structure

The Community has under cultivation 5.3 million ha of olives, corresponding to 544 million olive trees (4% of the area of the Community). Over 2 million farmers, broken down as follows by country, rely on olive cultivation for at least part of their income: about 900 000 in Italy, 550 000 in Spain, 350 000 in Greece, 200 000 in Portugal and 45 000 in France.

Production structures differ widely between countries. In Italy and Greece, olives are usually cultivated in regions where no other crops are possible and where the disappearance of olive cultivation would mean not only social but also ecological deterioration. The situation in Spain is quite different. Olives are cultivated over vast areas: they are harvested in bulk, and crushed in large-scale oil mills, which usually belong to cooperatives. The oil obtained is generally refined there. The Spanish olive oil industry, over 70% of which is situated in the south of the country, has recently undergone far-reaching restructuring; considerable efforts have been made to improve profitability. Portugal and France are relatively problem-free compared to other producer countries.

Consumption

Spanish consumers are accustomed to blends of refined and virgin oil. The Greeks and the French consume mainly virgin olive oil. Italian consumers are equally divided between virgin oils and oil blended either with refined olive oil or olive pomace oil.

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Table 3
Production of olive oil

(1 000 tonnes)	1986/87			1987/88 (1)		
	Olive oil	Edible olive marc oil	Total	Olive oil	Edible olive marc oil	Total
EC	1 180.0	95.5	1 275.5	1 531.5	128.5	1 660.0
Greece	300.0	24.0	324.0	250.0	30.0	280.0
Spain	493.5	39.5	533.0	691.5	55.5	747.0
France	1.0		1.0	2.5		2.5
Italy	354.5	28.5	383.0	550.0	40.0	590.0
Portugal	31.0	3.5	34.5	37.5	3.0	40.5

(1) Provisional figures.

Source: Fedolive.

MARGARINE

(NACE 411.5)

Summary

The margarine industry forms an important part of the EC oils and fats industry. It is composed of some 109 companies employing approximately 25 000 people and produces almost 25% of the world margarine output. A substantial part of the oil used for manufacturing margarine is obtained from Community-grown oilseeds. The largest producers are the Federal Republic of Germany, the United Kingdom and the Netherlands. The highest consumption per capita is in Denmark, the Netherlands and Belgium. Besides margarines, the industry is also engaged in the production of minarines. During the last few years the industry has gone through an important period of restructuring during which the numbers of both companies and employees have been reduced.

Description of the sector

The principal product of the industry is margarine for consumers and professional use. Even though the definition of margarine varies from country to country, margarine can, in general, be defined as an emulsion of oil in water consisting of at least 80% fat of which not more than 3% is butter fat. However, these percentages may vary: in the United Kingdom and France, margarine can contain up to 10% butter fat, in Spain up to 50%. The second most important product is minarine, which differs from margarine in its fat content: it contains between 39 and 41% fat. Production of minarine is not allowed in some EC countries, for example Italy. In some EC countries, principally the United Kingdom and Ireland, the industry is also involved in the production of spreads and products which are mixtures of butter fat and non-butter fat in varying percentages.

Current situation

In 1988 the industry produced 1.78 million tonnes of margarine, including minarine and spreads. This represents almost 25% of total world margarine production. The highest production was in Germany (472 000 tonnes), followed by the United Kingdom, the Netherlands, Belgium and France. Total EC margarine production increased between 1978 and 1982, but has been slowly decreasing since then. In some Member States such as Belgium, Greece, Spain and Portugal, however, production has followed an upward trend since the beginning of the 1980s.

Consumption

The average consumption of margarine per capita in the EC was some 6.1 kg in 1988. For the EC as a whole, per capita consumption decreased from 6.3 kg in 1982 to 6.1 kg in 1988. Denmark has the highest per capita consumption (15.0 kg in 1988) followed by Belgium (13.8 kg) and the Netherlands (10.2 kg). Consumption of so-called solid fats is traditionally very low in the Mediterranean countries: margarine consumption in Italy was 1.3 kg per capita in 1988 and 1.3 in Spain.

Industry structure

There were 109 companies in the European margarine industry in January 1986: seven in Belgium, 14 in Denmark, 19 in the FR of Germany, 11 in Spain, seven in France, one in Greece, four in Ireland, 19 in Italy, 15 in the Netherlands, four in Portugal and eight in the United Kingdom.

Table 1
Main indicators, 1980-88
Margarine

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production	1 740	1 774	1 798	1 774	1 773	1 774	1 766	1 764	1 785
Index	100	102	103	102	102	102	102	101	-
Consumption per capita (kg)	6.0	6.1	6.3	6.2	6.3	6.3	6.1	6.1	6.1

Source: Imace.

Table 2
Margarine and minarine production

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC	1 740	1 774	1 798	1 774	1 773	1 774	1 766	1 764	1 785
Belgium, Luxembourg	158	150	161	159	169	172	171	184	183
Denmark	98	103	110	103	110	107	99	99	103
FR of Germany	511	518	516	500	483	466	470	470	472
Greece (1)	13	13	13	24	24	24	27	27	27
Spain	46	47	47	54	57	59	64	67	88
France	165	165	166	162	154	154	153	153	161
Ireland	16	18	18	16	16	17	17	18	19
Italy	69	72	72	68	64	65	65	68	72
Netherlands	243	247	254	254	265	282	264	232	226
Portugal	38	43	42	47	50	51	52	55	59
United Kingdom	383	398	399	387	381	377	384	391	375

(1) Estimated.

Source: Imace.

Table 3
Per capita consumption of margarine

(kilograms)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC	6.0	6.1	6.3	6.2	6.3	6.3	6.1	6.1	6.1
Belgium, Luxembourg	11.8	11.8	12.6	12.9	13.6	13.8	13.7	13.8	13.8
Denmark	16.8	17.2	18.3	16.9	16.8	16.3	15.0	15.0	15.0
FR of Germany	8.4	8.4	8.4	8.3	7.9	7.6	7.7	7.7	7.7
Greece (1)	2.3	2.3	2.4	2.5	2.6	2.6	2.8	2.9	3.0
Spain	1.0	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3
France	3.7	3.7	3.8	3.8	3.8	3.7	3.7	3.7	3.8
Ireland	3.7	3.7	3.7	3.7	3.7	3.7	3.9	4.1	4.1
Italy	1.2	1.3	1.3	1.3	1.2	1.2	1.2	1.2	1.3
Netherlands	12.6	12.3	12.0	12.0	11.8	12.5	11.7	10.3	10.2
Portugal	4.6	4.9	5.2	5.4	5.7	5.8	5.9	6.2	6.5
United Kingdom	7.0	7.4	7.5	7.4	7.4	7.3	7.4	7.5	7.3

(1) Estimated.

Source: Imace.

Trade

At present, trade in margarine within the Community covers less than 1.5% of total production. Trade between Member States is mainly going from Belgium (66 000 tonnes in 1987) and the Netherlands (85 100 tonnes) to the United Kingdom and France. Exports are very low. Trade in margarines and minarines between Member States has been gradually increasing in recent years; from well below 10% at the end of the 1970s, it has now risen to almost 15% of total production.

Regulatory environment

Despite several attempts during the last 15 years, national legislation concerning margarine has still

not been harmonized at EC level. In terms of advertising and taxation, margarine is still discriminated against in a number of EC countries compared with competing products. There are different VAT rates for margarine and butter in some EC countries. For example, margarine rates are much higher in Belgium (19% as compared to 6% for butter) and in France (18.6% as compared to 5.5% for butter) and Luxembourg. In some countries (Belgium and France) margarines must be clearly separated in display and in others (Italy, Greece) there are limitations affecting distribution channels.

Imace: Association des Industries Margarinières des Pays de la CEE, Association of the Margarine Industry of EC countries

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SLAUGHTERING, PREPARING AND PRESERVING OF MEAT

(NACE 412)

Summary

World meat production in 1988 was comparable to that in previous years. There was a slow rise in production in the Community and the United States, which are the most important producers. This trend was related to the fall in demand on the world market. Production grew slowly in China but grew much more rapidly in the USSR and the Eastern European countries (for example, pigmeat production; EC total was 12 083 million tonnes in 1987, 12 130 million tonnes in 1988 and will probably reach 12 113 million tonnes in 1989).

Description of the sector

The highly developed slaughter and meat processing industry comprises five subsectors:

- slaughterhouses (NACE 412.1)
- processing and preserving of meat (NACE 412.2)
- killing, preparing and preserving of poultry (NACE 412.3)
- processing of slaughter by-products (NACE 412.4)
- production of animal guts and meat offals (NACE 412.5).

Slaughterhouses will be analysed separately in the next chapter.

Pigmeat

Demand for pigmeat is still the strongest even though supply remained constant compared with previous years. There is a trend towards an increase in demand for lean pigmeat, which affects the slaughter weight. Despite this general trend, the fall in prices for foodstuffs has led to a rise in slaughter weight in North America.

Pigmeat production fell in Community countries in 1988, a rise in production occurring in Denmark only. The consumption of pigmeat amounts to one-third of the total meat consumption in the world.

Beef and veal

There has been a deterioration in the competitive position of trade on export markets. Nevertheless, the Community remains the major supplier for the Near East and North Africa. Community imports are stable from South America, which continues to be a major producer. The decline in beef and veal production that occurred in the main producer countries of the world in 1988 will persist according to the first 1989 estimates, reaching just 3%. The countries or areas most likely to experience market reductions are: USA (6.5%), Argentina (4%), Eastern Europe (4.3%) and the EC (2.4%).

Lamb

Lamb production continued its upswing in 1988, and in 1989 the growth rate should be about 3%. In Aus-

Table 1
Main indicators, 1980-89 (1)
Slaughtering, preparing and preserving of meat

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	32 236	34 621	43 931	41 713	48 320	50 360	55 488	57 354	60 845	N/A
Net exports (2)	-963	-373	-1 327	-872	-270	-732	-355	-382	-176	N/A
Production	31 273	34 248	42 604	40 841	48 050	49 628	55 133	56 972	60 669	64 706
Employment (number)	327 404	320 000	321 337	323 310	342 984	339 378	399 108	392 685	386 699	385 594

(1) 1980 EC 9; 1981-85 EC 10; 1986-88 EC 12 (estimated).

(2) 1988 excluding Greece.

Source: Eurostat (Inde, Bise, Comext).



Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC (1)	31 273	34 248	42 604	40 841	48 050	49 628	55 133	56 972	60 669	64 706
Index (2)	64.8	70.5	78.7	82.3	96.7	100.0	101.9	105.3	112.1	119.6
USA (3)										
Index	45 216	59 032	69 003	74 581	86 895	87 981	70 382	60 099	63 939	N/A
Index	51.4	67.1	78.4	84.8	98.8	100.0	80.0	68.3	72.7	N/A
Japan (3)										
Index	5 789	8 595	9 251	11 029	12 977	14 063	N/A	N/A	N/A	N/A
Index	41.2	61.1	65.8	78.4	92.3	100.0	N/A	N/A	N/A	N/A
Production in constant prices										
EC (1)	40 290	40 017	40 869	43 066	49 188	49 628	56 116	59 864	62 928	64 024
Index (2)	84.2	83.2	84.0	87.7	99.2	100.0	103.7	110.7	116.3	118.3
EC trade in current prices										
Imports extra-EC (1)	2 716	3 001	3 514	3 333	3 682	3 922	3 398	3 420	N/A	N/A
Index (2)	70.4	76.5	89.6	85.0	93.9	100.0	80.9	81.4	N/A	N/A
Exports extra-EC (1)	1 816	2 479	2 172	2 499	3 194	3 322	3 051	3 049	N/A	N/A
Index (2)	55.2	74.6	65.4	75.2	96.2	100.0	90.9	90.8	N/A	N/A
X/M (1)	.67	.83	.62	.75	.87	.85	.90	.89	N/A	N/A
Imports intra-EC (1)	7 045	8 008	9 234	9 595	10 008	10 970	11 247	11 348	N/A	N/A
Index (2)	64.2	73.0	84.2	87.5	91.2	100.0	102.5	103.4	N/A	N/A

(1) 1980 EC 9; 1981-85 EC 10.

(2) Taking into account changes in EC membership.

(3) Census of Manufactures and Eurostat estimates.

Source: Eurostat (Inde, Bise).

Table 3
Total meat production (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
EC	35 041	38 136	42 604	44 528	52 307	54 102	55 133	56 972	60 669	64 706
Belgium	905	1 021	1 019	955	1 027	1 126	1 129	1 124	1 233	1 325
Denmark	2 585	2 953	3 343	3 518	3 947	4 086	4 076	3 912	4 093	4 330
FR of Germany	6 024	6 181	6 986	7 200	7 827	7 931	8 298	8 276	8 593	8 641
Greece	108	137	160	164	171	169	162	158	168	180
Spain	3 500	3 705	3 891	3 463	4 002	4 144	4 258	4 241	4 604	4 908
France	8 591	9 805	10 883	11 989	13 472	14 468	15 276	15 925	17 089	18 341
Ireland	1 244	1 212	1 377	1 461	1 723	1 984	1 991	2 132	2 335	2 440
Italy	4 686	5 066	5 683	6 120	6 501	6 231	7 419	7 928	8 818	9 255
Luxembourg	36	40	42	43	44	46	45	42	49	53
Netherlands	2 793	3 234	3 576	3 711	4 104	4 230	3 838	3 766	3 109	3 322
Portugal	161	183	204	225	255	331	363	360	460	491
United Kingdom	4 408	4 600	5 440	5 680	9 235	9 357	8 277	9 108	10 118	11 420

(1) Estimated.

Source: Eurostat (Inde).

Table 4
Employment (1)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
EC	384 349	373 782	373 847	375 179	394 833	390 988	399 108	392 685	386 699	385 594
Belgium	7 768	7 605	7 403	6 985	7 119	6 872	6 730	6 663	6 472	6 458
Denmark	21 016	21 414	21 391	21 571	22 287	25 272	25 941	25 426	24 939	24 887
FR of Germany	58 457	56 771	54 294	52 527	53 008	52 279	53 069	52 910	52 915	52 910
Greece	2 524	2 401	2 373	2 400	2 508	2 783	2 806	2 763	2 763	2 757
Spain	49 663	48 852	47 409	47 004	46 433	46 117	46 835	44 847	44 847	44 753
France	85 538	85 425	89 579	94 206	94 894	93 452	94 576	94 713	90 933	90 749
Ireland	10 634	9 693	9 629	9 298	9 682	9 305	9 179	9 111	8 900	8 881
Italy	33 374	32 087	31 809	34 255	35 492	32 861	35 621	34 242	33 209	33 253
Luxembourg	393	458	445	464	476	479	475	465	463	462
Netherlands	21 035	20 551	19 899	17 480	17 761	17 522	17 443	17 343	21 074	21 030
Portugal	4 758	4 930	5 101	4 865	5 416	5 493	5 190	5 025	5 173	5 162
United Kingdom	89 189	83 595	84 515	84 124	99 757	98 553	101 243	99 177	95 011	94 292

(1) Estimated.

Source: Eurostat (Inde).

Table 5
Human consumption of meat

(kg/capita)	1980	1981	1982	1983	1984	1985	1986	1987
EC (1)	N/A	N/A	N/A	87.1	87.5	88.5	89.4	91.7
Belgium/Luxembourg	97.9	95.1	98.0	97.6	100.9	102.3	102.6	101.3
Denmark (1)	85.9	79.7	77.6	80.4	83.9	90.1	101.3	104.0
FR of Germany	100.5	98.5	97.7	98.0	98.9	100.4	102.0	103.5
Greece	67.0	69.6	72.8	79.1	77.6	78.7	78.4	87.4
Spain	N/A	N/A	N/A	82.3	84.1	83.8	82.3	86.0
France	108.7	106.5	105.3	106.4	106.6	105.5	107.1	108.2
Ireland (1)	97.9	95.6	97.0	98.3	91.5	90.4	92.9	90.6
Italy	78.6	77.4	79.4	80.8	80.9	83.8	83.9	84.9
Netherlands	77.2	77.6	79.2	75.2	77.0	78.8	79.1	85.6
Portugal	N/A	N/A	N/A	57.3	54.6	54.9	58.8	64.3
United Kingdom	75.2	74.1	73.1	73.5	73.5	74.7	75.2	77.9

(1) 1980-83 estimated.

Source: Eurostat (Zpa1).

tralia, sheepmeat production will increase by about 6% and lamb production by about 1.7%. In the People's Republic of China, a growth of 10% in production is expected. The increase in EC production is estimated at 2.5% for 1989.

Consumption and production

Pigmeat

Pigmeat production in the main producer countries rose by 2.8% in 1988, the countries with the highest growth rates being China (2.3%), the USSR (2.9%) and the EC countries (1.8%). For the current year, a decline in production by about 0.1% is expected. Falling production in the EC (5.2%) will be offset by further growth in China (2.9%), the USSR (2.9%) and Canada (2%).

Pigmeat production in the EC rose again in 1988 (2.8%), but a sharp decline (5.2%) is expected for 1989. The countries with the largest declines are: France (9.8%), Spain (9.1%), FR of Germany (6.7%) and the Netherlands (3.4%).

The risk is obvious, however, that because of the good profitability in pig rearing, stocks could once more be topped up, so that in 1990 we could well expect an increasing supply of pigs for slaughtering.

Beef and veal

In the EC 12, production declined by a good 6% in 1988. For the current year a decline of up to 2.4% is estimated. The countries with the most marked decline in production in 1988 are: France (-4.5%), FR of Germany (-4%), United Kingdom (-15%), the Netherlands (-8%) and Ireland (-12%).

Since it is assumed that consumption in the EC will stagnate, the degree of self-sufficiency fell back to 101.4% in 1988, and in 1989 it should sink to just below the 100% mark. The consumption figures, however, provide only very limited information, since they give no indication as to how the raw material meat is actually used, and are only figures compiled from data relating to production, foreign trade and changes in stocks.

Lamb

Production is likely to increase in the following countries: Ireland (10.2%), FR of Germany (3.6%), Spain (3%); a decline is expected only in France. Spain, as the second biggest producer of lamb in the

EC (after the United Kingdom) will probably cross the self-sufficiency threshold in 1989.

Consumption of lamb should also increase further in 1989 (1.2%). Because consumption is growing less rapidly than production, the degree of self-sufficiency in the Community should increase to 83.2%.

Trade

Pigmeat

The EC's external trade in pigmeat continues to be characterized by declining imports and increasing exports. The main buying countries are Japan and the USA. The main suppliers are Hungary, East Germany and Sweden.

Beef and veal

In 1988 EC beef exports reached a volume of about 900 000 tonnes, 200 000 tonnes of which was from intervention stocks for suppliers under major contracts to Eastern bloc countries. Overall, it appears that a significant part of the sales from intervention stocks (with bones) amounting to about 442 000 tonnes were destined for export. For the current year, a decline of about 30% in the volume of exports to 600 000 tonnes, is expected. However, the EC will remain a net exporter.

EC imports in the beef sector in 1988 amounted to about 520 000 tonnes, which cut the EC export surplus back to about 380 000 tonnes compared to about 650 000 tonnes in the peak year of 1986. For 1989 a volume of imports of about 540 000 tonnes is forecast. This would reduce the export surplus to 60 000 to 100 000 tonnes.

Lamb

EC imports in 1988 amounted to 238 000 tonnes, the main suppliers being New Zealand (176 000 tonnes), Australia (15 000 tonnes), Hungary (11 000 tonnes) and Argentina (6 000 tonnes). The largest importers of third-country goods were the United Kingdom (135 000 tonnes), the Federal Republic of Germany (31 000 tonnes) and Italy (29 000 tonnes).

The main supplier to the Federal Republic of Germany was New Zealand (14 700 tonnes) followed by Poland (6 900 tonnes), Hungary (3 140 tonnes), Aus-

Table 6
Production of pork

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC (1)	9 960.0	10 093.6	10 064.4	11 909.8	12 068.6	12 134.8	12 364.5	12 750.8	N/A
Belgium	660.9	671.9	672.1	697.5	719.1	708.9	740.3	782.1	N/A
Denmark	966.4	987.0	985.5	1 043.0	1 034.4	1 083.3	1 144.1	1 148.8	1 167.6
FR of Germany	3 206.1	3 171.2	3 140.2	3 210.9	3 221.9	3 242.5	3 335.5	3 351.2	3 341.9
Greece	144.0	154.1	154.2	149.1	148.6	141.9	152.9	163.8	159.8
Spain	N/A	N/A	N/A	1 342.0	1 429.0	1 388.0	1 392.2	1 460.5	1 714.7
France	1 682.6	1 720.1	1 674.5	1 675.8	1 684.1	1 661.6	1 676.9	1 729.0	1 852.0
Ireland	153.4	149.9	153.3	160.9	143.6	135.6	137.1	140.8	142.4
Italy	1 085.5	1 105.8	1 108.1	1 166.0	1 218.1	1 188.2	1 172.2	1 230.6	N/A
Luxembourg	8.0	8.0	8.2	9.3	8.6	8.6	9.0	8.5	8.7
Netherlands	1 125.6	1 195.1	1 211.2	1 248.3	1 306.3	1 410.8	1 444.4	1 527.6	N/A
Portugal	N/A	N/A	N/A	200.0	208.0	197.0	170.6	189.6	182.6
United Kingdom	927.5	930.5	957.1	1 007.0	946.9	967.8	989.3	1 018.4	1 013.4

(1) 1980-82 EC 10.

Source: Eurostat (Zpa1).

Table 7
Production and external trade (1)
Pork

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Production	9 816	10 094	10 064	11 910	12 069	12 135	12 365	12 751
Index (2)	94.4	95.6	95.3	98.1	99.4	100.0	101.9	105.1
Imports extra-EC	127	109	118	98	148	174	113	113
Index (2)	102.3	82.8	89.7	56.3	85.1	100.0	64.9	64.9
Exports extra-EC	238	303	242	142	412	427	386	419
Index (2)	59.5	75.9	60.4	33.3	96.5	100.0	90.4	98.1
X/M	1.9	2.8	2.1	1.4	2.8	2.5	3.4	3.7

(1) 1980 EC 9; 1981-82 EC 10.

(2) Taking into account changes in EC membership.

Source: Eurostat (Zpa1).

Table 8
Production of beef

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC (1)	7 089.4	6 939.1	6 662.4	7 458.9	8 008.2	7 924.6	8 071.3	8 138.7	N/A
Belgium	302.4	309.5	274.1	282.0	309.6	316.8	316.5	316.7	N/A
Denmark	243.9	237.0	230.3	239.4	246.7	236.5	243.1	234.6	216.7
FR of Germany	1 570.0	1 537.8	1 477.2	1 494.3	1 613.5	1 575.7	1 695.7	1 680.5	1 608.3
Greece	N/A	93.9	89.8	85.9	84.8	82.0	81.7	85.6	81.8
Spain	N/A	N/A	N/A	422.0	398.0	401.0	437.2	444.5	444.9
France	1 837.6	1 836.2	1 745.4	1 811.0	1 991.7	1 893.2	1 910.8	1 960.1	1 825.9
Ireland	453.9	322.1	347.5	353.2	402.5	449.2	510.6	484.6	451.9
Italy	1 146.1	1 111.0	1 101.5	1 147.2	1 181.9	1 200.5	1 175.9	1 174.4	N/A
Luxembourg	8.3	8.2	7.5	8.9	9.6	9.3	9.8	9.3	7.6
Netherlands	418.6	437.4	420.2	450.3	514.8	510.9	539.4	546.5	N/A
Portugal	N/A	N/A	N/A	113.0	103.0	103.0	104.5	106.9	110.4
United Kingdom	1 108.6	1 046.0	965.9	1 051.7	1 152.1	1 146.5	1 046.2	1 095.0	945.5

(1) 1980 EC 9; 1981-82 EC 10.

Source: Eurostat (Zpa1).

Table 9
Production and external trade (1)
Beef

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Production	7 089	6 939	6 662	7 549	8 008	7 925	8 071	8 139
Index (2)	98.9	95.5	91.7	94.1	101.0	100.0	101.8	102.7
Imports extra-EC	408	371	387	454	421	491	434	445
Index (2)	105.1	80.7	84.1	92.5	85.7	100.0	88.4	90.6
Exports extra-EC	621	581	417	658	767	823	1 169	922
Index (2)	76.8	71.8	51.5	80.0	93.2	100.0	142.0	112.0
X/M	1.5	1.6	1.1	1.4	1.8	1.7	2.7	2.1

(1) 1980 EC 9; 1981-82 EC 10.

(2) Taking into account changes in EC membership.

Source: Eurostat (Zpa1).

Table 10
Production of lamb, mutton and goat meat

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC (1)	629.0	725.0	731.0	954.6	985.0	1 003.9	960.8	1 015.3	N/A
Belgium (2)	4.7	5.7	7.5	8.5	5.2	8.2	9.0	10.8	N/A
Denmark	.4	.4	.4	.4	.6	.8	.8	1.0	1.1
FR of Germany	29.6	27.7	27.3	29.4	28.4	27.2	25.5	29.4	29.1
Greece	N/A	120.8	120.0	121.1	130.1	122.4	106.5	124.5	125.1
Spain	N/A	N/A	N/A	202.0	207.0	210.0	210.2	217.9	229.9
France	182.0	182.6	192.8	182.9	178.8	177.6	169.1	169.8	160.5
Ireland	42.0	44.0	40.5	39.8	41.0	48.2	46.2	47.6	49.7
Italy	70.8	68.7	67.7	67.4	70.4	69.7	66.4	71.7	N/A
Netherlands	20.5	16.1	12.7	11.2	9.5	10.7	10.9	12.8	N/A
Portugal	N/A	N/A	N/A	27.0	26.0	25.0	25.0	27.0	N/A
United Kingdom (2)	278.6	259.0	262.1	286.8	288.0	304.1	291.2	302.7	346.9

(1) 1980 EC 9; 1981-82 EC 10.

(2) Estimated.

Source: Eurostat (Zpa1).

Table 11
Production and external trade (1)
Lamb, mutton and goat meat

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Production	629	725	731	955	985	1 004	961	1 015
Index (2)	98.9	95.0	95.8	95.1	98.1	100.0	95.7	101.1
Imports extra-EC	222	204	283	215	209	233	208	225
Index (2)	100.9	88.0	121.9	92.3	89.7	100.0	89.3	96.6
Exports extra-EC	6	6	5	10	6	6	3	13
Index (2)	116.7	116.7	100.0	166.7	100.0	100.0	50.0	216.7
X/M	.03	.03	.02	.05	.03	.03	.01	.06

(1) 1980 EC 9; 1981-82 EC 10.

(2) Taking into account changes in EC membership.

Source: Eurostat (Zpa1).

tralia (1 800 tonnes), Argentina and Uruguay (1 500 tonnes each).

Outlook

While beef and veal production is forecast to fall by 8% between 1986 and 1995, total meat production is expected to increase by 2%, the most marked

increase being in pig meat production (6%). By 1995, beef and veal production is expected to make up only 28% of total meat production, compared with 31% in 1986.

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SLAUGHTERHOUSES

(NACE 412.1)

Summary

In theory, all slaughterhouses should be upgraded by 1992 to meet the EC-approved standards, but it seems likely that this will probably not happen in practice. Indeed, to raise standards to the required level, many smaller and medium-sized slaughterhouses will have to spend considerable amounts of money.

Nevertheless, many slaughterhouses are already equipped to EC standards. The Federal Republic of Germany has 350 slaughterhouses, 299 of which have an EC export licence. In the Netherlands, 69% of all slaughterhouses — 105 out of 153 — have similar status. In Belgium and France, too, more than half of all slaughterhouses are already up to EC standards. France has 358 export slaughterhouses — nearly 30% of the European total of 1 237.

Even so, it still seems likely that excess capacity could be over 50%. The actual excess might even be considerably higher as a result of the investment in new buildings and equipment currently under way.

Although more slaughterhouses are likely to close over the next few years as a result of reduced cattle slaughtering, competition for throughput is likely to increase and force down margins even further.

It will of course be the larger slaughterhouses that will find it easier to cope with the change.

Below, the situation of slaughterhouses in individual EC Member States will be considered.

Unfortunately, the European Slaughterhouses Union could not obtain descriptions of the situation in Greece, Portugal and Spain.

United Kingdom

Number of slaughterhouses

The number of slaughterhouses in the United Kingdom continues to fall. The number fell from 1 000 in 1985/86 to 980 in 1986/87 and to 852 in 1987/88. The contraction in the number of slaughterhouses in 1987/88 was in fact even larger than in previous years: 36% below the number 10 years ago.

In recent years, a marked decline in the number of smaller slaughterhouses, combined with expansion and mergers of medium and large plants (in order to benefit from economies of scale), explain that larger plants with throughputs of over 30 000 cattle units a year today account for an increasing proportion of total throughput. In 1986/87 142 large plants with throughputs of over 30 000 cattle units accounted for 72% of total slaughtering in terms of cattle units. In 1987/88 there were 138 of these large slaughter-

Table 1
Total meat production
Slaughterhouses

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
EC (1)	24 128	24 101	23 959	28 145	28 897	28 918	29 472	30 428
Belgium, Luxembourg	1 225	1 246	1 221	1 257	1 320	1 335	1 366	1 415
Denmark	1 369	1 390	1 388	1 458	1 457	1 500	1 576	1 571
FR of Germany	5 559	5 484	5 387	5 445	5 587	5 568	5 814	5 850
Greece	520	570	548	562	559	560	537	579
Spain	N/A	N/A	N/A	3 088	3 140	3 130	3 108	3 266
France	5 661	5 733	5 677	5 710	5 876	5 734	5 817	6 013
Ireland	793	639	672	690	726	782	852	837
Italy	3 764	3 741	3 771	3 883	3 962	3 938	3 892	3 998
Netherlands	1 994	2 119	2 135	2 168	2 312	2 379	2 505	2 644
Portugal	N/A	N/A	N/A	568	542	525	577	630
United Kingdom	3 243	3 179	3 160	3 316	3 416	3 467	3 427	3 625

(1) 1980-82 EC 10.

Source: Eurostat (Zpa1).

Table 2
Number of slaughterhouses, 1987 (1)

	All slaughterhouses			EC-approved slaughterhouses	
	Number throughput (3)	Total throughput (4)	Average	Number	% of total
EC	6 973	118 790	17 036	1 237	18
Belgium	160	5 352	30 583	93	53
Denmark	273	8 976	32 879	51	19
FR of Germany (2)	350	25 455	72 729	299	85
Greece	430	3 912	9 098	7	2
Spain	476	14 337	30 120	46	10
France (2)	558	17 962	32 190	358	64
Ireland	854	3 136	3 672	45	5
Italy (2)	2 640	11 243	3 049	153	4
Luxembourg	6	92	15 333	6	100
Netherlands	153	11 215	73 301	105	69
Portugal	221	1 994	9 023	1	0
United Kingdom (2)	852	15 116	17 742	73	9

(1) Except for United Kingdom (year ending March 1988).

(2) As at October 1988, based on estimate for number of slaughterhouses.

(3) 1 000 cattle units.

(4) Cattle units.

Source: UEEA, MLC, Ofival, Istat.

houses, and these accounted for 74% of total slaughterings. The market share of the largest slaughterhouses with throughputs of over 100 000 has increased even more markedly; in 1987/88 there were 27 slaughterhouses in this category, which accounted for 30% of total throughput.

As a proportion of the total number of slaughterhouses, the number of plants with average throughputs of less than 10 000 cattle units a year has fallen since 1977/78. The proportion of total throughput accounted for by these smaller slaughterhouses has fallen from 13.7% to 8.7% over this period. The relative importance of the larger plants consequently increased. However, in absolute terms, the only categories of slaughterhouses whose number has increased are those with throughputs of 50 000 to 100 000 (from 51 to 59) and those with throughputs of over 100 000 (from 12 to 27). The quality of distribution has, however, remained similar.

The increases in throughput combined with the drop in the number of slaughterhouses means that average slaughterhouse throughput is continuing to increase considerably and, at 15 195 cattle units in 1987/88, was very nearly twice the average size 10 years ago.

Out of the 933 slaughterhouses paying levy during 1987/88, 93% killed sheep while almost as many (91%) killed cattle. The number of slaughterhouses killing pigs was lower (76%) and pig production tends to be more concentrated in particular regions of the country. During the last few years, the per-

centage change in the number of slaughterhouses killing cattle, sheep or pigs have been very similar. However, the decline in the number of slaughterhouses killing calves has been somewhat greater and in 1987/88 only 47% of the total number of slaughterhouses killed calves.

The more marked decline in the number of slaughterhouses killing calves can be traced back to the drop in total calf throughput. Calf slaughterings in 1987/88 dropped to only 38 000 units, the lowest recorded, due to reduced dairy calf births combined with increases in exports and demand for finishing from United Kingdom producers. Initial expectations are that there will be a further drop in total calf throughput in 1988/89.

The degree of concentration in slaughterings is greater in the pig sector than for other species.

Cattle slaughtering is less highly concentrated than sheep or pig slaughtering and there are more small slaughterhouses killing cattle than the other species.

Outlook

Overall, the output of medium and large slaughterhouses is likely to depend on the growth of demand on export markets or more selling to distant parts of the United Kingdom after 1993.

For some of the larger slaughterhouses killing more than 50 000 cattle units a year, the single market may

not require many changes, especially as nearly half already have EC export approval.

The Netherlands

The importance of the agricultural sector for the Dutch economy is illustrated by the fact that approximately one quarter of its total exports are farm products.

The Dutch trade balance shows a positive result of not more than ECU 1.1 billion. Yet, the agricultural balance amounts to not less than approximately ECU 7.7 billion.

Within agriculture, the livestock and meat sector is of crucial importance. In 1988 the total value of exports amounted to almost ECU 3.4 billion, and the sector showed a positive trade balance of about ECU 2.7 billion.

Despite the economic importance of the livestock and meat sector, its growth has been very low in recent years. Total Dutch meat production has stabilized at a level of about 2.5 million tonnes. The strong reduction in the number of slaughtering for beef (-10.2%) and veal (-8.4%) was just offset by an increase in pigmeat production (+2.6%) and higher average slaughter weights.

Total slaughtering in the Netherlands break down as follows: 88% pigs, 2% lambs, and bovine animals and calves 5% each.

Exports are increasingly destined for other EC countries, as the Netherlands have lost ground on the world market, partly because of the low dollar rate. In 1988 about 70% of the Dutch meat production was exported. 95% of all meat exports are destined for other EC countries, the main export markets being: FR of Germany (31% of Dutch meat exports), Italy (22%), France (15%), and the United Kingdom (11%).

As a result of reduced supplies and difficulties caused by the low dollar rate and competition from subsidized US exports of breeding cattle, exports decreased in volume terms. Actually, over recent years, the Netherlands has become a net importer of live cattle.

Reduced production also resulted in an increase in imports of meat and meat products. Despite lower exports and increased imports, considerably higher export prices helped the positive trade balance of the sector to stabilize at approximately ECU 513 million.

The growth rate of the pigmeat sector has considerably declined, mainly because of the low producer price levels and the environmental measures taken in the sector. Exports increased by 2.3% in volume terms but decreased by 1.4% in value as a result of a small drop in prices. Nevertheless, the trade balance of the pigmeat sector still made a positive contribution of approximately ECU 1.9 billion to the Dutch economy.

There is an enormous increase in exports of cheap piglets (+76%) and a fall in the total number of exported slaughtering pigs (-16%).

This shows that the Dutch slaughtering pig sector is competitive. In relative terms, live exports indeed decreased from 26 to 22% within total exports.

Especially worth mentioning are exports of bacon which have shown a strong increase (+11%).

Federal Republic of Germany

The slaughterhouse sector in the FR of Germany, as in the other countries of the Community, is characterized by considerable overcapacity, leading to stiffer competition and a growing tendency towards concentration. According to estimates, the three largest slaughtering firms account for some 50% of the sector's total revenue of ECU 3.7 billion.

In 1988 slaughterhouses (excluding communal slaughterhouses) achieved net sales of ECU 3 960 million compared to ECU 3 936 million in 1987.

This turnover was achieved by the 161 private and cooperative slaughterhouses; there are in addition about 100 communal slaughterhouses, and slaughterhouses for which no statistics exist, since they have fewer than 20 employees. In 1988 the total number of slaughterhouses in the Federal Republic was 299.

The figures for those employed in the 161 slaughterhouses for which statistics are available was 13 168 on a monthly average in 1988, compared to 12 652 in 1987. But the available figures show relatively little change: about 60% of the turnover of the total of 99 firms (not slaughterhouses) is accounted for by the 10 largest slaughterhouse firms in Germany.

In Germany, production of beef and veal in kilogram per head is expected to remain stagnant, with a slight increase in the volume of total use. This reflects the diminishing population and the increasing use of meat outside the food sector. For 1989, a degree of self-sufficiency of about 111% is

forecast for the Federal Republic. Exports of fresh and frozen beef from the Federal Republic to other Member States amounted to 276 764 tonnes in 1988, compared to 280 000 tonnes in 1987. The main countries receiving these exports were unchanged: Italy, France (each with a share of about one-third) and Greece (with a share of about 20%).

Third-country exports from the Federal Republic of Germany were able to be increased in 1988 to 155 000 tonnes. Main purchasing countries were Egypt (26% share), Poland, Yugoslavia, Iran and the Soviet Union.

Imports of fresh/frozen beef into the Federal Republic of Germany in 1988 reached a volume of just 225 000 tonnes, 165 000 tonnes of this from Member States and 60 000 tonnes from third countries. With a share of just 50%, Argentina was again the largest third-country supplier in 1988.

Denmark

During recent years a reduction in the industry's turnover has occurred. However, these tendencies have come to a stop so that turnover will be quite stable for the years to come.

Profitability levels are low, therefore the investment climate is dull.

The yearly supplies from non-EC approved slaughterhouses in Denmark are only 283 020 pigs, corresponding to 1.8% of the total Danish supplies in pigs.

Consumption trends are stagnating. However, a shift from low-quality to high-quality products is taking place.

As Denmark is exporting about 70% of its production, it is very dependent on export markets. Processed products have been replaced by fresh/frozen products. The export trade is in the hands of about 30 export firms but some of the large slaughterhouses and processing plants export direct.

Other EC countries take 85 to 90% of exports of Danish beef or beef products. Future developments will have to take account of the current over-production in certain sectors.

Exports to third countries are increasing. Denmark's export of beef and veal in percentage distribution to the major destinations was:

	1987	1988
Italy:	50.2	47.1
FR of Germany:	11.2	16.1
Other EC countries:	8.1	13.0
Third countries:	30.5	23.8

The number of persons working in slaughterhouses grew from 16 880 in 1985 to 27 600 in 1986, but then fell in both 1987 and 1988 to reach 15 700 in this latter year.

The reduction in the number of slaughterings in the coming years will probably only have a minor effect on employment in the industry. The development of high added-value products may offset any adverse effects within the processing sector.

Of the 273 slaughterhouses in Denmark, the vast majority of pig slaughterings are concentrated in just 30 meat plants. These meat plants are owned by nine companies, of which eight are cooperative. The export-authorized slaughterhouses receive yearly supplies of pigs of approximately ECU 15.8 million.

Italy

The continuing fall in the number of slaughterhouses is indicative of the difficult situation in Italy.

Two difficulties may arise in the natural development and the reorganization of the sector. First, the complexity and inflexibility of measures regarding health, with rules which are likely to increase costs, and secondly, the fact that national authorities have been unable to prepare a comprehensive overall programme intervening, if at all, solely to support certain cooperative ventures which do not have the necessary economic basis. This has led to detrimental commercial discrimination.

Large-scale slaughterhouses have developed in the last 15 to 20 years in an important effort to be up to the European level.

According to the latest Istat figures, there are some 2 700 active slaughterhouses. 1 900 public sector slaughterhouses process 20 to 25% of national production, 770 private firms and cooperatives process 65 to 70%. The remainder is processed by local firms.

Actually no updated reliable statistics exist in Italy on slaughterings, slaughterhouse capacity or the breakdown between public, private and cooperative slaughterhouses. All data available relate to 1983 on, with various, clearly incomplete, annual updatings.

The latest estimates indicate a considerable difference in efficiency between public and large-scale private slaughterhouses. While the latter represent about 45% of the total number, they only account for 25% of throughput. On the other hand large-scale private slaughterhouses represent only 13% of the total number but process 35% of production.

Belgium

The Belgian slaughterhouse sector has, over the last few years, seen profound modifications.

Implementation of Directive 83/90/EEC, an amendment to Directive 64/433/EEC relating to intra-Community exchanges of fresh meats gave the public health veterinary inspectors the opportunity to revise all the export approvals granted to slaughterhouses.

A complete report has been made of the situation within slaughterhouses approved for export. Overall, the final assessment was pessimistic; a few large pigmeat slaughterhouses aside, all the others needed far-reaching reforms, if not total reconstruction.

A complete plan for restructuring the whole slaughterhouse sector has been worked out with the purpose of bringing the structure and equipment of Belgian slaughterhouses to a satisfactory standard within five years. This plan consists of different stages, including approval by the central veterinary administration under the Ministry of Health of plans for converting plants wishing to keep their export approval, and transformation or reconstruction of slaughterhouses according to the approved plans.

Each stage has resulted in the withdrawal of the export approval for those who either did not want to convert or failed to put forward plans which could be acceptable to the veterinary authorities; thus, at this moment, 50 slaughterhouses have already lost their export approval altogether, while 16 others have lost it either for cattle or for pigs.

At present, conversion or reconstruction work is in full swing: a good 50% of the slaughterhouses have finished their building work, the rest are entering the final phase and it can be hoped that, apart from one or two exceptions, the 1990 deadline will be met.

The final cost of the reforms is unknown, but it will without doubt exceed ECU 200 million, that is, an average of more than ECU 2.5 million per slaughterhouse.

The scope and cost of these reforms have given rise to regroupings and increases in the numbers of killings in slaughterhouses which have adapted — the only way to make the building work carried out profitable. However, at present, certain converted units remain in a difficult economic position because their numbers of killings still lie below the profitability threshold, and one can fear for their future, especially if slaughterhouses approved for the national market only are to continue without conversions.

It is in this light of overall improvement in public health that the decision of the Belgian Ministry of Health to force slaughterhouses approved for the national market to adapt to EC standards by 1 July 1990 must be seen.

Ireland

The structure of the meat industry in Ireland has undergone substantial change over the past decade. The emergence of a small number of large meat companies (in some cases engaged in a mixture of beef, lamb, pigmeat and/or fish processing) is very noticeable. Increased emphasis has been placed on value-added products and the development of a downstream processing industry.

Investment in the industry tends to be very high and profit margins in recent years have been very tight.

The beef industry is Ireland's single most important industry, accounting for over 10% of the total national exports. Unlike other EC Member States, beef and milk production in Ireland are very much interlinked.

The seasonal pattern of beef slaughterings (46% of annual killings in the three months September, October and November) results in a considerable under-utilization of processing facilities for a large part of the year. Employment within the industry also follows a seasonal pattern.

Exports of beef, live cattle and sheepmeat from Ireland were valued at ECU 1.16 billion in 1988.

Cattle slaughterings peaked in 1986. The heavy level of disposals in that year reflected cutbacks in the dairy cow population as a result of reductions in milk quotas. In 1987 slaughterings fell by over 6% and fell again by 9% in 1988. Total cattle slaughterings at meat export premises were 1.23 million head in 1988 as compared to 1.43 million head in 1986.

In contrast, sheep slaughterings in Ireland have shown a steady increase in recent years. Slaughterings for export increased by 8.6% in 1988 to reach a record level of 1.42 million head. Of the 25 350 tonnes of sheepmeat exported in 1988, 92% of it was sold on the French market.

Pig slaughterings increased by 4% in 1988. Irish exports of pork and bacon in 1988 reached 39 000 tonnes, a 5% increase on the 1987 level. The big increase was in pork where exports rose by 6% to 25 000 tonnes.

Of the 370 300 tonnes of beef and veal exported from Ireland in 1988, the UK accounted for 36% of beef exports, the continental EC for 14%, with 50% of total beef exports being sold to markets outside the EC.

France

Some 36 million animals were slaughtered by 602 firms in France in 1986, 22 firms and 11 500 animals fewer than in 1985. This corresponds to a total of 3 473 million tonnes compared to 3 461 million tonnes in 1985, a rise of 0.3%.

Total tonnage has been growing by 18% annually between 1969 and 1986, whereas the number of firms has dropped from 1 393 to 602. In 1988, 558 slaughterhouses were reported.

Slaughtering is divided between the private and the public sector, which are developing in completely different directions, both in the number of slaughterhouses and the volume processed. The number of public sector slaughterhouses is falling (from 745 in 1975 and 452 in 1986), while the number in the private sector rose continually until 1985 (from 135 to 151 in 1975, then 150 in 1986).

Volume processed follows the same trend which has been falling in the public sector since 1975. Approximately one-third of all slaughtering was done in the private sector in 1985; in 1986 this had already risen to a half, accounting for 1 716 million tonnes of

meat (49.4%) as against 1 757 million tonnes (50.6%) in public slaughterhouses.

The breakdown of total volume slaughtered is as follows:

- 43.8% beef (62% public, 38% private);
- 41.3% pork (32% public, 68% private);
- 9.8% veal (66% public, 43% private);
- 4.5% sheep and goats (80% public, 20% private);
- 0.6% solid-hoofed animals (79% public, 21% private).

The public sector is dominant except in the pigmeat sector.

The beef and veal sector is the most significant, representing 53.6% of total volume.

61% of the 602 slaughterhouses existing in 1986 had export licences, processing 3 225 million tonnes (93% of total volume). 41% were in the public sector, processing 1 612 million tonnes, 20% in the private sector, processing 1 614 million tonnes. Thus 223 firms, processing 247 645 tonnes (7% of total volume), did not have export licences. In 1988, 64% of the 558 slaughterhouses had export licences.

Over the period 1970-85, average tonnage rose from 2 033 tonnes per year to 5 769 tonnes per year, an annual growth of 6.7%.

The trend towards concentration is continuing as a result of various modernization measures on the one hand and increasing capacity in certain firms on the other, leading to the closure of many — mostly small firms.

It should be pointed out that an increasing number of public sector slaughterhouses are managed by private firms, meaning that almost the entire tonnage is in effect accounted for by the private sector.

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POULTRY

(NACE 412.3)

Summary

Since the establishment of the European Community, the structures of the poultrymeat sector have changed considerably, like those of other agricultural and industrial sectors. The trend has been towards an increasing volume of production, differentiation of products and concentration of production, both geographically and in structural terms. The outlook for growth in the world market in general and the European market in particular is very favourable. There are two reasons for this: the first is due to the price difference from other meats, and the second stems from a growing consumer preference for poultry due to its taste and nutritional value.

Current situation

In 1988, the EC produced almost 6 million tonnes of poultrymeat and exported 408 000 tonnes. The rate

of self-sufficiency is 105.7%. Broiler chickens represent about 75% of total production.

Turkey meat is the second most important poultry product. The figures show that in 1988 the EC produced 953 000 tonnes of turkey meat, which represents an increase of 6.8%, compared with 1986. The per capita consumption of turkey meat in the EC is about 2.8 kg per annum.

By comparison with other agricultural sectors, the poultrymeat sector of the EC is subject to very liberal market organization. There are no guaranteed prices or intervention systems, nor does the poultrymeat sector have any system providing aid to private stocks. In principle, poultrymeat can therefore move freely from one Member State to another. As far as trade relations with third countries are concerned, the present market organization for poultrymeat includes a system of export refunds to compensate for the difference in cereal prices at world market

Table 1
Main indicators, 1980-88 (1)
Poultry

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	3 763	3 781	4 036	4 919	5 000	5 137	5 199	5 491	5 667
Net exports	257	416	361	369	275	214	250	297	326
Production	4 020	4 197	4 397	5 288	5 275	5 351	5 449	5 788	5 993

(1) 1980-82 EC 10.

Source: AVEC, Eurostat (Zpa1, Comext).

Table 2
Turkey meat, 1988 (1)

	B-L	DK	D	GR	E	F	IRL	I	NL	P	UK	EC
Production (1 000 tonnes)	4	2	96	3	16	331	22	250	27	28	174	953
Consumption per capita (kg)	1.2	.3	2.4	.3	.6	4.6	4.3	4.3	1.2	2.9	2.9	2.8

(1) Estimated.

Source: AVEC.

Table 3
Chicken meat, 1988 (1)

	B-L	DK	D	GR	E	F	IRL	I	NL	P	UK	EC
Production (1 000 tonnes)	132	101	229	136	762	843	57	593	396	170	795	4 214
Consumption per capita (kg)	13.7	9.1	6.6	13.4	19.7	10.6	13.7	10.4	12.2	17.0	14.7	12.1

(1) Estimated.

Source: AVEC.

level and within the European Community, as well as a system of sluicgate prices and import levies to prevent products from third countries being imported at unfair prices.

The poultrymeat sector in the EC also differs in other respects from other agricultural sectors. For instance, there is no possibility of obtaining aid for the establishment of poultry farms, except in cases where environmental protection is involved. Aid from public funds may be granted for modernization of slaughtering plants, but not for an increase in productive capacity. In its administration of the market organization, the EC Commission makes every effort to ensure that products can move as freely as possible from one market to another.

In 1971, the EC Commission presented a proposal for a Council Regulation on marketing standards for poultrymeat. That proposal was never adopted, but its main principles were later adopted by the United Nations' Economic Commission for Europe and have now been tested in practice for three and a half years, with good results. The UN/EC marketing standards are subject to current revisions made on the basis of practical experience. The EC Commission is now preparing a new proposal for marketing standards.

Common EC standards for the water content of frozen poultrymeat are laid down in a Council Regulation. These standards determine the maximum water content in poultrymeat, but certain misunderstandings have arisen due to different testing methods, and the EC Commission has now taken steps to carry out experiments in several Member States to decide whether it will be necessary to amend the Council Regulation of 1976 on water content. The main object is to remove any obstacles

to intra-Community trade that may be due to different testing methods.

The rules on health inspection of poultrymeat are laid down in a Council Directive on health problems affecting trade in fresh poultrymeat. However, the interpretation of the provisions of this directive differs considerably from one member country to another, and so do the inspection charges paid by the processing plants in the various member countries. In order to harmonize these charges, the EC Commission has presented a proposal for a Council Directive laying down a minimum fee to be collected for health inspection in all member countries.

Production and consumption

Since the last critical period in 1982-83, the poultrymeat sector has made great efforts to keep production in step with the market demand. Although consumption has increased from 3.7 million tonnes in 1980 to 5.7 million tonnes in 1988, the threat of over-production has had the effect of depressing the price of poultrymeat.

This should also be seen in the light of the situation on export markets. The keen competition in the world market, especially from the USA, has made it very difficult for European exporters to dispose of production surpluses in third country markets.

In 1985, the USA included poultrymeat in their Export enhancement programme and since then, the substantial subsidies granted to American poultrymeat exporters have made it possible for them to gain access to traditional European export markets. In 1986, American broiler exports increased by 30%, and the same happened in 1987. The consequences

Table 4
Production and external trade (1)
Poultry

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production	4 020	4 197	4 397	5 288	5 275	5 351	5 449	5 788	5 993
Index (2)	75.1	78.4	82.2	98.8	98.6	100.0	101.8	108.2	112.0
Imports extra-EC	77	48	65	76	94	111	77	105	125
Index (2)	84.7	53.2	72.1	68.5	84.7	100.0	69.4	94.6	112.6
Exports extra-EC	342	468	450	450	375	350	327	379	408
Index (2)	104.0	134.6	129.4	128.6	107.1	100.0	93.4	108.3	116.6
X/M	4.4	9.8	6.9	5.9	4.0	3.2	4.2	3.6	3.3

(1) 1980-82 EC 10.

(2) Taking into account changes in EC membership.

Source: Eurostat (Comext).

Table 5
Production of poultry

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988 (2)
EC (1)	4 020	4 197	4 397	5 288	5 275	5 351	5 449	5 788	5 993
Belgium, Luxembourg	133	133	147	128	126	131	134	141	146
Denmark	97	104	110	112	110	115	116	113	118
FR Germany	390	392	395	344	351	357	377	369	411
Greece	120	146	124	153	152	155	145	149	153
Spain	N/A	N/A	N/A	813	789	815	754	786	826
France	1 132	1 236	1 331	1 284	1 251	1 267	1 328	1 408	1 434
Ireland	50	49	52	53	52	55	59	67	72
Italy	1 013	1 015	1 047	1 043	1 020	998	1 001	1 046	1 057
Netherlands	337	377	384	399	410	425	442	471	485
Portugal	N/A	N/A	N/A	162	155	157	163	189	201
United Kingdom	748	745	807	798	858	876	930	1 029	1 093

(1) 1980-82 EC 10.

(2) Provisional.

Source: AVEC, Eurostat (Zpa1).

of the American export policy could have been disastrous for the European poultrymeat industry if the EC Commission had not granted an increase of EC export refunds.

Outlook

As far as the demand for poultrymeat is concerned, per capita consumption in the EC increased from 10.6 kg in 1976 to 17.5 kg in 1988. A further increase may be expected; in the USA the per capita consumption has now reached a level of no less than 37.3 kg. Poultrymeat is gaining an increasing share of total per capita consumption of meat in all important parts of the world, and this development is expected to continue. In several important markets, poultrymeat is even expected to be the most

common kind of meat, and consumption of poultry meat continues to increase even in periods when prices go up.

At the same time, however, international trade in poultrymeat continues to decrease. One of the reasons for this decline is increasing home production in traditional export markets, for instance in a number of Middle Eastern countries, where a considerable increase in poultry production is expected. Recent consumer inquiries seem to indicate that future generations will have a preference for poultrymeat because of its special culinary and nutritional qualities. The rapid evolution in the field of processed poultry products also predicts a fairly bright future for the poultry sector. Competition is certain to intensify, however, and the European poultrymeat sector must be prepared for an uncertain situation,

Table 6
Human consumption per capita of poultry

(kilograms)	1980	1981	1982	1983	1984	1985	1986	1987	1988 (1)
EC	N/A	N/A	N/A	15.6	15.6	15.9	16.2	16.8	17.5
Belgium, Luxembourg	13.0	13.2	14.9	15.0	14.6	15.4	16.2	16.3	16.4
Denmark	8.2	8.6	9.6	9.8	9.8	11.0	11.7	11.7	11.8
FR Germany	9.9	9.7	9.9	9.3	9.5	9.7	10.1	10.5	11.2
Greece	12.0	14.9	12.8	15.6	15.7	15.7	15.2	15.6	16.0
Spain	N/A	N/A	N/A	21.6	21.0	21.8	19.7	20.7	21.7
France	16.7	16.6	16.8	17.7	17.3	17.7	18.8	19.8	20.1
Ireland	14.4	14.2	14.9	16.0	15.6	17.2	18.4	20.0	20.5
Italy	18.1	18.1	18.6	18.6	18.2	18.0	17.9	18.5	18.7
Netherlands	9.0	9.5	11.5	11.1	11.9	12.7	13.4	14.7	15.0
Portugal	N/A	N/A	N/A	17.1	16.1	16.9	18.4	19.8	20.5
United Kingdom	13.4	13.4	14.5	14.7	15.7	16.2	17.3	18.4	19.4

(1) Provisional.

Source: AVEC, Eurostat (Zpa1).

both at national and international level, and plan its future production very carefully according to the market trend. In the long run, however, there is no doubt that poultrymeat will gain an increasing share of the total meat market.

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DAIRY PRODUCTS

(NACE 413)

Summary

The principal dairy products manufactured in the EC are liquid milk, butter (and butteroil), cheese (natural and processed), fresh products (cream, fermented milk, desserts, fresh cheese) and preserved milk (principally skimmed and whole milk powder, sweetened condensed and evaporated milk); other such as casein and whey products are less significant in certain EC Member States, but are growing in importance as the use of ultrafiltration spreads, allowing dairies greater manufacturing flexibility by breaking milk down into higher value-added components.

Current situation

Cheese consumption continues to grow slowly, although consumption of fresh cheese, cream and

fermented milks (particularly yoghurt) is expanding at a slightly faster rate. Overall, butter consumption has fallen slightly as mixed fat products develop a niche for themselves in an increasing number of Member States. Liquid milk consumption is stagnating, although this masks a trend toward increased consumption of low-fat milks to the detriment of full-cream milk. Production of low-fat milk powder has fallen since the introduction of milk quotas and since 1987, when the EC intervention was modified to restrict access according to time and price criteria.

Major structural and geographical features

The main milk-producing areas by Member State are in the west in Denmark (Jutland and Fuennen) and the United Kingdom (West Country, Shropshire, Cheshire, Lancashire), and in France (Basse Nor-

Table 1
Main indicators, 1980-89 (1)
Dairy products

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	33 157	35 858	39 971	44 395	45 825	47 558	52 579	53 743	56 250	N/A
Net exports (2)	2 561	3 176	3 229	2 754	3 607	2 903	2 172	2 532	3 352	N/A
Production	35 718	39 034	43 200	47 149	49 432	50 461	54 751	56 275	59 592	63 555
Employment (number)	257 759	250 845	249 391	252 389	249 659	241 072	264 523	261 647	260 352	259 803

(1) 1980 EC 9; 1981-85 EC 10; 1986-89 EC 12 (estimated).

(2) 1988: excluding Greece.

Source: Eurostat (Inde, Bise, Comext).

Table 2
Production

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987 (1)	1988 (1)	1989
EC (2)	38 350	41 860	46 340	50 243	52 896	54 154	54 751	56 275	59 592	63 555
Belgium, Luxembourg (2)	1 306	1 425	1 594	1 855	1 962	2 187	2 192	2 183	2 394	2 573
Denmark	1 531	1 713	1 927	2 295	2 461	2 447	2 441	2 394	2 505	2 650
FR of Germany	8 372	8 782	10 053	11 367	11 174	11 086	11 824	11 767	12 187	12 404
Greece (2)	201	256	293	315	529	393	377	363	437	467
Spain (3)	2 146	2 468	2 709	2 654	2 958	3 096	3 315	3 169	3 440	3 667
France	9 704	11 033	11 967	12 712	13 809	14 963	15 740	16 409	17 608	18 967
Ireland (3)	1 284	1 447	1 714	1 966	2 072	2 271	2 279	2 441	2 672	2 876
Italy	2 629	3 128	3 619	4 581	6 029	5 744	5 619	6 004	6 678	7 009
Netherlands (3)	5 183	5 296	5 139	5 139	4 598	4 370	3 965	3 892	3 213	3 437
Portugal (3)	285	358	431	440	506	597	644	660	691	737
United Kingdom	5 709	5 955	6 894	6 919	6 798	7 001	6 355	6 993	7 768	8 768

(1) Estimated.

(2) 1984-88 estimated.

(3) 1986-88 estimated.

Source: Eurostat (Inde).

mandie, Bretagne, Pays de la Loire), in the north in Spain (Santander, Galicia, etc.), in Greece (Macedonia, Thraki), in Portugal (north of the Douro river), and in Italy. In the Federal Republic of Germany and Ireland, milk production is concentrated in the southern part of the country (Bavaria and Baden-Wurtemberg; Munster and Leinster); it is fairly evenly spread throughout Belgium and the Netherlands.

From the last study published by the Commission ('Structure of the dairy industry in the Community in 1985 and changes since 1982', EC Commission DG VI) there was a clear trend showing decline in the number of dairies collecting less than 20 000 tonnes of milk and an increase in those collecting over 50 000 tonnes.

Production costs

Over 1987 production of butter (national costs weighed by production expressed in ecu — converted at green rates) increased slightly (+0,56%) in the EC as a whole; costs of skimmed-milk powder fell a little (-0,72%) whilst those of collection fell slightly more (-2,55%).

The cost of industrial fuels in national currencies fell some 11% on average in the EC; electricity costs fell 8,3% while gasoil fell almost 25%. (The inclusion of

Dutch costs — about 25% lower than other EC countries — reduces the EC average considerably.)

Packaging prices for sulphurized paper rose slightly, but were offset by a fall in the price of cardboard, so that butter-packaging costs overall fell slightly (-1.6%). Bulk powder packaging costs increased 3.3% on average.

Personnel costs per hour, expressed in national currencies as cost to employers, rose on average 4.63% for a pasteurizer operator, 8.25% for a butter maker, 7.66% for a milk-powder-plant operator and 7.68% for a milk collection driver.

Retail prices

The EC Commission's successful efforts to reduce considerable EC intervention stocks of butter and skimmed-milk powder (smp) in 1986 and 1987, together with the tightening up of milk supplies owing to the application of quotas, have caused prices to stabilize in a number of dairy product sectors, notably those sectors competing for milk proteins: milk powder, casein and cheese. Retail prices in the fresh dairy product sector fell slightly in 1987 in all countries except Belgium and the UK. In the two largest product markets, the Federal Republic of Germany and France, where inflation was about +1.5% and 3% respectively, prices fell by 1% in Ger-

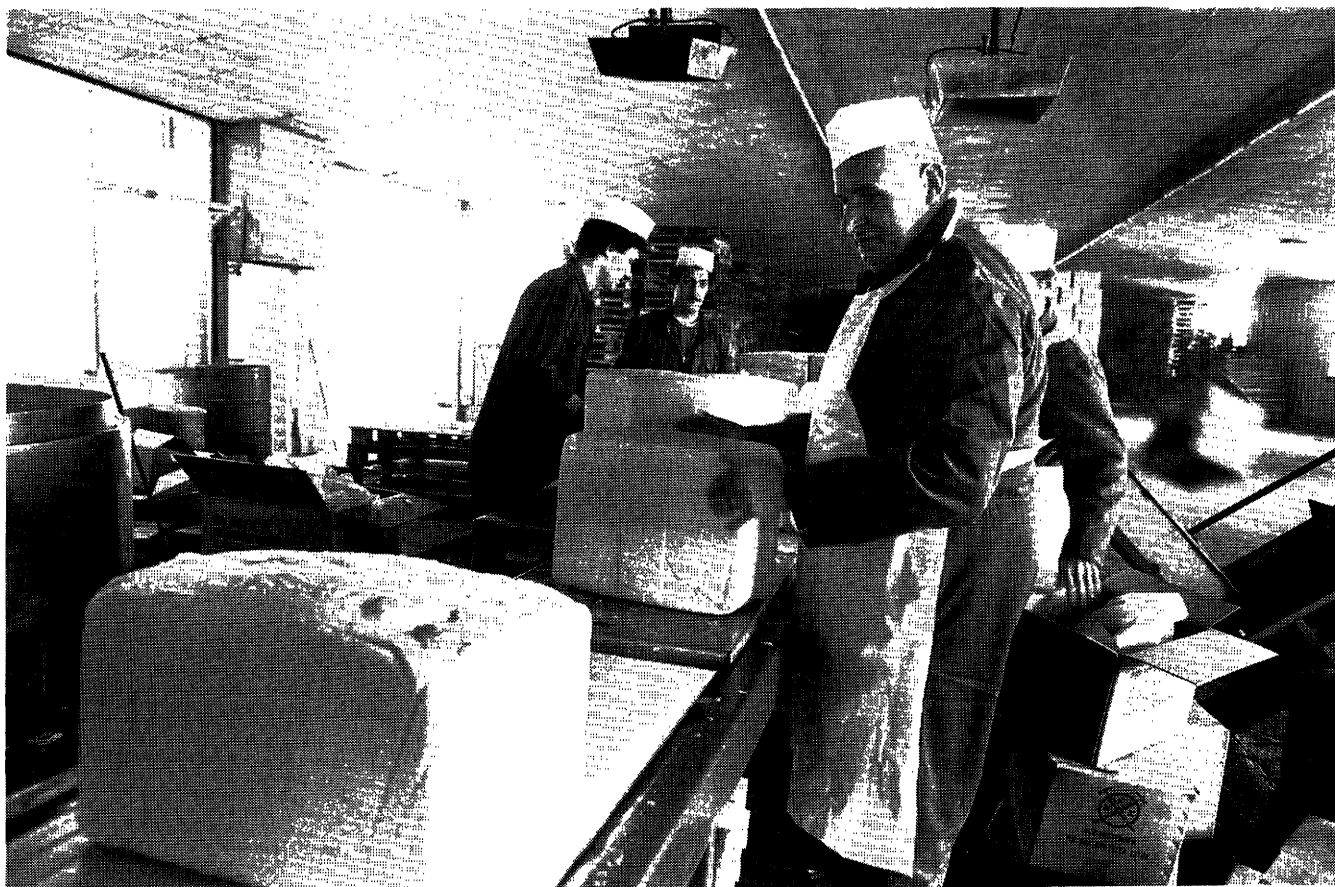


Table 3
Butter and butteroil production

(1 000 tonnes)	1983	1984	1985	1986	1987	1988	1989	1990
EC	2 316	2 139	2 062	2 236	1 911	1 693	1 620	1 598
Belgium	105	102	97	100	86	75	76	76
Denmark	131	104	110	112	196	94	89	87
FR of Germany	628	574	517	567	466	392	380	375
Greece	3	4	5	11	12	12	12	12
Spain	17	17	17	29	29	24	19	19
France	632	606	595	652	577	520	500	485
Ireland	159	166	162	154	134	122	111	111
Italy	78	81	80	80	84	83	81	80
Luxembourg	8	8	8	8	7	7	6	6
Netherlands	306	266	263	292	235	215	205	205
Portugal	7	6	7	9	9	10	10	10
United Kingdom	242	206	202	222	176	140	131	131

Source: Eurostat (Zpa1).

many and more in France. This was thought to reflect the growing concentration and power of large retail chains. Cheese prices firmed up in 1987 as increased competition for a raw material, especially milk protein, caused raw milk prices to rise. Whilst most cheese prices were flattening out earlier in 1988, those for speciality cheeses and Emmental continued to rise which meant that raw material prices for processed cheese increased.

Meaningful up-to-date milk producer price information is not available in many EC Member States; partly because many dairies, private and cooperative alike, operate 'on account' payment systems with a 13th month or bonus payment being made after the financial year end, and partly because many companies keep such information confidential.

● Butter

The substantial reduction in EC intervention stocks has helped relieve pressure on market prices,

although these are not rising at the same rate as those in the skim sector where demand is high in a number of product areas.

EC butter consumption is expected to fall slightly in 1988 mainly due to expansion of the mixed fat product market as more Member States open their markets to such products.

On the export market, prices have firmed up only slightly, despite the EC's action of disposing of public stock, since butterfat is in surplus world-wide.

● Cheese

Overall consumption continues to grow slowly, although this masks a variety of different trends within the market: semi-hard cheese sales continue to be buoyant whilst hard and blue vein cheese sales are now slipping slightly. Soft cheese sales continue to be stable. Processed cheese sales, whilst holding up well in the Community, suffered greatly in third countries buying in USD and especially in Middle

Table 4
Butter consumption

(1 000 tonnes)	1983	1984	1985	1986	1987	1988	1989	1990
EC	1 580	1 649	1 670	1 659	1 676	1 653	1 557	1 506
Belgium	82	85	83	80	83	83	83	83
Denmark	52	61	59	57	52	52	51	50
FR of Germany	399	427	461	482	506	514	470	440
Greece	6	7	10	17	16	16	16	16
Spain	17	17	18	17	18	17	17	18
France	482	524	511	526	520	490	460	440
Ireland	41	39	31	25	25	22	21	21
Italy	123	129	138	129	137	138	138	138
Luxembourg	5	5	4	3	3	3	3	3
Netherlands	50	56	58	59	58	58	58	58
Portugal	8	8	7	9	9	10	10	10
United Kingdom	315	290	290	255	250	250	230	230

Source: Eurostat (Zpa1).

Eastern oil-producing nations. Other cheese exports held up well and prices firmed up. Although a number of cheeses are now available in 'lower fat' form, such products are marginal to mainstream

business. Cheese substitutes similarly remain peripheral to this sector. However, the EC Commission's decision in 1988 to fund, from co-responsibility funds, a feasibility study concerning the use of a

Table 5
Natural and processed cheese production

(1 000 tonnes)	1983	1984	1985	1986	1987	1988	1989	1990
EC	4 157	4 342	4 435	4 489	4 628	4 759	4 792	4 829
Belgium	43	44	51	51	56	60	62	62
Denmark	251	295	256	254	272	260	265	270
FR of Germany	847	878	913	924	955	1 008	1 020	1 030
Greece	172	179	182	203	205	210	210	210
Spain	152	153	159	162	157	160	160	160
France	1 230	1 273	1 307	1 326	1 360	1 386	1 409	1 431
Ireland	52	55	78	63	65	73	75	75
Italy	636	659	667	670	697	691	669	664
Luxembourg	3	3	3	3	3	3	4	4
Netherlands	497	526	533	546	563	572	577	580
Portugal	28	29	30	30	31	38	41	43
United Kingdom	245	246	256	258	264	298	300	300

Source: Eurostat (Zpa1).

Table 6
Consumption of cheeses

(1 000 tonnes)	1983	1984	1985	1986	1987	1988	1989	1990
EC	3 866	3 959	4 148	4 205	4 351	4 433	4 475	4 527
Belgium	112	113	116	121	123	124	125	125
Denmark	57	63	58	64	64	66	67	67
FR of Germany	821	836	884	909	943	985	985	1 000
Greece	200	204	209	228	229	230	230	230
Spain	163	167	174	180	185	194	195	195
France	1 035	1 086	1 152	1 133	1 208	1 225	1 240	1 255
Ireland	13	13	14	14	16	16	16	16
Italy	864	876	935	909	935	935	935	935
Luxembourg	5	5	5	5	5	5	5	5
Netherlands	192	202	200	212	218	218	220	222
Portugal	28	30	30	36	37	39	42	44
United Kingdom	379	364	371	394	389	398	416	433

Source: Eurostat (Zpa1).

Table 7
Liquid milk (drinking milk) production

(1 000 tonnes)	1983	1984	1985	1986	1987	1988	1989	1990
EC	27 361	27 927	28 058	28 048	28 001	28 440	28 753	28 979
Belgium	842	827	852	849	898	900	900	900
Denmark	716	692	668	670	662	655	650	650
FR of Germany	5 729	5 908	6 100	6 072	6 302	6 678	6 930	7 050
Greece	344	359	262	252	260	260	280	280
Spain	3 000	3 000	3 047	3 007	2 989	2 978	2 966	2 966
France	3 615	3 964	3 795	3 998	3 774	3 850	3 950	4 050
Ireland	781	740	748	740	703	665	652	652
Italy	3 137	3 192	3 273	3 238	3 256	3 260	3 250	3 250
Luxembourg	61	64	66	68	67	68	68	69
Netherlands	1 305	1 279	1 242	1 201	1 186	1 180	1 170	1 160
Portugal	645	637	718	768	762	826	839	853
United Kingdom	7 186	7 265	7 288	7 186	7 142	7 120	7 099	7 099

Source: Eurostat (Zpa1).

Table 8
Production of milk powders

(1 000 tonnes)	1983	1984	1985	1986	1987	1988	1989	1990
EC	3 200	2 957	2 781	2 968	2 554	2 295	2 303	2 327
Belgium	177	155	151	162	142	127	132	132
Denmark	134	115	120	125	115	104	104	103
FR of Germany	854	741	675	768	603	565	552	577
Spain	31	32	32	47	52	44	44	44
France	972	971	880	927	819	715	745	745
Ireland	180	213	188	182	160	128	123	123
Italy	3	2	3	3	3	3	3	3
Luxembourg	13	14	13	13	12	10	10	10
Netherlands	488	427	408	404	348	343	345	345
Portugal	12	11	11	14	14	14	14	15
United Kingdom	337	276	302	324	287	241	231	231

Source: Eurostat (Zpa1).

European 'real dairy' symbol (at the request of the EC dairy industry) shows that the industry is alert to the need to consider whether and how dairy product identity can be safeguarded and enhanced in a world of rapidly improving food processing techniques.

- Liquid milk

EC-wide consumption of liquid milk continues to fall slightly, although individual markets within the EC, such as France, where the liquid milk consumption level was traditionally low, and the Federal Republic of Germany are increasing steadily. Nevertheless, sales continue to reflect a shift to lower fat milks with semi-skimmed milks (1,5 to 1,8% fat) growing more rapidly than skimmed (0,3% fat). The EC school milk programme currently applies only to whole and semi-skimmed milks; uptake remains constant.

Packaging remains primarily in cartons and plastic bottles in most Member States, although the UK pint delivered on the doorstep is still in glass bottles. In certain regions of Germany a test launch of full cream (unstandardized) milk in glass bottles sold in shops over 1986-87 has proven popular on a modest scale.

- Preserved milk products

Production of skimmed-milk powder fell as a result of the tightening up of quotas in 1987 and the reduction in use of calf milk replacers. Production of whole-milk powder increased to meet export demand, although prices especially of small packs fell below those of bulk orders for the first time ever, owing to increased competition in this sector. Production of concentrated milk has continued to fall over a number of years, as customers, especially in third countries switched to powdered milk.

Table 9
Dairy cows' milk production

(1 000 tonnes)	1983	1984	1985	1986	1987	1988	1989	1990
EC	118 778	116 746	115 829	117 107	111 822	109 650	108 813	108 588
Belgium	3 872	3 819	3 796	3 918	3 777	3 675	3 675	3 675
Denmark	5 427	5 234	5 099	5 111	4 860	4 739	4 685	4 670
FR of Germany	26 913	26 151	25 674	26 350	24 420	23 976	23 900	23 900
Greece	678	670	663	648	645	648	650	650
Spain	6 210	6 392	6 258	6 108	5 941	5 801	5 775	5 775
France	27 650	27 700	27 790	28 074	27 146	26 700	26 700	26 700
Ireland	5 595	5 809	5 810	5 607	5 523	5 242	5 137	5 137
Italy	10 617	10 658	10 753	10 857	10 898	10 850	10 600	10 350
Luxembourg	290	299	301	299	293	283	283	283
Netherlands	13 240	12 782	12 550	12 695	11 672	11 397	11 335	11 335
Portugal	1 061	1 042	1 114	1 206	1 290	1 360	1 400	1 440
United Kingdom	17 226	16 191	16 022	16 235	15 358	14 979	14 673	14 673

Source: Eurostat (Zpa1).

**Table 10
Employment**

	1980	1981	1982	1983	1984	1985	1986	1987 (1)	1988 (1)	1989
EC (2)	293 176	282 843	281 366	284 404	281 519	272 692	264 523	261 647	260 352	259 803
Belgium, Luxembourg (2)	6 627	6 459	6 639	8 567	8 546	8 428	8 255	8 172	7 938	7 921
Denmark	9 430	8 011	7 961	8 179	8 296	7 097	7 501	8 565	8 401	8 383
FR of Germany	49 586	48 860	47 944	46 888	44 486	42 812	41 265	41 141	41 145	41 141
Greece (2)	3 696	3 794	4 236	4 528	4 732	5 251	5 294	5 212	5 212	5 201
Spain (3)	22 994	22 836	22 379	22 670	22 103	22 074	22 263	21 466	21 466	21 421
France	81 173	78 108	78 011	78 597	75 970	72 762	68 936	69 036	66 281	66 147
Ireland (3)	12 008	11 701	11 435	12 222	11 637	11 137	10 986	10 904	10 652	10 630
Italy	27 523	27 409	27 462	30 415	34 450	33 809	33 050	31 770	30 812	30 853
Netherlands (3)	22 768	22 460	22 113	21 360	20 875	20 040	19 804	19 277	23 653	23 604
Portugal (3)	8 727	9 162	9 596	9 345	9 757	9 546	9 020	8 733	8 991	8 972
United Kingdom	48 644	44 043	43 590	41 633	40 467	39 736	38 149	37 371	35 801	35 530

(1) Estimated.

(2) 1984-88 estimated.

(3) 1986-88 estimated

Source: Eurostat (Inde).

● Fresh products

This sector has consistently grown throughout most of the 1980s. In 1987 EC markets strengthened by 5% in volume for fermented milks and fresh cheese, by over 7% for cream and 10% for dairy desserts. Whilst

low-fat fermented milk product sales continue well, the German market is seeing strong growth of its fat-enriched yoghurt sector. The development of specialist sectors, e.g. products for children, is boosting growth in the yoghurt sector as is the increasing popularity of multipacks.

**Table 11
Production and external trade
Dairy products**

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC (1)	35 718	39 034	43 200	47 149	49 432	50 461	54 751	56 275	59 592	63 555
Index (2)	70.8	77.3	85.6	92.8	97.7	100.0	101.1	103.9	110.0	117.4
USA (3)	22 473	30 458	36 661	41 851	46 839	49 271	39 326	34 983	34 637	N/A
Index	45.6	61.8	74.4	84.9	95.1	100.0	79.8	71.0	70.3	N/A
Japan (3)	5 437	7 233	7 707	9 118	10 795	11 698	N/A	N/A	N/A	N/A
Index	46.5	61.8	65.9	77.9	92.3	100.0	N/A	N/A	N/A	N/A
Production in constant prices										
EC (1)	48 105	47 934	48 129	50 413	51 254	50 461	54 206	55 838	57 277	58 450
Index (2)	95.9	95.3	95.9	100.2	101.6	100.0	100.1	103.1	105.8	107.9
EC trade in current prices										
Imports extra-EC (1)	484	623	680	686	643	682	731	709	N/A	N/A
Index (2)	72.1	91.3	99.6	100.5	94.2	100.0	98.9	95.9	N/A	N/A
Exports extra-EC (1)	3 003	3 773	3 904	3 480	3 910	3 827	2 998	3 080	N/A	N/A
Index (2)	78.5	98.6	102.0	90.9	102.2	100.0	78.0	80.1	N/A	N/A
X/M (1)	6.2	6.1	5.7	5.1	6.1	5.6	4.1	4.3	N/A	N/A
Imports intra-EC (1)	4 338	5 421	6 201	6 422	6 493	7 332	7 812	8 160	N/A	N/A
Index (2)	59.2	73.9	84.6	87.6	88.6	100.0	106.5	111.3	N/A	N/A

(1) 1980 EC 9; 1981-85 EC 10.

(2) Taking into account changes in EC membership.

(3) Census of manufactures and Eurostat estimates.

Source: Eurostat (Inde, Bise).

Employment trends

Employment in the dairy industries is decreasing in each of the Member States. There are many reasons for this. The main ones can be summarized as follows:

- fewer dairies and concentration on production of specific products coupled with the development of mechanization and automation of production lines
- limits on milk production because of the introduction of milk quotas since 1984.

Exports

The northern Member States are climatically better suited to dairying, indeed most of them — particularly the Netherlands, Belgium, France, Denmark and the Federal Republic of Germany — have a long tradition in dairy exports developed over many years.

In 1987, exports of butter and skimmed-milk powder (smp) increased significantly as the EC disposed of its intervention surpluses in sales to the USSR (butter) and food-aid schemes. By early 1988, this release of pressure began to find its way through to commercial markets and prices began to rise. Reports of smp prices exceeding even those of whole-milk powder are not uncommon, although this is also a result of relatively new activity on the part of New Zealand in the whole-milk powder retail market.

Cheese prices also firmed and volumes remained consistent with those of 1985 and 1986, although the trend for processed cheese has differed: exports fell sharply as dollar-reliant clients especially in the Middle and Far East were affected by the depreciation in the USD. The situation was then aggravated by the tightening up of EC milk quotas which

reduced milk supplies and, owing to demand from competing dairy product sectors, placed milk protein for cheese at a premium.

Butter prices have not firmed up anywhere near as much as those of other products. The world market is oversupplied with butter and, as there is little prospect of demand increasing significantly in the near future, the remedy lies in the hands of world butter producers.

Outlook

The Council of Ministers' decision in December 1986 to reduce milk-production quotas by a further 9.5% in 1987-88 and 1988- 89 caused immediate shortages of milk protein in certain regions of some Member States in the trough production period. Whilst 5.5% of this was to be a temporary reduction, 3% was to be a definitive reduction; the further 1% to be achieved by the tightening up of the existing system (e.g. supplementary levy for both Formula A and Formula B set at 100%; more active encouragement of voluntary cessation of milk production) as laid down in COM(86) 648. In any case, quotas will apply until 1992 and very likely thereafter, albeit possibly in an amended, more flexible form.

Domestic consumption of cheese, fresh products and liquid milk will probably increase consistently to 1992. However, great uncertainty is cast on the level of the EC's future export performance, where, since dairy products are very closely linked to the CAP mechanism, much depends on the Community policy and not just on market competition. This makes forecasting of EC dairy exports and production by product almost impossible.

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DEEP-FROZEN PRODUCTS

(NACE 414.1 and 421.3)

Summary

The market for deep-frozen products is growing rapidly, helped by increasing storage possibilities in the home. The United Kingdom leads the field in this respect, with sales of frozen foods (including ice-cream) totalling more than ECU 5.1 billion, compared with ECU 2.8 billion in the Federal Republic of Germany and ECU 1.6 billion in France.

Current situation

Qualitative studies have demonstrated that housewives believe that the nutritional value of frozen foods is very close to that of fresh produce. The same studies show that frozen foods are popular because they can be prepared quickly, and the seasonal restrictions of fresh produce are avoided. Other factors, such as the absence of waste and the time saved by home storage, are favourable to a growth in demand for frozen products and indicate that the potential market is much larger than its current size.

Products

Fruit and vegetables are the leading frozen products, accounting for a quarter of total sales. These are followed by potato-based products, representing one-

fifth of the total. Breaded products or products with cream are growing fast; prepared meals, desserts and bakery products are likely to have the highest rates of growth.

If quality is the major advantage of prepared dishes, novelty is almost as important. One of the basic reasons for which people buy prepared dishes is to vary their menus, have a break from the daily routine and experience new sensations. New products are thus a key element in increasing sales.

Frozen products are highly standardized in appearance (presentation, packaging, colour) and by the fact that they can be prepared quickly and easily. They thus correspond to the agro-industrial production models favoured by the multinational food giants, which hold the largest share of the market (Iglo-Ola for Unilever and Findus for Nestle).

Factors behind production trends

The production and distribution of frozen products requires very high investment in equipment. Only large firms are able to establish and maintain national distribution networks (hence the small number of producers). Small producers distribute their products by using the refrigeration capacities of large-scale ice-makers.

Table 1
Frozen food sales, 1986

(1 000 tonnes)	Denmark	FR of Germany	France	Italy	Netherlands	United Kingdom
Vegetables	31	216	231	157	47	335
Potato products	10	246	207	29	64	181
Fruit, fruit juices	1	16	7	1	1	2
Fish, seafood, molluscs	9	94	113	44	11	161
Meat	16	64	122	11	4	77
Venison	0	0	1	0	0	0
Bakery products	21	96	101	20	14	52
Milk products	1	2	2	7	1	35
Ready meals	N/A	100	72	14	72	N/A
Miscellaneous	N/A	N/A	N/A	5	N/A	N/A
Poultry	42	375	28	12	N/A	220
Total	131	1 209	884	300	214	1 063
Consumption (kg/capita)						
Including poultry	25.6	19.8	16.0	5.2	14.7	18.7
Excluding poultry	17.4	13.7	15.5	5.0	14.7	14.9

Source: Swiss Frozen Food Institute.



Large supermarkets are devoting more and more space to frozen products, emphasizing their practicality and quality.

Special departments (freezer banks) can now be found in all large supermarkets.

Outlook

After a period of stagnation in the late 1970s and 1980s, current prospects seem to be very promising. Consumption of these products is increasing at such a rate that in 1990 sales should be a third higher than in 1985. Europeans consume over 5 million tonnes of frozen products annually (excluding ice-cream), representing almost ECU 9 billion. Demand appears to be increasing rapidly in France and the Federal Republic of Germany, and at a more moderate pace in the UK. It is estimated that some 6.3 million tonnes will be marketed in 1990, compared with 5.2 million tonnes in 1986, accounting for a total value of ECU 10 to 11 billion for EC 8.

Written by DRI-Europe, based on information published in *Panorama of EC Industry 1989*

FRUIT AND VEGETABLE PROCESSING AND PRESERVING

(NACE 414)

Summary

The processing and food industry has experienced a steady growth in recent years. A production increase of around 5% a year is expected in the medium term. Climatic conditions explain why the canned fruit industry in particular is concentrated in the south of Europe. The EC industry as a whole employs some 128 000 persons. High land and labour costs as compared to countries like South Africa and Australia make competition very tough for European manufacturers. Therefore the EC has established an aid scheme for crops such as pears and peaches.

Description of the sector

NACE category 414 comprises quick freezing of fruit and vegetables, production of fruit and vegetables preserved in vinegar, brine or oil, whether or

not canned, and the manufacturing of jams, marmalades and jellies.

The need to carry over seasonal fruit for year-round production leads to the primary fruit process being one of intermediate preservation, either by freezing, chemical preservation (sulphur dioxide) or canning.

Current situation

In 1988, consumption rose by 13%. Most of this consumption is, however, being supplied by non-European manufacturers, mainly because of the reasons mentioned in the summary. In 1988, European producers covered only 65% of European demand of fruit. This is especially reflected in the trade balance which shows a constant deficit, rising by 69% in 1988 compared to 1987. A decreasing trend in the produc-

Table 1
Main indicators, 1980-89 (1)
Processing and preserving of fruit and vegetables

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	8 216	9 312	10 353	10 709	12 526	12 892	13 080	13 589	15 375	N/A
Net exports (2)	-1 715	-1 467	-1 491	-1 596	-1 818	-1 929	-1 136	-1 285	-2 178	N/A
Production	6 501	7 845	8 862	9 113	10 708	10 963	11 944	12 304	13 197	14 071
Employment (number)	111 115	119 725	114 723	108 552	109 161	107 125	132 096	130 077	128 861	128 606

(1) 1980 EC 9; 1981-85 EC 10; 1986-89 EC 12 (estimated).

(2) 1988, excluding Greece.

Source: Eurostat (Inde, Bise, Comext).

Table 2
Production of canned vegetables

(thousand 850 ml tins)	1980	1981	1982	1983	1984	1985	1986	1987
EC (1)	1 983 127	2 219 545	2 521 980	2 402 374	2 421 991	2 692 877	2 651 682	2 347 164
Belgium	125 000	180 000	214 000	186 000	162 500	180 000	195 000	184 000
Denmark	22 500	22 500	22 400	28 134	27 191	26 248	25 445	N/A
FR of Germany	102 653	121 276	119 084	77 730	72 490	97 903	101 004	62 146
Spain	N/A	N/A	N/A	250 588	250 588	296 688	308 394	308 560
France	889 763	1 062 193	1 262 039	1 005 003	1 114 100	1 169 399	1 117 792	1 067 995
Ireland	31 997	32 997	24 371	22 051	N/A	N/A	N/A	N/A
Italy	168 800	167 500	168 300	165 100	163 800	176 000	172 200	174 900
Netherlands	225 000	279 491	325 000	282 000	305 000	396 695	385 941	320 183
United Kingdom	417 414	353 588	386 786	385 568	325 822	349 944	345 916	229 380

(1) Excluding Greece, Luxembourg and Portugal; 1980-82 excluding Spain; 1984-87 excluding Ireland; 1987 excluding Denmark.

Source: OEITFL.

tion of canned vegetables can be observed in recent years (an average of -6.4% per year between 1985 and 1987) whereas the production of canned fruit slightly increased in 1987, compared to 1986.

Consumption and production

The preserves market within Member States varies slightly according to national tastes, habits etc. For example the consumption of jams, marmalades etc., has been quite constant (perhaps a small decrease in the last years); however, a shift can be observed within the segment towards a higher quality product, a product with more fruit than the standard product for instance, although the standard product still accounts for a large majority. Another noticeable trend in recent years is seen in the uptake of reduced sugar jams, fuelled by the greater awareness of diet and nutrition, but so far the movement is in single percentage figures.

If we examine the figures by country, we note that the French consume a lot more canned vegetables than the Germans (in relative terms), but for all EC

countries production is slowing down, and in general reached its peak in 1985.

Employment

As can be seen from Table 1, employment more or less stagnated in 1989. Employment peaked in 1986, when 132 096 persons were directly employed in the 12 Member States. In 1989 employment provided by the industry fell back by 3% compared to 1986. More than 100 factories are engaged in canning fruit throughout Europe, employing 12 000 people permanently and 25 000 seasonally. Almost 50% of the canneries in Italy and France belong to growers' cooperatives.

Outlook

Growth in consumption is likely to rise. However, European manufacturers of preserved fruit in the EEC have never been able to cover the full European requirement, due to higher production costs

Table 3
Production of canned fruit

(thousand 850 ml tins)	1980	1981	1982	1983	1984	1985	1986	1987
EC (1)	967 841	920 877	987 798	1 393 357	1 388 157	1 398 104	1 305 882	1 349 366
Belgium	31 390	37 720	38 426	40 969	41 663	41 885	45 784	47 863
Denmark	3 000	5 000	4 000	9 330	13 832	11 708	9 119	N/A
FR of Germany	142 654	122 730	146 111	148 721	133 744	134 040	130 585	146 828
Greece	224 620	210 000	215 960	212 563	218 448	197 983	182 150	143 377
Spain	N/A	N/A	N/A	341 176	341 177	342 235	330 521	323 252
France	181 827	167 312	217 413	239 250	239 507	240 506	234 598	246 829
Italy	222 500	224 000	212 000	230 000	244 000	260 000	240 000	289 235
Netherlands	126 000	120 400	108 300	122 000	107 000	123 715	92 235	103 300
United Kingdom	35 850	33 715	45 588	49 348	48 786	46 032	40 890	48 682

(1) Excluding Ireland, Luxembourg and Portugal; 1980-82 excluding Spain; 1987 excluding Denmark.

Source: OEITFL.

Table 4
Production of jam, marmalade, jellies and chestnut paste

(tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
EC (1)	521 842	518 761	528 234	592 638	598 807	615 037	625 537	601 836
Belgium	16 380	19 935	20 864	19 596	24 107	18 950	18 326	20 935
Denmark	22 500	22 500	23 000	23 000	25 755	26 964	29 311	N/A
FR of Germany	106 180	104 577	105 168	120 000	125 000	130 000	135 000	140 000
Spain	N/A	N/A	N/A	60 000	60 000	60 234	58 560	54 320
France	124 006	127 940	132 877	129 800	135 402	137 085	144 218	150 964
Ireland	13 000	13 000	13 000	13 000	11 000	13 500	11 650	N/A
Italy	52 500	50 000	50 000	48 000	47 000	47 000	47 000	48 000
Netherlands	35 400	35 349	33 700	32 910	28 100	26 400	29 100	24 700
United Kingdom	151 876	145 460	149 625	146 332	142 443	154 904	152 372	162 917

(1) Excluding Greece, Luxembourg and Portugal; 1980-82 excluding Spain; 1987 excluding Denmark and Ireland.

Source: OEITFL.

than South Africa and sometimes Australia, while European producers have been able to replace the USA as the main source for their markets. (In 1988 for example, the EC agricultural prices were 0.337 ECU/kg for peaches and 0.438 ECU/kg for pears. In South Africa, the processing industry paid

respectively 0.112 ECU/kg and 0.168 ECU/kg for those products).

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FLOUR

(NACE 416.12)

Description of the sector

The EC's flour milling industry annually produces over 24 million tonnes of wheat and rye flour. The number of operating mills within the Community fell from around 11 000 in 1970 to less than 3 606 in 1988. There are considerable variations in the structure and capacity of the industry within the different Member States. In the Federal Republic of Germany, France, Spain, and Italy, annual production averages less than 10 000 tonnes per mill. In contrast, the British, Irish and Danish industries are concentrated in much larger units. In the UK, for example, each of the country's 92 mills produces an average of more than 43 000 tonnes per annum.

Production

Production is primarily geared to domestic markets. Over 85% of flour is sold directly to small and industrial bakeries, biscuit, cake and rusk manufacturers. Other users include starch and glue manufacturers. On average, 75% of flour production is used for the making of bread, the consumption of which has increased slightly to an annual average of 65 kg per capita following a period of decline caused by greater affluence and a wider choice of foodstuffs. The image of bread as a healthy foodstuff and the larger variety of bread on offer are important factors contributing to this recent increase in consumption.

Consumption

Total EC flour consumption has risen by 10% over the past two decades, from 20 to 22 million tonnes.

Automation and higher productivity have led to overcapacity in the milling sector. In 1987 overcapacity in the Community stood at about 9.5 million tonnes. There is clearly a need for further restructuring of the industry in certain countries.

Trade

The volume of intra-EC trade remains small but is growing at an average rate of 12% per year. It increased from 109 000 tonnes in 1976 to 379 000 tonnes in 1987. The institution of the internal market at the end of 1992 may further stimulate the intra-EC flour trade, particularly in view of reductions in transport costs. At present, the relatively high cost of transporting flour means that 80% of intra-Community trade involves Belgium, the Netherlands, Germany, and France, countries which have common borders. The largest single importer is the Netherlands, which in 1987 was the destination of 38% of total intra-EC trade (144 020 tonnes).

Exports to third countries play a vital role in stabilizing the internal market. In 1988 about 10% of the flour processed by the EC's millers was exported to third countries (about 2.6 million tonnes). France alone exported 1.4 million tonnes. Around 70% of the EC's flour exports went to Africa, where Egypt is the single largest market. The European Community, with a market share of 60% of the international flour trade (worth ECU one billion in sales) is by far the world's leading exporter. Since 1985, however, Community exporters have had to cope with competition from the US, whose exports are subsidized under the Export enhancement programme. A decrease in the EC's market share could have a destabilizing effect on the European milling industry.

Table 1
Main indicators, 1980-89 (1)
Grain milling

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	6 182	6 815	7 183	7 880	8 180	8 127	9 974	10 619	11 586	N/A
Net exports (2)	495	666	650	192	588	693	436	395	324	N/A
Production	6 677	7 481	7 833	8 072	8 768	8 820	10 410	11 014	11 910	12 688
Employment (number)	33 548	34 818	33 750	32 654	32 523	31 626	44 978	45 562	45 108	45 009

(1) 1980 EC 9; 1981-85 EC 10; 1986-89 EC 12 (estimated).

(2) 1988: Excluding Greece.

Source: Eurostat (Inde, Bise, Comext).

Table 2
Number of mills and total flour production, 1988

(1 000 tonnes)	Number of mills	Total flour prod.	Average prod. per mill
EC (1)	3 606	24 397	7
Belgium	65	917	14
Denmark (2)	14	347	25
FR of Germany	616	4 138	7
Greece (3)	180	1 400	8
Spain	513	2 099	4
France (2)	1 034	5 075	5
Ireland	8	179	22
Italy	977	4 550	5
Luxembourg	4	46	12
Netherlands	53	1 079	20
Portugal	50	574	12
United Kingdom	92	3 993	43

(1) Approximate figures because of absence of 1988 data for Denmark, Greece and France.

(2) 1987 figures.

(3) 1986 figures.

Source: National Milling Associations.

Table 3
Destination of flour consumed in home country, 1988

(%)	Bakeries	Biscuits rusks, confection.	Household flour	Other uses
Belgium	90.5	7.8	1.6	.2
Denmark (1)	83.0	N/A	17.0	0.0
FR of Germany	73.0	14.0	9.0	4.0
Greece	N/A	N/A	N/A	N/A
Spain	77.9	16.6	2.2	3.2
France	72.7	14.4	5.9	7.0
Ireland	72.0	13.0	15.0	0.0
Italy (2)	83.0	N/A	N/A	17.0
Luxembourg (2)	90.0	N/A	N/A	10.0
Netherlands	71.5	13.5	.5	14.5
Portugal	89.0	10.0	1.0	0.0
United Kingdom	63.5	15.6	6.9	14.0

(1) Bakeries includes biscuit, rusks and confectioneries.

(2) Disaggregated figures available only for bakeries.

Source: National Milling Associations.

Technological development

Technological innovation in the flour milling industry has aimed at securing both a low-cost production process and improvements in flour quality. Despite its image as a traditional industry, the sector has progressively been modernized to meet the increasingly exact demands of its customers. Computerized operating systems and on-site quality-control laboratories with facilities for measuring protein content, humidity and bread-making elasticity have become commonplace.

Table 4
Exports of flour to third countries, 1988

(1 000 tonnes)	Exports
EC (1)	2 601.1
Belgium, Luxembourg	205.2
Denmark	2.3
FR of Germany	349.9
Spain	91.3
France	1 415.4
Italy	353.1
Netherlands	176.7
United Kingdom	7.2

(1) Greece, Ireland and Portugal negligible.

Source: Eurostat (Comext).

Table 5
Principal importers of wheat flour from the EC, 1981/82-1987/88 (July/June)

(1 000 tonnes)	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88 (1)
World total	7 545	6 829	7 775	6 237	5 745	6 749	6 215
Egypt	1 761	2 210	2 635	2 330	1 994	1 804	1 700
Libya	364	409	447	370	465	439	350
Cameroon	114	62	85	49	163	191	280
Yemen A.R.	143	187	258	257	222	250	270
Sudan	251	137	385	384	264	258	260
Syrian A.R.	177	210	68	115	65	388	230
Cuba	343	234	546	219	228	237	230
China	N/A	N/A	222	145	144	401	225
Vietnam	237	273	265	89	50	221	200
Iraq	191	327	348	252	213	179	100

(1) Provisional figures.

Source: International Wheat Council.

Table 6
Exports of wheat flour, 1981/82-1987/88 (July/June)

(1 000 tonnes)	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88 (1)
World total	7 545	6 829	7 775	6 237	5 745	6 749	6 215
EC (2)	4 381	3 069	3 932	3 853	3 523	3 442	3 400
plus processing (3)	680	620	258	179	84	74	50
USA	1 070	1 590	1 937	1 003	1 103	1 704	1 239
Canada	535	401	730	428	355	481	516
Japan	125	149	319	210	308	431	387
USSR	200	200	200	200	100	250	150
Australia	130	124	78	81	50	82	73
Others	423	676	321	283	222	285	400

(1) Provisional figures.

(2) 1981/82-1984/85 EC 10; 1985/86-1987/88 EC 12.

(3) Secondary trade (flour processed from imported wheat).

Source: International Wheat Council.

GAM: Groupement des Associations Meunières des Pays de la CEE

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INDUSTRIAL BAKING

(NACE 419.1)

Summary

The industrial manufacture of bread and baked goods has grown in importance due to the increasing urbanization of the population, new distribution systems and changes in shopping habits. The bread industry is an important supplier of bread and baked goods, bread representing between 18 and 70% of the industrial baking market, depending on the country.

Current situation

The European bread industry is expanding, and there is a continuing trend towards concentration. It has been able to bring changing market conditions, eating habits and consumer desires into line with one another through a wide range of high-quality products as well as new products. The fast-food sector represents good prospects for increased sales and growth for industrial bread producers. The same is true for the production and marketing of deep-frozen baked goods.

Industry structure

The bread industry is in competition not only with small-scale bakeries but also with manufacturers of substitute products. The increasing power of retailers on the demand side is a source of concern since they are increasingly tending to concentrate. Under these circumstances, the overall revenue level and the capitalization of firms should not be considered satisfactory.

The bread industry in all countries is characterized by regular increases in personnel costs. Cost-intensive manpower and technological progress are forcing firms in the industry to increase the degree of

automation of their production, necessitating considerable investment.

Consumption

Bread consumption, which had been falling in all countries, has stabilized or even increased slightly since the early 1980s, following various kinds of Community publicity and public relations campaigns, including explanations of the nutritional value of bread aimed at consumers.

Ideas concerning nutrition have changed over the past 10 years, and changes in the economic environment have affected eating and shopping habits. Consumer information has become a high priority and their creativity and innovation have enabled industrial bread producers to take advantage of this development.

The bread industry, as a significant processor of agricultural produce, depends on the supply of high-quality raw materials. This is particularly true of cereals for bread but is also valid for other raw materials involved in processing.

Regulatory environment

The planned dismantling of structural surplus in accordance with EC agricultural policy reforms will be welcome, as will an agricultural price policy adapted to the realities of the market.

New technologies

New technologies have made their appearance in the bread industry. New processes such as analysis methods, extrusion and others have been integrated.

Table 1
Employment in EC bread factories, 1980-88

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	N/A	N/A	4 298	4 216	4 171	3 810	3 808	3 786	3 891
Denmark	N/A	N/A	N/A	N/A	N/A	N/A	11 000	11 000	12 000
FR of Germany	50 200	52 700	52 700	53 400	55 000	57 200	59 500	62 500	66 100
France	10 344	11 320	11 788	12 300	12 980	13 920	14 420	14 760	14 810
Ireland	N/A	N/A	N/A	N/A	N/A	N/A	9 600	N/A	9 300
Netherlands	39 700	N/A	N/A	N/A	38 800	N/A	38 400	38 200	38 000
United Kingdom	66 000	65 000	62 500	60 000	55 000	50 000	48 000	46 000	45 000

Source: AIBI.



Table 2
Baking industry, 1980-88
Turnover

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	N/A	169.5	156.6	154.1	154.0	155.9	159.8	N/A	N/A
Denmark	N/A	N/A	N/A	68.9	68.1	74.2	73.8	78.7	84.7
FR of Germany	1 673.8	1 767.4	1 909.1	2 044.9	2 206.8	2 369.4	2 538.7	3 018.1	3 218.7
France	675.1	741.3	763.3	767.9	823.8	899.1	969.8	1 099.3	1 170.3
Netherlands	927.0	998.0	1 120.0	1 186.0	1 248.0	1 278.0	1 370.0	1 435.0	1 435.0
United Kingdom	2 437.8	2 849.3	2 853.0	2 793.8	2 917.2	3 100.3	3 058.9	3 071.4	3 455.6

Source: AIBI.

Areas in which progress is expected in the future include fermentation technology, the development of freezing techniques, new preservation methods, computerization and data processing.

Outlook

Larger production units can be expected in the traditional bread industry. Demand for special breads and breads that can be kept persists. The trend towards fresh goods will be maintained. Half-processed and deep-frozen baked goods will increase in importance as a result of fermentation technology and freezing techniques. Future prospects for the bread industry are good in this respect.

Takeovers and shareholdings in bread industry firms from other countries will lead to increased interconnections at the international level. Collaboration with other firms, both domestic and foreign, creates new opportunities for joint ventures. The creation of the single European market in 1992 will have an effect throughout the food and drink sector, including the bread industry, which is looking forward to free trade in its products and the dismantling of existing trade barriers.

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RUSK MAKING AND BISCUITS

(NACE 419.4 — 419.5)

COCOA, CHOCOLATE AND SUGAR

(NACE 421.1 — 421.2)

Summary

In these two sectors, there are over 2 000 companies in 11 Member States of the EC (Luxembourg's production being negligible) which employ nearly 280 000 persons. Production has been rising through the 1980s in both sectors, but more steadily in the case of biscuits and rusks.

Description of the sector

Both rusk making (NACE 419.4) and biscuit making (including the making of gingerbread — NACE 419.5) are included in bread and flour confectionery, which fall under NACE 419.

Current situation

The total turnover of these two sectors was about ECU 24 billion in 1987, which represents an average of ECU 3 360 per tonne. For the biscuits sector, the average per tonne (2.83 ECU/t) is lower than for the cocoa/chocolate and sugar confectionery sector (3.83 ECU/t).

Even though we noted a slight decline in turnover in 1986, the 1987 figure represents a resumption of the rising trend for both subsectors, but it is still not as high as the 1985 figure for the cocoa/chocolate and sugar confectionery industries sector.

Both sectors consume a large amount of agricultural raw materials, such as sugar, butter, milk powder

Table 1
Main indicators, 1980-87
Biscuits/rusks

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Turnover (1 000 ECU) (1)	5 400	600	6 600	7 200	8 150	9 100	9 000	9 500
Production (2)	2 644	2 716	2 775	2 875	2 970	3 068	3 280	3 358
Intra-EC trade (2)	274	297	309	325	362	391	427	480
Imports extra-EC (2)	27	22	24	25	28	31	38	45
Exports extra-EC (2)	125	140	159	160	177	202	198	200

(1) EC 9.

(2) 1980 EC 9; 1981-85 EC 10; 1986-87 EC 12.

Source: Caobisco.

Table 2
Main indicators, 1980-87
Cocoa/chocolate/sugar confectionery

(tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Turnover (1 000 ECU) (1)	9 100	9 300	10 300	11 350	13 150	15 000	14 100	14 500
Production (2)	3 037	3 036	3 184	3 113	3 251	3 303	3 541	3 785
Intra-EC trade (2)	450	460	480	530	570	600	635	700
Imports extra-EC (2)	57	58	54	55	57	62	64	72
Exports extra-EC (2)	180	195	210	250	275	305	290	302

(1) EC 9.

(2) 1980 EC 9; 1981-85 EC 10.

Source: Caobisco.

and flour. Thus, in 1987, these two industries were responsible for a total sugar consumption of 2 050 000 tonnes and a total flour consumption of 1 900 000 tonnes.

These sectors are also the largest cocoa consumers in the world, cocoa imports reaching over 800 000 tonnes (expressed in beans equivalent) in 1987.

Since 1980, production figures have improved consistently in almost every country, and for biscuits as well as for cocoa/chocolate and sugar confectionery. To put the EC figures in perspective, we have included in Table 4 and 5 the production figures for Japan and USA. However, for the USA, figures are only available for the cocoa/chocolate and sugar confectionery sector.

Table 3
Biscuits/rusks and cocoa/chocolate/sugar confectionery
Number of companies and employees, 1987

	Companies	Employees
EC	2 090	278 700
Belgium	125	11 000
Denmark	60	6 500
FR Germany	265	5 800
Greece	15	2 500
Spain	430	12 500
France	460	33 000
Ireland	40	4 200
Italy	230	40 000
Netherlands	170	16 000
Portugal	70	5 000
United Kingdom	225	90 000

Source: Caobisco.

Table 4
Biscuit production by country

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
EC (1)	2 685	2 716	2 775	2 910	3 005	3 248	3 280	3 358
Belgium	130	135	140	150	155	150	160	180
Denmark	75	80	90	100	110	115	115	105
FR of Germany	320	330	340	365	395	405	415	435
Greece	41	41	41	41	41	41	41	41
Spain	N/A	N/A	N/A	N/A	N/A	150	160	160
France	585	585	580	600	605	605	610	635
Ireland	24	25	24	24	24	22	24	22
Italy	460	485	525	560	595	615	600	605
Netherlands	280	285	285	285	290	320	320	335
Portugal	N/A	N/A	N/A	35	35	30	30	35
United Kingdom	770	750	750	750	755	795	805	805
Japan	266	266	267	267	257	247	237	227

(1) 1980-82 EC 10; 1983-84 excluding Spain.

Source: Caobisco (for EC countries) and *Statistical Bulletin of IOCCC* (for Japan).

Table 5
Cocoa/chocolate/sugar confectionery Production

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
EC (1)	3 059	3 037	3 184	3 118	3 255	3 499	3 541	3 785
Belgium	160	167	178	190	196	212	219	219
Denmark	53	52	54	58	61	62	59	60
FR of Germany	895	939	1 035	936	987	986	988	1 034
Greece	21	26	26	21	22	26	28	28
Spain	N/A	N/A	N/A	N/A	N/A	190	196	195
France	454	458	467	441	447	446	473	536
Ireland (2)	49	41	43	47	48	48	43	107
Italy	227	222	224	217	229	226	238	261
Netherlands	376	362	364	403	427	446	452	475
Portugal (3)	N/A	N/A	N/A	5	4	6	5	5
United Kingdom	824	770	794	801	834	853	841	868
USA	1 582	1 647	1 723	1 844	1 935	1 963	1 947	2 080
Japan	279	295	297	295	285	288	293	300

(1) 1980-82 EC 10; 1983-84 excluding Spain.

(2) 1980-86 excluding semi-finished cocoa products.

(3) Sugar confectionery production figures are not available.

Source: Caobisco (for EC countries) and *Statistical Bulletin of IOCCC* (for Japan).

- In the EC, the main biscuit producers are the United Kingdom, followed by France and Italy. The Japanese share of the market has been declining since 1983.
- For cocoa/chocolate and sugar confectionery, Germany is by far the largest producer, with 27% of total EC production. Between 1980 and 1987, the United States announced the highest production growth rate (31%), while the EC and Japan registered 23% and 7% respectively.

The rising trend in production that can be seen in Table 5 was made possible by the continued increase in total demand over the past few years. Per capita consumption of biscuits and rusks in particular is still rising, in contrast to, per capita consumption of cocoa/chocolate and sugar confectionery, which fell in 1986 and 1987.

It should be noted that Mediterranean countries consume fewer sweetened products than the northern countries.

Trade

In 1987, intra-EC trade reached a total of 1 180 000 tonnes, which represents 16.5% of total production. Exports to third countries amounted to 500 000 tonnes, or 7% of total production. The breakdown by sector was as follows in 1987:

- For the biscuits sector, intra-Community trade represented 480 000 tonnes, which accounted for 14% of biscuit production. The EC's external balance (in volume) was still running a large surplus (155 000 tonnes in 1987) since extra-EC imports and exports grew at about the same rate (respect-

Table 6
Biscuits/rusks
Per capita consumption trends

(kg)	1980	1981	1982	1983	1984	1985	1986	1987
EC (1)	9.12	9.14	8.81	10.00	8.60	8.70	8.70	9.50
Belgium, Luxembourg	9.80	10.20	10.50	10.50	10.30	10.10	11.30	12.90
Denmark	8.70	8.40	9.00	9.60	9.70	8.80	8.70	9.20
FR of Germany	5.80	5.70	5.70	6.10	6.40	6.30	6.30	6.20
Greece	N/A	N/A	4.50	N/A	4.50	4.50	4.00	4.00
Spain	N/A	N/A	N/A	N/A	N/A	N/A	4.10	3.90
France	9.80	9.80	10.00	11.30	11.80	12.00	12.50	13.10
Ireland	11.60	11.00	10.60	10.40	10.40	10.40	10.40	11.10
Italy	8.10	8.50	9.30	9.70	10.30	10.70	10.10	10.30
Netherlands	15.30	15.60	15.40	15.50	15.40	16.70	16.50	17.50
Portugal	N/A	N/A	N/A	3.50	3.30	2.90	2.70	3.20
United Kingdom	13.00	13.00	13.10	13.30	13.00	13.00	13.30	13.10

(1) 1980-81 excluding Greece, Spain and Portugal; 1982 excluding Spain and Portugal; 1983 excluding Greece and Spain; 1984-85 excluding Spain.

Source: Caobisco.

Table 7
Cocoa/chocolate/sugar confectionery
Per capita consumption trends, 1980-87

(kg)	1980	1981	1982	1983	1984	1985	1986	1987
EC (1)	4.25	4.30	4.40	4.40	4.55	4.75	4.40	4.40
Belgium, Luxembourg	4.90	4.85	5.20	5.45	5.55	5.70	5.85	5.50
Denmark	4.70	5.00	4.90	5.20	5.30	5.60	5.50	5.40
FR of Germany	6.15	6.15	5.90	5.90	6.30	6.05	6.05	6.50
Greece	.85	.90	.90	.90	.95	.95	1.10	1.10
Spain	N/A	N/A	N/A	N/A	N/A	N/A	2.30	2.10
France	3.40	3.35	3.50	3.40	3.40	3.30	3.35	3.40
Ireland	5.65	5.75	6.05	5.65	6.00	6.45	6.10	5.70
Italy	1.55	1.55	1.50	1.60	1.60	1.70	1.80	1.75
Netherlands	5.10	5.15	5.10	5.25	5.40	6.20	5.60	5.85
United Kingdom	5.75	5.90	6.20	6.20	6.40	6.60	6.45	6.50

(1) Excluding Portugal; 1980-1985 excluding Spain.

Source: Caobisco.

ively 60 and 67% between 1980 and 1987). Exports to third countries amounted to about 200 000 tonnes, or 6% of total production.

- For the cocoa/chocolate sector, intra-EC trade represented 700 000 tonnes, which was 19% of total production. The surplus of the external balance has considerably increased over the 1980s: exports grew by about 67%, while imports grew by only 26%. Exports to third countries amounted to 300 000 tonnes, or 8% of total production.

These exports were mainly destined for European Free Trade Association (EFTA) countries (142 000 tonnes), the USA (124 000 tonnes), the Gulf coun-

tries (44 000 tonnes), Canada (42 000 tonnes) and Japan (26 000 tonnes).

Imports of biscuits and rusk products from third countries amounted to approximately 120 000 tonnes.

Trade barriers with non-EC countries are the same as those in place in the cocoa, chocolate and sugar confectionery sector, i.e. high customs duties, blanket import restrictions or obstacles due to very restrictive legislation concerning food products.

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ICE-CREAM INDUSTRY

(NACE 421.3)

Current situation

Ice-cream is produced in every country of the EC. In 1987 total production amounted to 1 516 million litres. The external balance of the EC became slightly positive in 1987 as extra-EC exports grew considerably but international trade in ice-cream with respect to the EC remains limited since extra-EC imports and exports only represent about 9% of EC production and consumption. The industry employs around 25 000 persons in the EC. It should be noted that the only available figures for this sector are expressed in litres and not in value.

Table 1
Main indicators, 1986-87 (1)
Ice-cream

(1 000 litres)	1986	1987
Apparent consumption	1 510 465	1 505 020
Net exports (2)	-11 790	11 670
Production	1 498 675	1 516 690

(1) Excluding Portugal.

(2) Nimexe figures translated into litres: 1 kg = 2 litres.

Source: Euroglaces.

Production

Total production of ice-cream has been marked by an increasing trend since the early 1980s. Over the past three years, however, production volume has remained rather stable in the EC countries. The

Federal Republic of Germany was the main producer in 1988, with the United Kingdom, France and Italy following close behind in order. Altogether, these four countries represented about 70% of total production in 1988.

In several countries of the EC (France, Germany, Luxembourg, the United Kingdom), ice-cream is still considered as a pure 'dairy product'. This implies that national legislation rules out the use of vegetable fat. Another obstacle to a further development of ice-cream production is the importance of artisanal industry which represents a significant part of the market in some Member States (Germany, Italy and Spain), while these hardly exist in Denmark or Ireland, where industrial ice-cream production is included as part of the dairy industry.

It should be added that in spite of considerable efforts made by producers, ice-cream sales still depend on weather conditions. For this reason, seasonality must be taken seriously into account.

Consumption

A slight decrease in total consumption can be noted in 1987 but the situation is quite different from one country to another. It fell sharply in Belgium and Luxembourg (to about half of the 1986 level) but the drop was softer in Denmark, Germany and Ireland. The other EC countries, mostly in southern Europe saw a rise in their consumption.

Table 2
Production of ice-cream

(1 000 litres)	1983	1984	1985	1986	1987	1988 (2)
EC (1)	1 227 740	1 381 780	1 396 751	1 498 675	1 516 690	1 594 830
Belgium, Luxembourg	81 600	78 300	80 260	110 000	110 000	115 000
Denmark	39 240	39 800	40 810	52 000	49 400	53 350
FR of Germany	325 000	295 000	306 000	330 480	325 310	362 140
Greece	41 370	41 370	44 060	44 060	44 360	44 360
Spain	N/A	97 930	103 980	116 350	130 710	150 320
France	197 410	192 100	192 850	209 160	212 210	228 150
Ireland	26 100	25 580	23 280	23 280	24 400	24 660
Italy	225 000	213 750	225 510	223 255	227 720	227 720
Netherlands	43 700	39 960	40 000	48 920	48 000	48 000
United Kingdom	249 320	257 900	340 000	341 170	344 580	341 130

(1) 1983 EC 10; 1984-88 excluding Portugal.

(2) Estimated.

Source: Euroglaces.

Table 3
Ice-cream consumption in 1986 and 1987

(1 000 litres)	Imports extra-EC (2)		Exports extra-EC (2)		Total consumption		Consumption (3)	
	1986	1987	1986	1987	1986	1987	1986	1987
EC (1)	113 410	137 400	101 620	149 070	1 510 465	1 505 020	4.8	4.8
Belgium, Luxembourg	5 000	6 400	55 000	81 200	60 000	35 200	6.0	3.6
Denmark	600	1 100	10 000	18 600	42 600	31 900	8.3	6.3
FR of Germany	20 500	20 000	7 130	11 400	343 850	333 910	5.6	5.5
Greece	1 360	6 400	2 450		42 970	50 760	4.3	5.1
Spain	300	3 200	2 940	8 400	113 710	125 510	2.9	3.2
France	28 500	34 400	5 100	6 600	232 560	240 010	4.2	4.3
Ireland	3 300	3 300	5 240	6 400	21 340	21 300	6.0	6.1
Italy	5 950	5 700	4 660	6 670	224 545	226 750	3.9	4.0
Netherlands	34 400	38 000	5 950	4 500	77 370	81 500	5.3	5.7
Portugal	1 600	6 100	N/A	N/A	N/A	N/A	N/A	N/A
United Kingdom	13 500	18 900	3 150	5 300	351 520	358 180	6.2	6.3

(1) Excluding Portugal.

(2) Nimexe figures translated into litres: 1 kg = 2 litres.

(3) Litres per capita.

Source: Euroglaces.

Per capita, consumption varied little between 1986 and 1987. In general, it is higher in the northern countries of the EC, probably because competition from fresh fruits or cheese is less intensive there.

An important factor for the ice-cream industry is the fact that nearly every household is now equipped with a refrigerator and a freezer. This allowed the industry to progress from 'impulse products', consumed when and where they are bought, to familial products, stored and consumed at home. This led to a certain diminution of the seasonality of sales and a growth in sales volume through the 1980s.

Trade

Compared to total production in the EC trade figures are relatively low. Once again, however, the situation varies from country to country. The main importers are the Netherlands, France and The Federal Republic of Germany and the volume of imported ice-cream grew in 1987, except in the case of Germany. It is in the Netherlands that the portion of consumption accounted for by imports is the highest (46% in 1987). On the export side, all the countries except the Netherlands have improved their position, the volume of ice-cream exports having grown in 1987: Belgium and Luxembourg (47%), Denmark (86%), Germany (59%), Spain (185%), etc. Belgium and Luxembourg are by far the main exporters, with about 70% of their production going for exports.

Table 4
Ice-cream industry

(A) number of employees: 25 000

(B) the top 10 enterprises in alphabetical order:

France Glaces Findus	F — PARIS
Frisko Sol	DK — SKOVLUNDE
Helados Y Congelados	E — VITORIA
Italgel	IT — PARMA
Langnese Iglo	D — HAMBURG
Lyons Maid Ltd	UK — GREENFORD
Ortiz — Miko	F — ST DIZIER
Sagit SpA	IT — ROME
Schiller GmbH	D — NÜRNBERG
Wall's Ice Cream	UK — WALTON

Outlook

Given that ice-cream sales depend for the most part on weather conditions and seasonal factors, it is very difficult to make forecasts for this sector. There is no reason to believe that consumption will radically change in the coming years and the seasonality factor will probably remain. On the other hand, international trade in ice-cream is still developing and one can assume that this upward trend will continue in the immediate future.

Euroglaces

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SUGAR

(NACE 420)

Current situation

Sugar plays an important role in the common agricultural policy, employing 65 000 people directly and with almost 400 000 growers delivering beet to 172 factories during the 1988/89 season throughout the Community.

The EC sugar sector has had a market organization since 1968. The EC, the world's largest producer and second largest consumer of sugar, exports large quantities of this product outside the EC. This activity is carried on under a strict policy of self-finance and budgetary neutrality.

Production

All the EC countries, with the exception of Luxembourg, produce sugar beet, as is shown in the table

below. The total area over which beet is cultivated increased in the 1970s, reaching a peak of 2.2 million ha in 1981-82, but has since decreased to a stable level of approximately 1.8 million ha, or 3% of the total amount of usable arable land in the Community.

The sugar contained in the 90 to 95 million tonnes of sugar beet produced is extracted, stored and packaged in a small number of high-capacity factories (38 in the Federal Republic of Germany, 14 in Belgium, 6 in Denmark, 52 in France, 33 in Italy, 8 in the Netherlands, 13 in the United Kingdom, etc.), that operate 24 hours a day during the harvest season. As the manufacturing period varies from approximately 60 days in Italy to 120 days in the UK, the Community sugar industry is able to receive and process more than 1.3 million tonnes of beet per day.

Table 1
Main indicators, 1981/82 — 1987/88 (1) (2)
Sugar manufacturing and refining

(1 000 tonnes)	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
Apparent consumption	10 995	10 855	10 686	10 890	10 790	11 069	10 896
Net exports (3)	3 811	3 874	2 673	2 464	2 888	3 009	2 653
Production	16 060	15 101	12 253	13 586	13 645	14 122	13 209
Employment (1 000)	77.3	76.3	72.9	73.5	71.2	68.8	65.8

(1) Year runs: 1 October to 30 September; units are 1 000 tonnes of white sugar.

(2) 1981/82 to 1985/86 EC 10.

(3) Quota + C sugar without transformed products.

Source: CEFS.

Table 2
Areas under beet

(1 000 hectares)	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
EC (1)	1 993	2 242	2 098	1 905	1 936	1 886	1 899	1 840
Belgium	126	135	130	120	123	125	118	111
Denmark	75	76	76	72	74	73	69	67
FR of Germany	414	464	429	403	423	415	399	384
Greece	28	42	41	38	28	43	44	28
Spain	183	220	260	249	209	178	195	182
France	521	610	533	462	501	464	421	420
Ireland	33	35	34	36	36	35	38	37
Italy	282	320	257	222	217	225	277	283
Netherlands	121	133	137	117	129	131	137	128
United Kingdom	210	207	201	186	196	197	201	200

(1) Excluding Luxembourg and Portugal.

Source: CEFS.



Table 3
White sugar production

(1 000 tonnes)	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
EC	13 166	16 060	15 101	12 253	13 586	13 645	14 122	13 209
Share of world production (%)	15	16	15	13	14	14	14	13
Belgium	799	1 030	1 105	782	839	943	938	804
Denmark	427	480	537	346	547	530	499	388
FR of Germany	2 749	3 392	3 303	2 507	2 894	3 155	3 192	2 731
FR of Germany, from molasses	N/A	2	9	19	19	19	19	19
Greece	174	323	296	298	218	317	287	182
Spain	904	1 026	1 144	1 240	1 074	903	1 020	1 005
France-Metropolitan	4 205	5 130	4 446	3 562	3 957	3 953	3 410	3 649
France-DOM ⁽¹⁾	N/A	317	309	263	300	296	305	303
DOM cane sugar ⁽¹⁾	0	0	16	8	9	15	14	14
Ireland	148	168	222	197	222	174	186	223
Italy	1 779	2 048	1 180	1 244	1 275	1 244	1 719	1 718
Netherlands	875	1 044	1 130	743	934	915	1 239	979
Portugal	0	9	9	9	5	4	5	2
United Kingdom	1 106	1 092	1 419	1 062	1 323	1 211	1 323	1 226

⁽¹⁾ DOM: Départements d'outre mer (French overseas departments) are Guyana, Guadeloupe, Martinique, Réunion.

Source: CEFS.

Table 4
Number of sugar and refinery companies

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89
EC	115	110	106	99	98	96	93	88
Belgium	10	10	10	10	10	10	10	9
Denmark	2	2	2	2	2	2	2	2
FR of Germany	30	29	29	23	23	22	21	17
Greece	1	1	1	1	1	1	1	1
Spain	15	13	11	10	7	7	7	7
France	34	34	34	34	34	33	31	31
Ireland	1	1	1	1	1	1	1	1
Italy	18	16	14	14	16	16	16	16
Netherlands	2	2	2	2	2	2	2	2
United Kingdom	2	2	2	2	2	2	2	2

Source: CEFS.

Table 5
Per capita consumption trends

(kg)	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
EC	N/A	34.5	33.9	33.3	33.9	33.5	34.3	34.0
Belgium	36.3	37.5	38.5	39.9	39.3	39.8	38.3	38.9
Denmark	40.0	41.2	39.7	39.1	38.9	39.9	37.9	38.6
FR of Germany	35.9	36.9	35.6	34.7	36.1	35.2	35.3	35.4
Greece	34.3	29.1	29.4	30.5	31.3	31.8	30.6	32.0
Spain	30.2	27.5	27.4	26.4	24.1	26.0	26.1	26.0
France	36.0	36.6	35.5	34.9	34.6	34.2	37.4	35.8
Ireland	40.9	40.7	40.1	39.8	38.8	38.7	38.4	38.4
Italy	29.0	27.6	26.8	25.7	28.9	26.8	26.7	26.3
Netherlands	39.5	39.5	38.3	38.3	38.5	39.2	39.4	38.5
Portugal	N/A	27.6	29.5	30.5	34.1	29.9	30.6	30.3
United Kingdom	38.9	40.5	41.0	40.4	40.2	40.4	42.2	42.1

Source: CEFS.

Table 6
Total sugar consumption (1)

(1 000 tonnes)	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
EC	N/A	10 995	10 855	10 686	10 890	10 790	11 069	10 896
Share of world production (%)	N/A	12	12	11	11	11	11	N/A
Belgium	358	370	379	393	387	392	378	384
Denmark	205	211	203	200	199	204	194	198
FR of Germany	2 212	2 276	2 193	2 127	2 203	2 148	2 155	2 168
Greece	332	284	289	301	310	316	305	320
Spain	1 135	1 041	1 043	1 009	925	1 002	1 013	1 052
France	1 947	1 990	1 938	1 915	1 907	1 892	2 074	1 996
Ireland	140	141	140	140	137	137	136	138
Italy	1 640	1 561	1 519	1 465	1 649	1 534	1 528	1 510
Netherlands	561	564	549	551	556	569	576	567
Portugal	N/A	273	294	306	345	304	313	311
United Kingdom	2 194	2 283	2 308	2 278	2 271	2 293	2 398	2 252

(1) White sugar equivalent.

Source: CEFS.

Table 7
Consumption, 1987/88 (1)

(tonnes)	EC	B	DK	D	GR (2)	E	F	IRL	I	NL	P (2)	UK
Human consumption												
Direct												
(1 000 tonnes)	3 667.0	120.6	54.4	521.7	127.9	485.0	623.5	57.5	790.0	104.0	124.4	658.0
(kg/capita)	11.3	11.8	10.6	8.5	12.8	12.5	10.9	16.3	13.8	7.1	12.3	11.6
Industrial												
(1 000 tonnes)	7 066.0	257.3	139.9	1 613.2	191.9	567.0	1 314.0	77.8	711.3	438.0	186.6	1 569.0
(kg/capita)	21.8	25.1	27.3	26.4	19.2	14.6	23.1	22.0	12.4	29.7	18.5	27.6
Total												
(1 000 tonnes)	10 733.0	377.9	194.3	134.9	319.8	1 052.0	1 937.5	135.3	1 501.3	542.0	311.0	2 227.0
(kg/capita)	33.1	36.9	37.9	34.9	32.0	27.1	34.0	38.3	26.2	36.7	30.8	39.2
Chemical industry												
(1 000 tonnes)	154.7	4.6	2.9	33.4	0.0	0.0	58.0	3.0	8.7	24.0	0.0	20.0
Feedstuffs												
(1 000 tonnes)	8.5	1.7	.8	0.0	0.0	0.0	0.0	1.0	0.0	5.0	N/A	5.0
Total industrial uses												
(1 000 tonnes)	7 229.2	263.7	143.6	1 646.6	191.9	567.0	1 372.0	80.8	720.0	463.0	186.6	1 594.0
(kg/capita)	22.3	25.8	28.0	26.9	19.2	14.6	24.3	22.9	12.5	31.4	18.5	28.1
Total consumption												
(1 000 tonnes)	10 896	384	198	2 168	320	1 052	1 996	138	1 510	567	311	2 252
(kg/capita)	33.5	37.5	38.6	35.5	32.0	27.2	35.0	39.2	26.3	38.4	30.8	39.6

(1) White sugar equivalent.

(2) 40% human direct consumption/60% industrial consumption.

Source: CEFS.

Since sugar beet is an agricultural raw material, production depends on climatic conditions as well as on the area under cultivation, although the effect of such conditions has been greatly diminished by progress in seed quality. Yields (in tonnes of sugar per hectare) however, can vary by as much as 30% in the same country from one year to another. After reaching a peak of 16 million tonnes in 1981-82, EC sugar production has stabilized between 13 and 14 million tonnes in the past five years. These volumes make the EC the world's largest producer, well ahead of the USSR (9 million tonnes), Brazil (7.8 million tonnes) and Cuba (6.9 million tonnes).

Consumption

Sugar consumption has stabilized in the 1980s because market demand became saturated, and new sweeteners have been marketed (i.e. isoglucose, synthetic products). Per capita consumption varies according to national eating habits (from 27 kg/y in Spain to 40 kg/y in Denmark and the United Kingdom). In general, there has been a significant shift year after year from domestic use (table sugars) to industrial use (processed sweetened products, organic chemicals), the latter now representing over 60% of total sugar consumption in the EC.

Trade

According to the terms of Protocol III of the Lomé Convention, the EC is committed to import 1.3 million tonnes of sugar annually from African, Caribbean and Pacific countries for an indeterminate period, the prices paid to the producers being based on current intervention Community price. Since the EC is more than self-sufficient in sugar, these ton-

nages increase the quantities available for exports. In a period of depressed world prices, the results are:

- a significant increase in the export receipts of the countries concerned;
- a specific cost to the EC assimilated by the Community budget.

The EC sugar exports totalled:

- 1982/83: 5 207 million t
- 1983/84: 4 062 million t
- 1984/85: 3 832 million t
- 1985/86: 4 204 million t
- 1986/87: 4 506 million t
- 1987/88: 4 193 million t.

The breakdown of exports by geographical zone for 1987 was 37% for Africa, 40% for the Near and Middle East, 9% for Asia and 11% for non-EC European countries.

Organization of sugar in the EC

The organization of the sugar market in the Community is based essentially on a quota system together with a mechanism for financing exports. Each EC country has an A quota and a B quota called the specialization segment.

The EC total A quota amounts to 10 540 000 million t and the B quota to 2 288 588 million t (A + B = 12 828 588).

Both the A and B quotas benefit from subsidies, in contrast with C sugar produced over and above these tonnages, for which there are no price or disposal guarantees and which must necessarily be exported to third countries.

Table 8
Production and external trade (1)

(1 000 tonnes)	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
Production	15 025	13 948	11 010	12 507	12 738	14 122	13 209
Index	120.1	111.5	88.0	100.0	101.8	112.9	105.6
Imports extra-EC	1 372	1 333	1 389	1 368	1 316	1 497	1 540
Index	100.3	97.4	101.5	100.0	96.2	109.4	112.6
Exports extra-EC (2)	5 183	5 207	4 062	3 832	4 204	4 506	4 193
Index	135.3	135.9	106.0	100.0	109.7	117.6	109.4
X/M	3.8	3.9	2.9	2.8	3.2	3.0	2.7

(1) 1981/82 — 1985/86 EC 10.

(2) Quota + C sugar without transformed products.

Source: Eurostat (Zpa1), CEFS.

Table 9
Production quotas by country

(tonnes white sugar)	Quota A	Quota B	Quota B/ Quota A (%)
EC	10 540 000	2 288 588	21.7
Belgium	680 000	146 000	21.5
Denmark	328 000	96 629	29.5
FR of Germany	1 990 000	612 313	30.8
Greece	290 000	29 000	10.0
Spain	960 000	40 000	10.0
France	2 560 000	759 233	30.0
DOM ⁽¹⁾	436 000	43 600	10.0
Ireland	182 000	18 200	10.0
Italy	1 320 000	248 250	18.8
Netherlands	690 000	182 000	26.4
Portugal	55 000	5 455	10.0
Port./Azores	9 000	909	10.0
United Kingdom	1 040 000	104 000	10.0

(1) DOM: Départements d'outre mer (French overseas departments): Guyana, Guadeloupe, Martinique, Réunion.

Source: CEFS.

Export financing

The sugar sector is regulated by a self-financing system in which producers are responsible for all the costs involved in the export of Community sugar. Nevertheless, re-exporting costs of the equivalent imported tonnage from ACP countries are handled by the EAGFF.

The cost is financed through production contributions from growers (60%) and manufacturers (40%):

- (a) a levy of 2% of the subsidy price for quota A sugar;
- (b) a levy of 39.5% of the subsidy price for quota B sugar;
- (c) when the product of these two levies is insufficient, a special levy must be collected so that the export account can be balanced.

Thus, at the end of a complex process, the costs relating to A sugar and B sugar are entirely financed by the sugar sector.

Because manufacturers are compelled to export non-quota sugar at their own expense, and because C sugar falls into this category, there is no levy on its production.

By way of example, in 1987-88, of the total exports (4 193 000 tonnes) quota sugar accounted for 3 375 000 tonnes and non-quota sugar for 818 000 tonnes.

Industry structure

The European sugar industry, being a heavy-investment sector, is concentrated in a very small number of companies (88 for the whole Community compared with 203 in 1960). Sugar manufacturing is complemented by considerable refining activity, particularly in the United Kingdom, France, and Portugal.

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COMPOUND FEED INDUSTRY

(NACE 422)

The EC compound feed industry consists of two distinct industries, the farm animal feed and the pet food industry, which differ in size and development. We begin by analysing the compound feed industry in its entirety below, and in the following section, look more closely at the pet food industry. Unfortunately, no information was available about the farm animal feed industry.

Summary

1988 has been a good year for compound feed producers. Including Greece for the first time, production totalled almost 100 million tonnes. This represents an increase of about 0.5 % over the previous peak (of 98 879 000 tonnes in 1983).

Current situation

For the first time in many years, progress was recorded in all Member States in 1988 and in all three major production lines: cattle, pig and poultry. There was just one exception, with milk replacers for calves where, following a drop of about 3% in 1987, production fell again by about 4% in 1988.

The following facts played an important role: milk production was intensified; more rational feeding offset the effect of quota; grain and roughage crops were poor; pig prices were favourable; and the overall economic situation in Portugal improved.

Generally speaking, 1988 was a good year for the compound feed industry, but the favourable production figures should not mask the problems: feed mills work at between 30 to 75% of their production capacities; competition is extremely strong and profit margins tight. Production units have been

closed down, while mergers and takeovers continue. The market share between cooperatives and private industry which is currently in a ratio of about 35:65 tends to change in favour of the cooperatives. Integration between industrial feed and livestock production, though difficult to quantify, is in progress.

Consumption

The present situation of consumer demand for livestock products may be characterized as follows:

- consumer demand has reached a saturation point for many commodities;
- competition from new products is increasing;
- every now and then there are incidents causing negative publicity effects on the image of animal production industry (illegal use of additives, health problems);
- human population growth in Europe is nearly stagnant.

These factors have resulted in a stabilizing demand for compound feed in Europe. In addition, a number of countries outside the EC which used to be important target markets for livestock products, became self-sufficient or even started exporting. The products that were destined for these markets had to be sold on the EC market. This excess production problem was exacerbated by the fact that the rapid growth of the livestock markets had stimulated an even larger increase in production capacity of the compound feed industry. New feed mills were built and the capacity and efficiency of the existing ones was increased.

Table 1
Main indicators, 1980-89 (1)
Animal and poultry feeds

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	15 535	16 821	18 275	20 209	21 319	20 593	23 498	24 391	25 606	N/A
Net exports	190	471	410	335	536	404	322	229	163	N/A
Production	15 725	17 292	18 685	20 544	21 855	20 997	23 820	24 620	25 769	25 514
Employment (1 000)	85.8	83.3	80.8	79.3	77.8	74.1	86.9	85.6	85.9	85.7

(1) 1980 EC 9; 1981-85 EC 10.

Source: Eurostat (Inde, Bise, Comext).

Currently, there is obviously an over-capacity in compound feed production. Feed companies have tried to react to this situation by undertaking several adjustments: cutting profit margins, developing new feed markets (fish feed), increasing product differentiation, utilizing new raw materials, adopting new technologies, implementing cost reduction, developing niche market products and participating in new market concepts of animal feed products.

Compound feed demand

Cattle feed

Following a decline in 1987, production went up again by 3.5% in 1988, despite falling dairy cow numbers. France, Italy and the Federal Republic of Germany made substantial progress of 8, 6.9 and 5.4% respectively. Advances were more moderate in Belgium (4.2%), the United Kingdom (0.7%) and the Netherlands (0.1%). Denmark and Ireland were on the losing side. Portugal reached an astonishing score of nearly 18% which is largely due to bad weather conditions and a poor roughage harvest.

Milk replacers for calves

The veal industry continued to be struck by the milk quota. Production costs increased by two main factors: milk replacers became more expensive after the rundown of the intervention stock of skimmed-milk powder. The reduction in dairy herds meant fewer and consequently dearer calves. Especially in the Federal Republic of Germany, the hormone crisis brought a sharp decline in demand for veal.

Pig feed

Pig farmers enjoyed profitable incomes thanks to a favourable cost/selling price ratio. France, Ireland and Denmark made the best scores: 9, 5.9 and 5.4%

respectively. At the other end, Portugal had to cope with swine fever and a consequent loss of pig herds, which reduced demand by more than 5%. In between, Belgium, the Netherlands and Spain progressed by 4.5, 1.1 and 3.8% respectively. The UK and Germany recorded only small increases of 1.6 and 0.8%.

Table 2
Compound feed (1)

(1 000 tonnes)	1984	1985	1986	1987	1988
Cattle feed	29 549	29 056	30 066	31 083	32 214
Index (2)	101.7	100.0	103.5	96.4	99.9
Pig feed	26 671	26 481	27 360	33 356	34 561
Index (2)	100.7	100.0	103.3	106.5	110.3
Poultry feed	21 084	21 147	21 550	26 706	27 255
Index (2)	99.7	100.0	101.9	104.0	106.1
Other	3 707	3 290	3 633	5 229	5 310
Index (2)	112.7	100.0	110.4	124.3	126.2
Total	81 011	79 974	82 609	93 374	99 340
Index (2)	101.3	100.0	103.3	102.9	106.1

(1) 1984-85 EC 10; Greek industrial compound production included at an estimated 1 million tonnes per year; excluding Luxembourg.

(2) Taking into account changes in EC membership.

Source: Fefac.

Poultry

The Portuguese and the Irish industry had a good year with 10 and 7.5%, followed by the UK with 4.6% and France with 3.5%. Italy and Spain also booked minor increases but in all other Member States stagnation and decline are showing.

Raw material consumption

The overall pattern has not changed very much from 1987. The use of grain as animal feed remains in the

Table 3
Compound feed output per livestock class, 1988

(1 000 tonnes)	B	DK	D	E	F	IRL	I (1)	NL (2)	P	UK	EC (3)
Cattle feed	1 352	1 797	7 074	2 309	3 949	1 194	4 200	5 300	927	4 112	32 214
Pig feed	2 688	2 425	5 959	4 169	5 187	446	2 600	7 800	1 102	2 185	34 561
Poultry feed	933	502	3 267	3 802	6 135	373	4 200	3 300	1 052	3 691	27 255
Other	90	139	510	1 020	1 275	148	850	400	136	742	5 310
Total	5 063	4 863	16 810	11 300	16 546	2 161	11 850	16 800	3 217	10 730	99 340

(1) Estimated.

(2) Marketing year 1987/88.

(3) Excluding Greece and Luxembourg.

Source: Fefac.

Table 4
Cereal proportion in compounds

(%)	1983	1984	1985	1986	1987	1988
EC	39.6	39.0	38.3	35.4	32.7	31.0
Belgium	29.3	22.0	20.0	19.6	18.0	18.0
Denmark	37.8	40.5	39.5	33.3	29.2	28.0
FR of Germany	21.6	23.8	24.0	23.6	20.1	18.3
Greece	50.0	50.0	50.0	50.0	50.0	47.1
Spain	65.3	65.0	67.5	68.4	64.9	63.1
France	47.7	48.1	45.6	39.6	33.8	31.0
Ireland	67.2	42.1	46.8	33.3	38.1	33.3
Italy	53.6	51.4	52.8	51.9	48.2	47.1
Netherlands	15.3	15.6	16.1	13.9	12.1	11.9
Portugal	55.1	65.4	52.0	37.9	30.0	25.8
United Kingdom	43.8	45.3	42.3	38.4	40.6	38.3

Source: Fefac.

limelight. Since 1983 the cereal proportion in compounds has continued to decline.

Grain use is decreasing and use of grain replacers is increasing, resulting in a grain percentage use of 39 in 1984 and 31 in 1988. Grain replacers are heavily used in Benelux and the Federal Republic of Germany, but inclusion in compound feed in the southern European countries is decreasing as well.

Table 5
Raw material consumption

(1 000 tonnes)	1984	1985	1986	1987	1988 (1)
Manioc	5 257	6 336	5 822	6 986	6 900
Sweet potatoes	101	351	602	607	600
Grain offals	1 197	973	683	230	100
Corn gluten feed	3 734	3 542	4 097	4 707	4 500
Maize feed meal	1 036	958	1 440	2 393	2 800
Brewery distillers	416	436	633	853	700
Citrus pulp	1 322	1 467	1 237	1 652	1 500
Beet pulp	417	488	321	483	700
Other	133	114	207	347	500
Total	13 613	14 665	15 042	18 258	18 300

(1) Estimated.

Source: Fefac.

Regulatory environment

Maximum Aflatoxin levels in babassu, cotton, colza, palm kernel, groundnut and maize, as well as their derivatives have been fixed at 0.2 ppm for raw materials.

The great battle for keeping coccidiostats under the additives regulation has started. More and more feed legislation tends to be based on socio-economic parameters in addition to the traditional criteria of quality, safety and efficiency. Minimum standards for keeping pigs and calves in intensive production

systems are being tabled for adoption by the Council of Ministers.

At Community level, measures are being prescribed for the limitation of water pollution by nitrates. Member States are making efforts to reduce phosphorous contamination by feeding lower P levels.

The compound feed industry is playing a positive role to reduce the negative environmental effects:

- improved feed conversion ratio by better nutrition will result in a lower quantity of manure;
- reduced mineral contents in the feed;
- detailed adjustment of feed programmes to the requirements of the different growth or production phases;
- improvement of the availability of minerals in raw materials, for instance phytase project;
- recycling projects.

Technological development

The future of the compound feed industry will be influenced by new technological developments in its own field and in other sciences:

- biotechnology, resulting in new additives, BST, PST, Beta-agonists, etc., resulting changes in population structures, feed standards and requirements;
- enzymes and probiotics, creating changes in feed values, feeding systems and changes in the importance of certain raw materials;
- genetic engineering, with consequences for requirements, performances, disease resistance, new products, but also for consumer acceptance;
- information technology.

The compound feed industry will continue to face intense competition not only among existing feed companies but also with new potential entrants and substitute products.

Feed companies serving a number of sectors may be low cost driven, or may try to differentiate by combining feed sales with extensive service packages, or find other ways to distinguish from the overall market.

Other companies operate on a narrower base (for instance specialized in one segment of the market), aiming for economies of scale or trying to differentiate (top quality young animal feed service companies, etc.).

Market segmentation or differentiation can be done in different directions: livestock sector (e.g. poultry, pigs, dairy), type of farming (e.g. free-range products), type of product aiming at special markets, consultancy services separated from feed.

If companies have to adjust to new competitive environments, different strategic options are open: forward integration, adding new services to the product, developing niches for speciality feeds, acquisition of competitors in order to diminish capacity.

Outlook

For 1989 indicators and estimates point to a decline of about one million tonnes of compounds in the EC 9 and an increase of about one million tonnes in Portugal, Spain and Greece. Compound production in Greece is indeed expected to expand thanks to the EAGGF programme. Total EC production would thus still stay around its peak of 100 million tonnes.

Some experts believe, however, that this forecast may be too optimistic. It appears indeed, that in some major producing countries such as Germany, the Netherlands and the UK, production has already been falling sharply in the first half of 1989.

The internal market for compound feed is saturated and offers little prospects for large progress. Being a product with low added value, long distance export is not easy. Export refunds granted under the CAP system are insufficient to build up real and regular markets in third countries.

Consumption per head of beef and veal will decrease over the next decade. Poultry meat consumption is

expected to increase considerably to a level close to that of beef consumption, while pork consumption will increase further following a brief stagnation this year.

Egg consumption will continue to decrease as in recent years, unless product development and strong marketing efforts succeed in creating new opportunities and opening large consumer segments. Feed compounders and producers have to work hand in hand with marketing organizations to reach this goal.

The compound feed industry has to cope with overcapacity in certain regions, and consequently with pressure on margins and struggle for tonnage. There will be a tendency to stronger market orientation. On one side, 'free' feed sales to farmers will be the objective, but involvement of the feed industry in integrated projects to produce specified animal products will also continue to develop.

Downstream activities will receive more emphasis and will have more influence on product specification, production circumstances and also on margins. Concepts of quality control through the total production chain will grow, resulting in co-makership between subsequent stages of the production chain. This tendency will also lead to specialization and vertical integration.

Flexibility, control and optimal adjustments of the subsequent partners is a must to compete adequately with fully integrated organizations.

A continuing consolidation and concentration process of companies seeking a stronger market position and increased market share is expected. The long-term value of takeovers and mergers, however, will be determined by how well company structures and market approaches match. In spite of the larger organizations, the feed companies tend to maintain their regional or national character to address the specific nature of the many regional and national markets.

Retail organizations and processors of animal products are rapidly reaching a European scale. To follow this trend and to prepare for 1992, feed or animal production companies are trying to acquire, merge or cooperate to reach a global scale.

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PET FOOD

(NACE 422.2)

Summary

Industrial production of pet food began in Europe in the late 1950s. In a quarter of a century, the prepared pet food industry has made its mark as a new and important sector of the food processing industry; its unique characteristics and rapid growth have made it one of the most dynamic processors of agricultural materials. Situated between the food industry on the one hand and the feedingstuff industry on the other, the prepared pet food industry has proved to be an additional and valuable outlet for agricultural produce. Its prime merit lies in its potential for giving added value to materials and surpluses not taken up by food and the foodstuff industries. The prepared pet food industry provides direct employment for some 18 000 people. A strong growth rate of around 7% per year, which is very high for the food industry, is expected over the medium term.

Description of the sector

The EC pet food industry covers three major product categories :

- dog food
- cat food
- food for other pets, such as birds, fish, etc.

Current situation

One of the dominant characteristics of this industry is investment in technology and high-performance equipment, which enables it to develop quality foods from materials (meat, poultry and fish by-products, cereals and vegetables) not used for human consumption or in excess of requirements. In giving added value to these agricultural by-products and materials, which were previously often wasted, the activity of the Community pet food industry has a

positive impact on the income and profit margins of farmers and fishermen. It also lowers the cost of other parts of the carcass, which reduces meat prices to the consumer, and as a result of it, substances such as blood, which in the past were inevitable sources of pollution, are reprocessed. Prepared pet food significantly reduces the quantities of fresh meat taken from the human food chain to be fed to pets.

Consumption

From a very modest level in 1950, the increase in sales of prepared pet food has been rapid, as may be seen from the turnover figures over the past decade.

The number of companies involved in the manufacture and marketing of prepared pet food has risen in line with the growth in the market. In 1987 there were 248 production units, of varying sizes, located in all regions of the Community. None of the Fediaf member companies which represent 94% of EC production utilize meat or by-products from whales, kangaroos or other endangered species in the manufacture of pet food.

Today over half of the 44 million pet-owning households, corresponding to 170 million animals in the European Community, use prepared pet food on a regular basis and this trend is increasing.

Products are prepared scientifically according to nutritional requirements recommended by the National Research Council (NRC) of the National Academy of Sciences of the USA. The industry manufactures (under biochemical, bacteriological and organoleptic control) a very wide range of products and recipes that provide variety and are nutritionally sound and convenient. Pet foods for cats and dogs may be categorized according to the manufacturing process or method of use:

Table 1
Pet food sales

(million ECU)	1974	1978	1981	1983	1986	1987
Sales	653	1 298	2 179	2 552	3 188	3 437

Source: Fediaf.

- products sterilized in metal containers;
- intermediate moisture products with moisture levels ranging from 15 to 50%;
- dry products with a maximum moisture level of 14%.

In each of these categories:

- complete products offering the animal in good health all the nutritive elements it needs;
- complementary products which need to be fed together with other foods to ensure a balanced diet.

Table 2
Consumption of raw materials, 1986

(1 000 tonnes)	
Meat by-products	1 193
Fish by-products	114
Cereals and vegetables	965

Source: Fediaf.

Other pet foods include food for birds, aquarium fish and small animals (hamsters, etc.). This exists in a range of forms, such as biscuits, flakes or pellets. In each case, the products can be complete or complementary.

Trade

Due to the absence, up to 1987, of specific subheadings for pet food in the Nimexe, there are no figures available on imports of raw materials and exports or imports of prepared pet food. However, the majority of the materials used by the pet food industry originate from the European Community. Imports consist mainly of primary offal (liver, lungs) of which the quantities available in the EC are insufficient. These imports subsequently enable the industry to use greater quantities of secondary EC by-products.

Trade between Member States in pet food is highly developed. However, the Community market is self-sufficient, and the import of finished products is minimal.

On the other hand, efforts to expand into foreign markets are beginning to bear fruit. According to data collected amongst Fediaf members, the exports of prepared pet food are estimated at 190 000 tonnes. This is already quite an achievement and an obvious

indication of the international competitiveness of the industry given the impact of transport costs of these weighty products in relation to low unit prices. Foreign markets are promising and should lead to an increased surplus.

Outlook

The rapid growth rate of the European pet food industry demonstrates that it meets a real need by providing pet-owners with the assurance that prepared pet food is of consistently high quality allowing nutritionally balanced feeding.

Table 3
Breakdown of sales, 1987

(1 000 tonnes)	
Dog food	
Tinned	1 099
Other	607
Cat food	
Tinned	948
Other	209
Foods for birds, fish and other pets	55
Total	2 918

Source: Fediaf.

However, there is still potential for further development. Increasing numbers of pet-owners realize that prepared pet food is the best way to keep their pets healthy.

According to estimates, over the next five years, the growth trend in prepared pet food sales will be close to 50% in the European Community. This may be explained in part by a rise in the pet population, but to a greater extent by the fact that pet-owners increasingly understand the importance of a nutritionally balanced diet as a means of keeping their pets in good health.

Hence, strong motivation exists for the industry to further intensify its efforts in research and development, to maintain its rate of investment and to increase its positive contribution to the Community economy as a whole and to agriculture in particular.

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MISCELLANEOUS PRODUCTS

(Included in NACE 423)

SOLUBLE COFFEE

(Included in NACE 423.10.1)

Summary

The soluble coffee industry is based on heavy capital investment and high technology.

Compared to the world's total coffee consumption, soluble coffee consumption represents about one-third of the world green coffee consumption. The EC, the USA, Japan and Australia are at present the biggest instant coffee consumers. EC production of instant coffee grew slowly through the 1980s to reach 87 631 tonnes in 1987. Imports represent 17.6% of consumption while only 8.7% production is exported.

Consumption

Soluble coffee consumption inside the EC stabilized at around 97 006 tonnes in 1987 after peaking at about 100 137 tonnes in 1984. The UK represents about half of EC soluble coffee consumption, followed by France and the Federal Republic of Germany (16 300 tonnes and 12 000 tonnes). Consumption per capita is the highest in the UK at 0.86 kg and to a lesser extent in Ireland (0.50kg/head). In the EC as whole, the consumption per capita averaged 0.30kg in 1987 and has remained stable over the past few years.

Trade

There is a 9% tariff quota on imports (instead of the usual 18%) within the generalized system of pref-

erences (GSP), as a result of which 19 200 tonnes are imported at half the duty rate.

The fact that coffee is subject to the International Commodity Agreement (ICA) may have some repercussions on the supply of green coffee for processing. As one manufactures to national and even local tastes (by blending coffees of different origins), availability is sometimes hampered by the ICA quota system.

Coffee is a commodity that represents a very important revenue for the countries of origin and there have been times when coffee ranked immediately after oil in the importing countries' trade balance.

Soluble coffee is one of the few processed products for which the principle of purity is fully implemented; the EC Directive on coffee and chicory extracts (77/436) stipulates that soluble coffee is to be obtained by extraction from roasted coffee beans, the only acceptable medium of extraction being water.

There are no soluble coffee factories in Denmark, Greece and Ireland. There is considerable trade between Member States and about 20 000 tonnes of soluble coffee are imported and around 8 000 tonnes are exported every year.

Regulatory environment

The International Coffee Agreement (ICA) is of particular relevance to the activities of the European coffee industry and to European trade. The

Table 1
Main indicators, 1983-87
Instant coffee

(tonnes)	1983	1984	1985	1986	1987
Apparent consumption	96 801	100 137	97 039	96 079	97 006
Imports	25 163	23 859	23 634	17 605	17 051
Exports	6 175	6 258	8 295	8 360	7 676
Production	77 813	82 538	81 700	86 834	87 631

Source: Eurostat and Afcasole.

Table 2
Instant coffee consumption

	Total consumption (tonnes)					Per capita consumption (kilograms)				
	1983	1984	1985	1986	1987	1983	1984	1985	1986	1987
EC	96 801	100 137	97 039	96 079	97 006	.30	.31	.30	.30	.30
Belgium, Luxembourg	1 271	1 251	1 257	1 318	1 296	.13	.12	.12	.13	.13
Denmark	440	570	300	408	360	.09	.11	.06	.08	.07
FR of Germany	14 000	13 000	12 500	12 000	11 900	.23	.21	.20	.20	.20
Greece	3 500	4 500	3 357	3 470	3 180	.35	.46	.34	.35	.32
Spain	8 500	8 500	8 500	8 700	8 900	.22	.22	.22	.22	.23
France	14 300	16 100	16 400	16 200	16 300	.26	.29	.29	.29	.29
Ireland	1 540	1 970	2 287	2 350	1 760	.44	.55	.65	.66	.50
Italy	1 900	1 700	1 300	1 490	1 490	.03	.03	.02	.03	.03
Netherlands	1 400	1 400	1 440	1 590	1 530	.10	.10	.10	.11	.10
Portugal	800	800	800	800	1 390	.08	.08	.08	.08	.13
United Kingdom	49 230	50 340	49 000	48 000	48 900	.87	.89	.86	.84	.86

Source: Afcaso.

implementing body of the ICA, the International Coffee Organization (ICO), is an intergovernmental organization. Its members are 50 coffee exporting countries, representing some 99% of world coffee production, and 24 importing countries (amongst others, all EC Member States), accounting for about 87% of world consumption. In a nutshell, its main objective is to bring about a balanced supply-demand situation with stable prices. It achieves this mainly through a system of exports quotas: the total annual volume of coffee allowed for export to members is limited to a quantity that is expected to result in the maintenance of a weighted average of prices within a predetermined range (in recent years USD 1.20 to 1.40/pound). The total volume is distributed to individual producing countries. There is a complex system to ensure that the volume exported by each individual producing country remains within its allotted export quota.

Table 3
Imports of green coffee into the EC

(tonnes)	1985	1986	1987	1988
EC	1 551 710	1 537 300	1 645 341	1 629 794
Belgium, Luxembourg	101 247	81 624	88 668	82 220
Denmark	46 296	46 455	50 844	50 019
FR of Germany	423 427	452 888	487 026	492 399
Greece	20 292	12 500	21 361	22 200
Spain	133 390	149 092	147 198	141 468
France	275 750	281 515	297 020	303 001
Ireland	530	654	756	858
Italy	281 087	251 547	263 318	259 401
Netherlands	144 750	141 203	155 465	150 731
Portugal	22 051	20 831	27 420	25 100
United Kingdom	102 884	98 991	106 265	102 327

Source: EUCA.

Since exports to non-members (primarily countries in Eastern Europe and the Middle East) are not limited in volume, countries that produce more coffee than the quality covered by their export quotas compete for a share in non-member markets. This has resulted in prices that were half of those prevailing in the member market causing problems of a political as well as economic nature.

The rigidity of the quota allocation system has been a particular source of concern for the European coffee industry. Changes in the consumption pattern could not be accommodated by an increase of the quota for those countries whose coffees were in demand. This has recently contributed to excessive price differences between the two main types of coffees, i.e. Arabicas and Robustas.

The ICO has been in existence since 1962. The underlying treaties have regularly been renegotiated. The ICA went into force in 1983 and expires on 30 September this year. Since 3 July 1989 however, the quota system has been suspended and after 5 days of negotiations between producers and consumers members of the ICO, no agreement could be reached. This has led to a sharp decrease of coffee prices, which fell to their lowest level for 14 years (Robustas as well as Arabicas). The market is thus now governed by supply and demand, and prices are the same for all countries. The ICO will continue to exist, providing statistical information and serving as a forum in which discussions on a new and fully functional ICA can be resumed.

The suspension of the quota system offers new opportunities to producing countries such as Brazil, Indonesia or Central American countries to recapture market shares, especially as crops are expected

to be exceptionally favourable in 1990 and 1991. However, the very likely drop of prices, which already started will have an important impact on export earnings in countries which do not have sufficient reserves to follow an aggressive commercial policy or mainly produce less demanded sorts of

coffee such as Robustas (Madagascar or African countries, as for example, the Ivory Coast).

Afcasole: Association des fabricants de café soluble des pays de la Communauté européenne
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TEA

(NACE 423.10.5)

Tea consumption in the UK, by far the largest consumer in the Community, has gradually been decreasing over the last 25 years. In 1977, it amounted to 200 000 tonnes and in 1987, it had fallen to about 160 000 tonnes.

Table 4 shows the imports of tea in the different EC countries. In 1988, EC imports totalled 215 800 tonnes. The United Kingdom is the first importer with 162 699 tonnes or 75.4% of the total, the Federal Republic of Germany (14 800 tonnes or 6.8%), Ireland (10 376 tonnes or 4.8%), France (10 155 tonnes or 4.7%) and the Netherlands (9 500 tonnes or 4.4%) are following but with much smaller amounts.

In almost all EC countries, imports had slightly fallen in 1987 but the increasing trend has resumed as in the beginning of the 1980s.

Table 4
Imports of tea into the EC

(tonnes)	1985	1986	1987	1988
EC	208 837	225 802	195 142	215 800
Belgium, Luxembourg	1 295	1 498	1 214	1 300
Denmark	2 317	2 432	2 155	2 200
FR of Germany	15 500	15 500	14 700	14 800
Greece	300	300	300	300
Spain	734	719	730	740
France	9 154	10 036	9 148	10 155
Ireland	10 656	11 295	10 885	10 376
Italy	3 876	3 295	3 489	3 500
Netherlands	9 361	9 429	9 725	9 500
Portugal	285	232	217	230
United Kingdom	155 359	171 066	142 579	162 699

Source: CEEdT.

CEEdT: Comité européen du thé
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VINEGAR

(NACE 423.3)

Summary

The vinegar industry is an innovative sector. A large part of the annual income in turnover is generated by new products. Production in the EC reached 398 million litres in 1987. This is a 1.8% decrease compared with 1986. Consumption fell by about the same percentage but is still higher than production. As a result, net exports still remain more positive with about 14.7 million litres.

It should be noted that all the figures given below are calculated for vinegar with 10% acidity. Moreover,

Greece, Luxembourg, the Netherlands and Portugal are not included.

Production and consumption

In 1987, there were 152 vinegar companies in the EC. These are mostly concentrated in Southern Europe, especially in Italy (44), Spain (32) but also in the Federal Republic of Germany (30) and France (24). Their total turnover reached ECU 197 million in 1987. The average production per company was 2.6 million litres in 1987. This is a slight decrease

compared to 1986. The distribution of production among the EC countries has the following in 1987: the Federal Republic of Germany 29.9%, France 22.2%, UK 16.6%, Italy 13.4%, Spain 10.5%, Belgium 4.1%, Denmark 3%, Ireland 0.3%.

Table 5
Main indicators, 1986-87 (1)
Vinegar

(hundred litres)	1986	1987
Apparent consumption	3 922 538	3 837 844
Net exports	134 499	146 920
Production	4 057 037	3 984 764
Per capita consumption (2)	1.4	1.3
Number of enterprises	150	152
Average production (3)	27 047	26 215

(1) Excluding Greece, Luxembourg, the Netherlands and Portugal.

(2) Litres

(3) Average production of fermented vinegar by company.

Source: CPIV.

As mentioned before, fermented vinegar amounted to 3 984 764 hectoliters in 1987. Fifty-five percent of it was distilled vinegar which is mainly produced in the Federal Republic of Germany and France. Wine vinegar accounted for 34.5% of total production and Italy, Spain and France are the largest producers for this type of vinegar. The remaining 10.5% are other vinegar for which the UK is the main supplier in the EC.

Per capita consumption of vinegar in the Community amounted to 1.5 litres, which is a slight increase in comparison with the previous year's level, e.g. 1.3 litres. The highest level was registered in Denmark (2.4 litres) and the lowest in Ireland and Italy (respectively 0.4 and 0.9 litres). In Italy, however, large quantities of vinegar are still being pro-

duced from wine in households and, consequently, the average consumption is actually much higher.

The raw material for vinegar production is alcohol, which is extracted by fermenting agricultural products such as wine, sugar beet, potatoes or fruit. As a result, the vinegar industry is a major purchaser for wine. In 1988, some 1.5 million hectolitres of wine, 250 000 hectolitres alcohol and 400 000 hectolitres of malt, fruit wine and other raw materials were produced in the Community. Distilled alcohol usage is diminishing, while wine and other raw materials such as cider are increasingly used.

Trade

EC imports amounted to 176 479 hectolitres in 1987, which is about the same level as in 1986. For Ireland and Belgium, imports represent about 50% of production while only 1 to 6% in the other EC countries. EC exports reached 323 349 hectolitres in 1987. This means a 3.8% increase in comparison with 1986. In Germany, exports accounted for 15.1% of production. Here again, in the other EC countries, the situation is different: the share of exports in total production only represents between 3 and 7% of production.

The annual increase in turnover is to a large extent generated by new products, which are mostly convenience oriented. To develop new products and improve the various types of vinegar, companies have their own research and development departments.

For the eight EC countries considered, total turnover reached about ECU 200 million in 1987.

Table 6
Production of vinegar

(1 000 hl)	1980	1981	1982	1983	1984	1985	1986	1987
EC (1)	3 540	3 589	3 804	3 601	3 978	4 099	4 057	3 985
Belgium	102	125	167	190	137	154	171	164
Denmark	133	136	152	128	134	145	142	119
FR of Germany	993	1 081	1 150	1 128	1 086	1 177	1 230	1 192
Spain	N/A	N/A	N/A	N/A	363	381	398	417
France	987	1 021	1 077	925	993	987	930	885
Ireland	13	13	12	12	12	10	9	10
Italy	522	522	550	550	541	526	540	535
Netherlands	130	107	90	91	84	84	N/A	N/A
United Kingdom	661	584	606	579	628	636	638	663

(1) Excluding Greece, Luxembourg and Portugal; 1980-83 excluding Spain; 1986-87 excluding the Netherlands.

Source: CPIV.

Regulatory environment

The producers of fermentation vinegar are organized in national professional associations. In 1949, these national associations came together in the permanent committee of vinegar producers.

At present, a great deal of the ongoing discussion is focused on the single market of 1992. The Permanent International Vinegar Committee asked the Commission for a clear distinction between fermentation vinegar from agricultural produce on the one hand, and chemically produced substitutes on the other.

In addition, a Code of Practice for vinegar is under preparation, based on the FAO/WHO standard for vinegar of 1986; the goal being to establish what is meant by good quality produce and thus assure the free movement of goods without competitive distortions.

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ALCOHOL AND SPIRITS

(NACE 424)

Summary

This sector includes two major categories of products: spirits and ethyl alcohol of agricultural origin. The latter is used in many different ways, such as in food processing (spirits, vinegar, etc.), and solvents and chemical reagents, and has potential applications in the automobile sector. The EC is the world's leading exporter of spirits: EC whiskies and brandies (cognac, armagnac, etc) dominate export markets, followed by gins, vodkas and liqueurs. But within the EC, consumption has not increased for years.

Table 1
Estimated manpower (1)

(1 000)	Employees	Enterprises (2)
1980	85	532
1981	81	511
1982	77	498
1983	75	469
1984	68	449
1985	65	437
1986	65	409
1987	64	N/A
1988 (3)	66	N/A

(1) For enterprises employing 20 employees or more.

(2) Excluding Denmark, Ireland and Luxembourg.

(3) Estimated.

Source: Eurostat (Inde), UEAES.

National tastes still prevail, with, for instance, Korn in Germany, pastis in France, ouzo in Greece, jenever in the Netherlands and Belgium, akvavit in Denmark. But major categories of drinks are consumed everywhere such as whisky (or whiskey in Ire-

land), brandy (or Weinbrand in Germany), gin, vodka, rum and liqueurs.

Direct manpower in the alcohol and spirit sectors for enterprises employing 20 persons in the EC can be assessed as shown in Table 1.

Production

If there was a slight increase in production in 1987 over 1986, this was mainly due to developing export markets. The EC alcohol and spirits sector consumes an estimated 2 to 2.4 million tonnes of solid raw materials (cereals, potatoes, fruit) and in addition, an estimated 24 to 25 million hl of wine (including quantities bought up by intervening authorities), beet molasses and cane juice or syrup.

Table 3 shows that in 1987 the EC produced more than 12 million hl of pure alcohol of agricultural origin compared with 8.6 million hl for the EC 10 in 1980. On the other hand, three Member States (Germany, the UK and France) produced ethyl alcohol from ethylene at a rate of 5 million hl per year.

Alcohol from molasses is produced in all EC countries except Luxembourg and represents a little under a third of overall agricultural alcohol production.

Grape alcohol ranks first in alcohol production at 4 to 5 million hl per annum and is produced in five

Table 2
Production of ethyl alcohol by agricultural origin, 1980

(1 000 hl)	Molasses	Beets	Cereals	Wines	Fruits	Potatoes	Others	Total
EC 10	2 878	1 648	491	2 516	393	605	74	8 605
Belgium	114	0	2	0	0	0	0	116
Denmark	82	0	19	0	0	19	0	120
FR of Germany	242	0	83	0	54	561	0	940
Greece	206	0	0	84	77	0	0	367
France	569	1 648	0	1 432	3	0	44	3 696
Ireland	858	0	15	0	0	0	30	107
Italy	62	0	0	1 000	259	25	0	2 142
Netherlands	569	0	45	0	0	0	0	614
United Kingdom	176	0	327	0	0	0	0	504

Source: Eurostat (Zpa1), UEAES.

Table 3
Production of ethyl alcohol by agricultural origin, 1987

(1 000 hl)	Molasses	Beets	Cereals	Wine	Fruit	Potatoes	Other	Total
EC	3 642	1 925	808	5 419	384	444	117	12 739
Belgium	75	0	5	0	0	0	0	80
Denmark	93	0	11	0	0	15	0	119
FR of Germany	122	0	46	0	63	427	8	666
Greece	151	0	0	50	77	0	19	297
Spain	600	0	80	1 200	0	0	60	1 940
France	900	1 925	67	1 500	99	0	0	4 491
Ireland	40	0	10	0	0	0	23	73
Italy	869	0	306	2 659	105	2	0	3 941
Netherlands	598	0	19	0	0	0	7	624
Portugal	15	0	0	10	40	0	0	65
United Kingdom	179	0	264	0	0	0	0	443

Source: Eurostat (Zpa1), UEAES.

countries (Italy, France, Spain, Greece and Portugal) most of which benefits from Community intervention in wine growing.

Only France produces alcohol directly from sugar beet. National assistance in this subsector has been abolished as a consequence of the dismantling of the State monopoly.

The other categories of alcohol and spirits are less important, depending on market conditions for their raw materials (fruit, figs and potatoes, each of which represents less than 1 million hl per annum).

The leading producer of spirits is the UK which claims over a third of Community production. Some sectors are now recovering from deep depressions and others are still declining.

Consumption

Produktschap voor Gedistilleerde Dranken (Schiedam) publishes the alcohol consumption figures in terms of amounts of pure alcohol. This makes it possible to observe trends over given periods. Consumption levels are provided per capita for the whole population.

Table 5 shows the changes in total consumption of pure alcohol per capita in the 12 EC countries over the period 1960-87.

Those figures are broken down for the three main categories of alcoholic drinks (spirits, wine and beer) which appear in Table 6:

Table 4
Estimated annual production of spirits

(1 000 hl)	1983	1984	1985	1986	1987	1988
EC	9 050	8 950	9 500	9 600	9 600	N/A
Belgium	74	74	74	64	64	N/A
Denmark	79	87	93	77	74	N/A
FR of Germany (1)	1 080	1 055	1 031	997	976	N/A
Greece	105	105	105	105	105	N/A
Spain (2)	1 070	1 070	1 214	1 201	1 129	1 100
France (3)	2 200	1 800	2 150	2 100	2 060	2 280
Ireland	125	125	125	120	120	N/A
Italy	990	990	900	850	800	N/A
Luxembourg	3	2	2	2	2	2
Netherlands	378	325	311	306	296	302
Portugal	88	90	83	85	78	N/A
United Kingdom (4)	2 846	2 983	3 093	3 108	3 376	3 784

(1) Excluding Bouilleurs de cru. Structure: Weinbrand 27%, rum 10%, bitters 8%, liqueurs 9%, eau de vie (from fruit) 5%, miscellaneous 14%.

(2) Structure: brandy 35%, anis 10%, girebra 22%, rum 10%, whisky 7%, miscellaneous 16%.

(3) Structure: anis 27%, cognac 23%, cereal-based spirit 13%, rum 4%, others 33%.

(4) Structure: Scotch whisky 83%, vodka and gin 17%. Others not included.

Sources: National associations and UEAES.

Table 5
Consumption trends — pure alcohol

(litres per capita)	1960	1970	1980	1985	1986	1987
Belgium	6.4	8.9	10.8	10.5	10.3	10.7
Denmark	4.6	6.8	9.2	9.9	10.0	9.6
FR of Germany	6.8	10.3	11.5	10.8	10.5	10.6
Greece	5.3	4.7	6.7	6.2	4.6	5.4
Spain	8.6	12.1	14.1	11.8	11.7	12.7
France	18.2	17.3	14.4	13.3	13.2	13.0
Ireland	3.9	4.5	7.3	5.6	5.5	5.4
Italy	13.8	13.8	11.5	11.6	10.2	10.0
Luxembourg	11.1	10.1	18.4	13.0	12.7	13.0
Netherlands	2.5	5.6	8.8	8.5	8.6	8.3
Portugal	10.4	15.6	11.0	13.1	11.2	10.5
United Kingdom	5.1	6.4	7.1	7.1	7.1	7.3

Sources: Produktschap voor Gedistilleerde Dranken and UEAES.

- spirits, expressed in litres of pure alcohol,
- wine, expressed in litres of volume,
- beer, expressed in litres of volume.

Table 6
Alcohol consumption by country, 1987

(litres per capita)	Spirits (1)	Wine (2)	Beer (2)	Total (1)
EC	2.00	45.00	80.00	10.00
Belgium	2.15	23.00	121.10	10.70
Denmark	1.50	20.60	118.10	9.60
FR of Germany	2.24	25.80	144.20	10.60
Greece (3)	N/A	31.80	32.30	5.40
Spain	3.00	54.00	64.50	12.70
France	2.30	75.10	38.90	13.00
Ireland	1.70	6.00	75.00	5.40
Italy	1.00	79.00	25.60	10.00
Luxembourg	2.50	58.50	116.50	13.00
Netherlands	2.07	14.60	84.30	8.30
Portugal	.80	64.30	40.00	10.50
United Kingdom	1.73	11.00	110.50	7.30

(1) In litres of pure alcohol.

(2) In litres in state.

(3) Beer and wine only.

Source: Produktschap voor Gedistilleerde Dranken.

If it is assumed that the volume of wine consumed contains an average of 11% pure alcohol and that of beer an average of 4%, the consumption of pure alcohol works out to about 20% for spirits, 50% for wine and 30% for beer.

Trade

EC 12 is still the world's leading exporter of spirits, with Scotch and Irish whiskies and widespread brandies (cognac, armagnac, Weinbrand and French, Italian, Spanish, Greek and Portuguese brandies) leading the market, as well as liqueurs.

Over 80% of all Scotch whiskies sold during 1987 and 1988 were exported, with a substantial increase in exports during 1988.

Table 7
External trade in Scotch whiskies

(1 000 hl) (1)	1987	%	1988	%
UK domestic sales	446.0	15.7	451.7	15.5
Exports	2 401.7	84.3	2 459.7	84.5

(1) Pure alcohol equivalent.

Source: UEAES.

The 10 principal markets for Scotch whisky and whiskey produced in Northern Ireland are:

USA	18.2%
UK	15.5%
France	10.1%
Japan	5.8%
Spain	4.8%
Italy	4.1%
South Africa	3.3%
Australia	3.2%
Federal Republic of Germany	2.6%
Belgium-Luxembourg	2.0%
EC 12	45.0%

The second-ranking export item obviously is cognac, for which external trade is increasing as well.

Table 8
External trade in cognac

(1 000 hl) (1)	1987	%	1988	%
French domestic sales	33.2	8.6	35.2	8.3
Exports	354.1	91.4	390.0	91.7

(1) Pure alcohol equivalent.

Source: UEAES.

Table 9
Concentrations and mergers in the EC spirit drink industry

	1986	1987	1988	First quarter of 1989
Enterprises concerned and type of arrangement	Guinness plc acquires majority in Distillers Company plc, after previous purchase of Arthur Bell	I.B. Berentzen and Pabst und Richarz: merger Allied Lyons sells its 12% share in Bacardi to the Bacardi family Moët/Hennessy purchases Hine cognac from Guinness Allied Lyons acquires the remaining 49% share of the Canadian concern Hiram Walker	Whitbread takes over James Burrough (UK) The Canadian concern Seagram acquires Martell & Cie The Dutch Lucas Bols takes over the German Strohtman Asbach acquires all shares held by Doornaat Cointreau and Remy Martin: cooperation agreement Bruggeman acquires Fryns from the Irish Yoko Fresh Foods Allied Lyons and Suntory: cooperation agreement Pernod-Ricard obtains majority in Irish Distillers Group	Idv. International Distillers & Vintners acquires the Portuguese company Sileno Merger: the Danske Spirit-Fabrikker and the Danske Sukkerfabrikker Louis Royer is acquired by Suntory Idv. International Distillers & Vintners and Metaxa sign an agreement for the takeover of 100% in SEA Metaxa Distillers SA and of 30% in N. Kaloyannis Bros SA

Source: UEAES.

The 10 principal markets for cognac in 1987 were (in hl of pure alcohol):

USA	93 417
UK	47 585
Japan	44 120
France	35 155
Federal Republic of Germany	31 304
Hong Kong	30 193
Belgium	11 406
Netherlands	10 732
Singapore	10 332
Canada	7 696

Expanding markets are the US and the Far East (Singapore, Taiwan, Thailand, Hong Kong, Japan, Malaysia).

The principal external outlet for the German Weinbrand is the US as well, while Spanish brandy is a well-known product in Latin America. Italian and Greek emigrants remain loyal to their fatherland's products, their emigrant concentration being as far away as Australia. French, Dutch and Danish brand liqueurs can be found everywhere, as can British and

Irish cream liqueurs. German-based eau-de-vie, which originates in the Black Forest, are appreciated in Japan and the US.

Some imported products such as US bourbon, Canadian whisky and Mexican tequila long ago made their entry. The Community has bilateral agreements with the US (for bourbon) and Yugoslavia (for slivovitch), for instance. Rum is imported from the Caribbean.

Structural change

Announcements made from 1986 until the beginning of 1989 indicate intensive regrouping in and outside the EC spirit-drink industries for the most part oriented to the expanded new market as from 1 January 1993 in Europe. In Table 9 we only report on the most significant of these regroupings.

UEAES: Union européenne des alcools, eaux de vie et spiritueux
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SCOTCH WHISKY

Summary

Scotch whisky is easily the European Community's leading net export earner among spirituous beverages with volume sales greater than the combined total of all other Community-produced spirituous beverages. It is also Scotland's leading net export earner and one of the top five in the United Kingdom. 15 000 are employed within the industry, with employment also provided in many ancillary industries, e.g. carton, label, cap, bottle and transport.

Production

Scotch whisky is distilled mainly from barley and maize. Barley, of malting quality, is bought almost entirely from UK farms. Maize is, in the main, imported from countries outside the EC. A small quantity of high-diestase barley is imported. Except for very small quantities of caramelized sugar, used solely to standardize the colour of the final product, all whiskies are distilled from natural ingredients, e.g. cereals, yeast and Scottish water.

Scotch whiskies can be divided into two main categories — malt whiskies and grain whiskies. The malt whiskies are distilled mainly in the Highlands and Islands, from malted barley; and grain whiskies mainly in the Lowlands, mostly from maize and malted barley. These whiskies are then matured for at least three years (the legal minimum) and in many cases for considerably longer periods. The great preponderance of malt whisky supplies is used for 'blending' with grain whisky to make the traditional 'blended' scotch whisky. But, in addition, there are 'single malts', the unblended product of a single malt whisky distillery.

Sales and exports

In 1988 world sales of Scotch whisky totalled 291 141 712 litres of pure alcohol (1pa), equivalent to almost one billion bottles (75 cl) at the traditional strength of 40% alc./vol. In terms of the smaller 70 cl bottle in which Scotch whisky is increasingly sold in the European Community, it comfortably passes the billion mark. Exports accounted for 245 969 856 1pa, an increase of 2% over the previous year which was also the third successive annual increase and the

highest export figure since 1982. The value of these shipments rose by 12% to UKL 1 288 million.

The United States remains the largest individual export market for Scotch whisky, even though shipments in 1988 fell by 10% to 53 161 353 1pa, worth more than UKL 231 million. In 1988 shipments to France increased by 8% to 29 468 537 1pa, worth UKL 143 million and comfortably ahead of third place Japan.

Japan is a market of which the Scotch whisky industry has high hopes as a result of the changes brought about by the liquor tax reform on 1 April 1989. This follows the acceptance by Japan of a GATT ruling and its agreement to halve the tax on Scotch whisky and to match it with the tax levied on Japanese whiskies.

It is the European Community however which accounts for more than one third of Scotch whisky exports — over 85 million 1pa worth UKL 462 million in 1988. Within the Community, Spain has shown remarkable growth to overtake Italy as the fourth largest market, with Germany and Belgium eighth and ninth respectively, Greece 10th and the Netherlands 11th.

The United Kingdom market

In its home market, Scotch whisky has weathered the challenge of other spirits and is still dominant. It still accounts for almost half of the spirits consumed in the United Kingdom and far more than its nearest rival. However, it has to contend with a British taxation system in which imported alcoholic drinks like table wine are taxed at a lower rate than domestic products such as Scotch whisky. Yet duty-paid figures of 45 171 800 1pa in 1988 still managed to show a modest increase of 1%.

Outlook

Scotch whisky is exported to over 180 markets and is on sale in every country in the world which does not specifically prohibit the import of spirits. However, it continues to face numerous barriers or restrictions to trade imposed by governments. While recognizing that the economics of some overseas countries make the early removal or reduction of some of these obstacles difficult to achieve, the industry attaches

the greatest importance to the sustained and determined effort being made by the European Commission and the British Government to seeking fairer trading conditions for Scotch whisky worldwide. The importance of this coordinated effort cannot be over-emphasized because, until a substantial reduction of trade barriers takes place, no significant growth in Scotch whisky exports can be expected.

Moreover, although the advent of the Scotch whisky Act 1988 and the recent EC Council of Ministers agreement on the EC Spirits Regulation will help to underpin Scotch whisky's reputation as a prestige

product of the highest quality, a number of developments unfavourable to Scotch whisky worldwide exist. Apart from obstacles to trade, changing consumer preferences and perceptions Scotch whisky managed to maintain its worldwide performance.

The Scotch whisky industry is confident that the challenge can be met and that Scotch whisky's contribution to the economy of the United Kingdom and the European Community will be maintained.

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BREWING BEER

(NACE 427.1)

Summary

Brewing is the third largest branch of the food industry after dairy and meat products and is the largest of the secondary processing industries. Within the individual Member States, it is the largest food industry in Germany, Belgium and Luxembourg and the second largest in the UK and Denmark.

In 1987 there were 1 378 independent brewing companies in the Community employing some 162 700 persons (excluding Spain, Greece and Ireland), and producing 264 million hl of beer, 10 million hl of which were exported to non-Community countries. Within the Community the average annual per capita consumption of beer was 81.4 litres in 1988. The industry uses 5.5 million tonnes of malting barley each year.

Brewing beer fall under NACE 427.1 and malt, which is its raw material and will be considered afterwards, under NACE 427.2.

Production

Table 2 shows the number of active breweries, the number of independent brewing companies and the number of persons employed in 1987 in the Member States. Table 3 gives a breakdown of brewing plants by production. There is a strong trend towards concentration in the industry.

Table 1
Main indicators, 1980-88
Brewing

(100 000 hl)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption (1)	230.3	228.8	227.9	230.2	224.4	225.8	228.1	257.1	248.5
Net exports (1) (2)	5.6	6.3	7.1	7.2	7.6	7.4	7.6	7.3	8.0
Production (1)	235.9	235.1	235.0	237.4	232.0	233.2	235.7	264.0	256.5
Employment (1 000) (3)	N/A	N/A	N/A	N/A	N/A	N/A	157.5	162.7	N/A

(1) 1980-86: excluding Spain and Greece; 1988: excluding Greece and Portugal.

(2) Excluding the supply for ships.

(3) 1986: excluding Spain, Greece and Ireland; 1987: excluding France.

Source: CBMC.

Table 2
Structure of Industry

	Active breweries (plants)			Independent brewing companies		Employees		
	1986	1987	1988	1986	1987	1986	1987	1988
EC (1)	1 597	1 568	1 594	1 433	1 378	178 768	171 494	162 494
Belgium, Luxembourg	130	131	148	109	107	12 832	10 316	9 500
Denmark	23	22	22	18	17	7 200	5 900	5 100
FR of Germany	1 190	1 161	1 168	1 140	1 120	59 500	58 100	56 300
Greece	N/A	7	N/A	N/A	N/A	N/A	2 550	N/A
Spain	N/A	34	34	26	N/A	N/A	15 000	15 000
France	37	41	N/A	N/A	32	8 809	N/A	N/A
Ireland	7	7	7	5	4	N/A	3 532	3 194
Italy	24	23	25	12	12	5 020	5 100	4 640
Netherlands	20	21	N/A	14	15	9 625	9 745	9 221
Portugal	8	8	N/A	4	4	4 504	4 430	N/A
United Kingdom	117	113	113	68	66	50 000	48 000	44 000

(1) Estimated.

Source: CBMC.

Table 3
Division of brewing plants by annual production, 1987

(1 000 hl)	0-9		10-59		60-119		120-499		500-1 000		1 000 +	
	Plants	Output	Plants	Output	Plants	Output	Plants	Output	Plants	Output	Plants	Output
Belgium (1)	54	149	20	565	32	5 242	20	8 302				
Denmark	0	0	12	N/A	1	N/A	4	N/A	2	N/A	3	N/A
FR of Germany	611	1 946	327	8 476	83	7 194	89	20 913	29	19 352	22	34 621
France (2)	14	42	9	25	5	491	7	1 426	2	1 629	2	16 275
Ireland	0	0	0	0	1	N/A	3	N/A	2	N/A	1	N/A
Italy	1	6	1	56	0	0	11	3 923	9	6 051	1	1 086
Luxembourg	0	0	2	30	0	0	3	632	0	0	0	0
Netherlands	0	0	8	141	0	0	0	0	5	1 215	8	16 191
Portugal	0	0	1	48	1	88	3	819	1	512	2	3 510

(1) Categories for Belgium : 0-10; 11-63; 64-265; 265 + .

(2) Brewing companies.

Source: CBMC.

Table 4
Total beer production

(100 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC (1)	235.9	235.1	235.0	237.4	232.0	233.2	235.7	264.0	256.5
Belgium	14.3	13.8	14.6	14.2	14.3	13.9	13.7	14.0	13.8
Denmark	8.2	8.2	8.5	8.7	8.5	7.9	8.5	8.5	8.7
FR of Germany	92.3	93.7	94.8	95.0	92.6	93.3	94.1	92.8	92.6
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.8	N/A
Spain	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25.8	26.6
France	21.7	21.7	22.3	21.8	20.7	20.3	20.7	19.9	20.1
Ireland	6.0	5.8	5.6	5.5	5.4	5.5	5.4	5.0	5.1
Italy	8.6	9.0	10.2	10.1	9.1	10.3	11.1	11.1	11.3
Luxembourg	.7	.8	.8	.7	.6	.7	.7	.7	.6
Netherlands	15.7	16.6	16.2	17.3	17.0	17.5	18.0	17.5	17.5
Portugal	3.6	3.8	3.9	3.8	3.7	3.8	4.1	5.0	N/A
United Kingdom	64.8	61.7	58.1	60.3	60.1	60.0	59.4	59.9	60.2

(1) 1980-86 excluding Spain and Greece; 1988 excluding Greece and Portugal.

Source: CBMC.

Table 5
Total beer consumption

(100 000)	1980	1981	1982	1983	1984	1985	1986	1987
EC (1)	228.4	226.5	227.1	229.2	222.9	223.8	225.6	255.4
Belgium, Luxembourg	13.4	12.6	13.5	13.1	12.8	12.4	12.5	12.3
Denmark	6.7	6.7	6.8	7.1	6.9	6.6	6.7	6.4
FR of Germany	89.7	90.6	91.1	91.1	88.4	89.0	89.4	88.1
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.8
Spain	N/A	N/A	N/A	N/A	N/A	N/A	N/A	26.5
France	23.7	23.7	24.3	23.8	22.6	22.1	22.4	21.7
Ireland	4.2	4.0	4.0	3.8	3.8	3.9	3.7	3.3
Italy	9.5	10.1	11.6	11.8	10.8	12.4	13.2	13.2
Netherlands	12.2	12.8	11.7	12.6	12.0	12.2	12.5	12.4
Portugal	3.5	3.7	3.7	3.7	3.5	3.7	4.0	4.8
United Kingdom	65.5	62.3	60.4	62.2	62.1	61.5	61.2	62.9

(1) 1980-86 excluding Spain and Greece.

Source: CBMC.

Table 6
Per capita consumption of beer

(litres)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC average (1)	84.3	83.5	83.6	84.1	81.7	81.9	82.3	78.6	81.4
Belgium, Luxembourg	130.8	124.0	131.9	128.0	125.2	120.9	122.1	120.8	118.9
Denmark	130.7	131.0	133.7	138.8	134.0	129.2	130.0	125.2	126.5
FR of Germany	145.7	147.0	147.9	148.3	144.8	145.8	146.5	144.3	144.1
Greece	N/A	N/A	N/A	N/A	N/A	N/A	N/A	38.3	N/A
Spain	N/A	N/A	N/A	N/A	N/A	N/A	N/A	66.8	68.7
France	44.3	44.0	44.8	43.7	41.2	40.1	40.4	38.9	39.2
Ireland	121.7	116.4	115.0	108.0	108.4	109.0	104.5	93.5	94.4
Italy	16.7	17.9	20.6	20.7	18.9	21.7	23.0	23.0	22.5
Netherlands	86.4	89.6	82.0	87.5	83.4	84.4	86.0	84.3	83.3
Portugal	35.0	37.0	37.4	37.0	35.5	36.9	39.5	47.0	N/A
United Kingdom	117.1	111.5	107.3	110.5	110.1	108.9	107.8	110.5	111.2
USA	91.9	92.6	91.5	91.1	89.6	88.9	90.0	88.9	N/A

(1) 1980-86 excluding Spain and Greece; 1988 excluding Greece and Portugal.

Source: CBMC.

Table 7
Estimated share of total beer sales consumed in private homes

(%)	1980	1981	1982	1983	1984	1985	1986	1987
Belgium, Luxembourg	N/A	57	57	57	58	57	N/A	32
Denmark	77	78	78	78	74	74	74	74
FR of Germany	60	60	60	60	60	60	60	60
Ireland	6	N/A	N/A	N/A	6	6	5	6
Netherlands	60	60	60	N/A	N/A	N/A	N/A	N/A
Portugal	24	24	22	22	22	38	33	35
United Kingdom	12	12	13	15	16	16	17	18

Source: CBMC.

Table 8
Production and external trade (1)
Brewing Industry

(hundred thousand hl)	1980	1981	1982	1983	1984	1985	1986	1987
Production	235.9	235.1	235.0	237.4	232.0	233.2	235.7	234.4
Index	101.2	100.8	100.8	101.8	99.5	100.0	101.1	100.5
Imports extra-EC	.8	.6	.8	.9	.6	1.4	.9	1.0
Index	57.1	42.9	57.1	64.3	42.9	100.0	64.3	71.4
Exports extra-EC (2)	5.3	6.0	7.0	7.2	7.8	8.1	8.9	8.0
Index	65.4	74.1	86.4	88.9	96.3	100.0	109.9	98.8
X/M	6.6	10.0	8.8	8.0	13.0	5.8	9.9	8.0

(1) Excluding Greece and Spain.

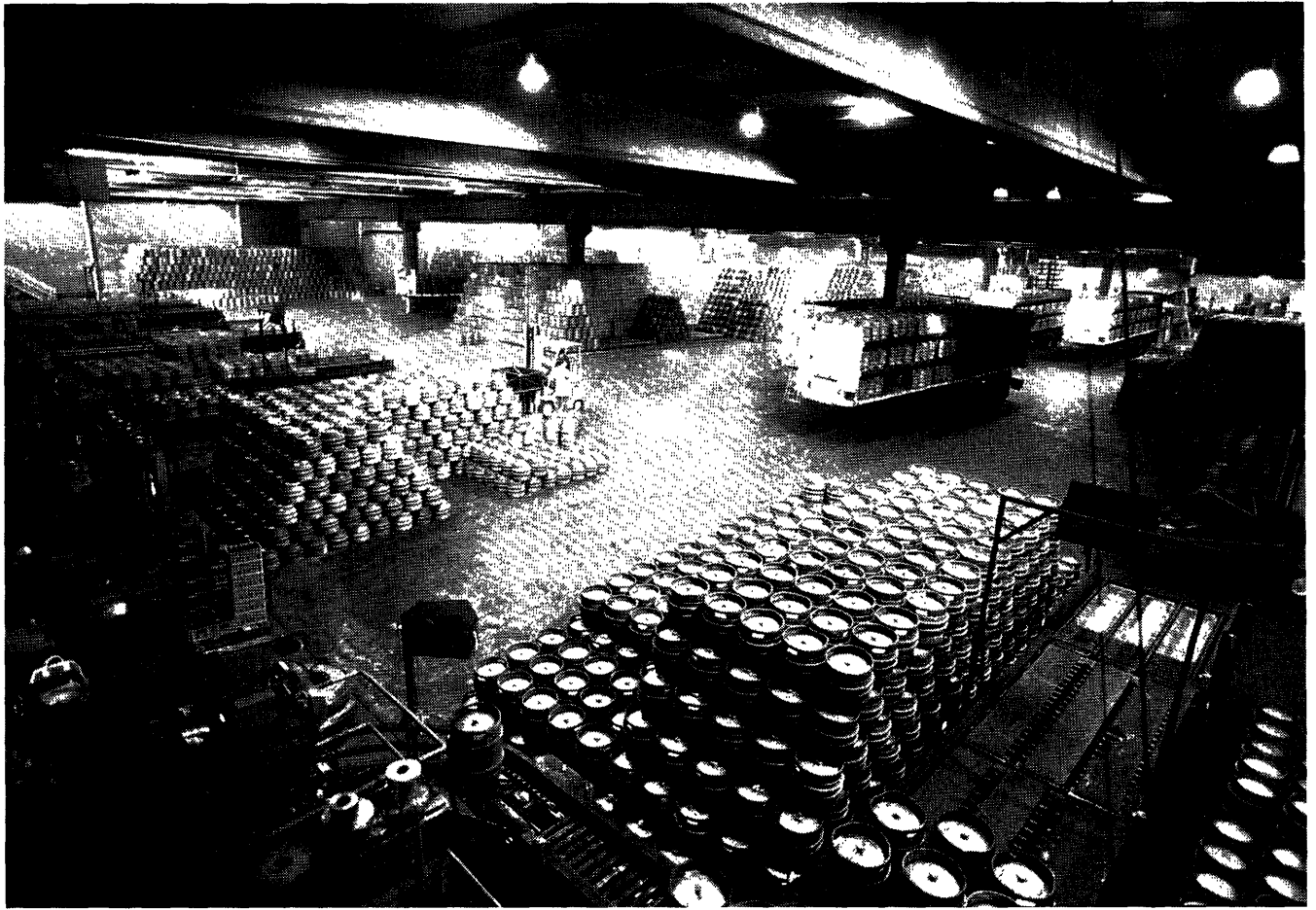
(2) Excluding the supply for ships.

Source: CBMC.

While the Community is producing surplus cereals, the brewing industry is short of its own raw material: malting barley. Between 1979 and 1984 the areas given over to growing malting barley in the EC dropped by almost 50%, leading to prices above threshold levels and imports of barley from third countries. The situation is still unsatisfactory.

Consumption

Table 4 shows total beer production in 1980-88 and Table 5 total beer consumption in the same period. Over the past few years the consumption of beer has not increased, due to changing trends in beverage consumption and lifestyle. Table 6, which indicates



consumption of beer per head, shows where some changes have occurred within the overall trend.

Probably the most important problem facing the European brewing industry is the stagnation of domestic beer consumption. Consumption in 1987 was at a similar level to that in 1970. As a result, third-country markets are becoming increasingly important to European beer producers.

Trade

Exports to third countries have grown although they represent a very small portion of total production.

Over the same period imports have remained at a very low level. The internal consumption of the EC Member States has not increased.

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MALT

(NACE 427.2)

Summary

The EC malt industry processes approximately 4.9 million tonnes of malt annually, which represents one third of world malt production. The main EC malt-producing countries are Belgium, France, Germany and the UK. Other malt producing Member States of significance are Denmark, Ireland, Italy and the Netherlands. Two categories of malt are produced: brewing malt, which accounts for 95.5% of the tonnage produced, and whisky malt.

The trends in malt exports followed the evolution of beer production. World beer production currently stands at around 1 000 million hl/year and increases annually by about 2.3%. Production is concentrated in the northern hemisphere (800 million hl), where consumption is stagnating. The past 15 years have seen a remarkable development of beer production and consumption in South and Central America (+6%/year), Asia (+11%/year) and Africa (+6%/year). As barley growing is difficult in these parts of the world, market opportunities for malt exporting countries in these areas are substantial.

Production

The value-added content of malting is low. In the Community, the raw material (barley) represents between 75% and 80% of the ex-factory sales price. To remain competitive on the world market, the European maltsters therefore have to manage their supply of the raw material as rationally as possible. Only certain varieties of barley can be used for brewing. Moreover, the barley has to meet stringent quality criteria in terms of germination energy, protein content, and diastatic power.

Trade

According to FAO statistics, the total world malt trade amounts to 2.73 million tonnes of malt (including the EC intra-Community trade of 758 000 tonnes), which represents an equivalent (in terms of imports) of ECU 702 million, i.e. about 260 ECU/tonne. This trade represents 18% of world malt production which is estimated at 14 million tonnes.

Table 9
Main indicators, 1980-87 (1)
Malt

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Apparent consumption	4 017	3 649	3 898	3 758	3 769	3 711	3 632	3 727
Net exports	963	1 219	1 122	1 268	1 020	1 089	1 118	1 233
Production (2)	4 980	4 868	5 020	5 026	4 789	4 800	4 750	4 960

(1) EC 9.

(2) UK malt for whisky estimated 1985, 1986 and 1987. Estimates for Denmark in 1987 and for Ireland in 1986 and 1987.

Source: Euromalt.

Table 10
Maltings, 1987/88

	B	DK	D	F	IRL	I (1)	NL	UK	Total
Independent	8	4	70	10	3	3	4	14	116
Associated to breweries	2	2	35	1	2	1	1	8	52
Associated to other industries	0	0	0	0	1	1	0	6	8
Total	10	6	105	11	6	5	5	28	176

(1) 1985 figures.

Source: Euromalt.

Table 11
Number and total capacity of maltings (plants), 1987-88

	0-9	10-19	20-29	30-39	40-49	50-99	100-200	200 +	Total
Number of plants									
Belgium	1	2	1	0	0	4	2	0	10
Denmark	2	0	2	1	0	1	0	0	6
FR of Germany	62	16	10	8	3	5	1	0	105
France	1	1	0	1	1	1	5	1	11
Ireland	1	3	0	0	1	1	0	0	6
Italy	1	2	0	0	2	0	0	0	5
Netherlands	1	0	1	1	0	2	0	0	5
United Kingdom	12	5	0	1	1	2	6	1	28
Total	81	29	14	12	8	16	14	2	176
Total capacity (million tonnes)									
Belgium	6	37	30	0	0	345	245	0	663
Denmark	11	0	50	40	0	70	0	0	171
FR of Germany	215	210	220	250	120	330	200	0	1 545
France (1)	N/A	28	0	N/A	N/A	134	1 099	N/A	1 260
Ireland	3	45	0	0	35	80	0	0	163
Italy (2)	2	26	0	0	95	0	0	0	123
Netherlands	3	0	28	35	0	130	0	0	196
United Kingdom (3)	39	73	0	N/A	77	139	1 153	N/A	1 480
Total (1)	N/A	697	328	N/A	N/A	1 879	2 697	N/A	5 601

(1) Classes used are : 0-19; 20-29; 30-100; 100+ .

(2) 1985 figures.

(3) Classes used are : 0-9; 10-19; 20-29; 30-49; 50-100; 100+ .

Source: Euromalt.

EC exports to third countries amounted to 1.27 million tonnes in 1988, which makes the EC by far the most important malt exporter in the world. In 1988, EC exports to third countries were geographically divided as follows:

1986 exports

Australia	258 000 tonnes
Canada	140 000 tonnes
USA	39 000 tonnes
Eastern Europe	280 000 tonnes

European third countries	100 000 tonnes
Africa	335 000 tonnes
Central & South America	438 000 tonnes
Asia	390 000 tonnes

The brewing process is adjusted once yearly, in accordance with the qualities of the brewing malt, which change from year to year. For technical reasons, therefore, the purchase of malt is subject to an annual cycle in the EC and world-wide. This cycle depends on the barley harvest in the northern hemisphere, where 85% of the malt is produced. Pro-

In 1986, the EC's main competitors on the world market were, in order of importance:

Table 12
Production and external trade

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Production (1) (2)	4 980	4 868	5 020	5 026	4 789	4 800	4 750	4 960
Index	103.8	101.4	104.6	104.7	99.8	100.0	99.0	103.3
Imports extra-EC	55	46	40	47	56	60	57	61
Index	91.7	76.7	66.7	78.3	93.3	100.0	95.0	101.7
Exports extra-EC (2)	1 018	1 265	1 162	1 315	1 076	1 149	1 175	1 294
Index	88.6	110.1	101.1	114.4	93.6	100.0	102.3	112.6
X/M	18.5	27.5	29.1	28.0	19.2	19.2	20.6	21.2

(1) Excluding Greece, Spain and Portugal.

(2) UK malt for whisky estimated 1985, 1986 and 1987. Estimates for Denmark in 1987 and for Ireland in 1986 and 1987.

Source: BIOS.

cessing of the new crop takes place in the period from December (when the new barley is mature), to November the following year. In order to cover the yearly purchasing and processing cycle of the breweries, the EC malting plants need licences with a validity of 12 months.

In 1988 intra-Community trade amounted to 758 000 tonnes, or about 28% of world trade in the same year. On the basis of extra- and intra-Community trade, the EC accounted for 74% of total world malt trade.

Industry structure

About two-thirds of the EC malting plants operate independently, while one-third are associated with

other industries, predominantly breweries. In 1988, there were about 175 EC malting plants, of which 100 were situated in Germany. The malting industry is capital intensive and its investments require many years to repay.

Outlook

The medium-term outlook for the Community malt industry is good. The consumption of beer has stabilized in Europe, while it has increased in third countries which do not produce barley.

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SOFT DRINKS

(NACE 428.2)

Summary

In this context, 'soft drinks' means non-alcoholic beverages consisting of water, flavouring substances, sugars or intensive sweeteners. Waters (mineral waters and other categories) sharing item 428 of the NACE classification system with soft drinks are not included, nor are fruit juices and nectars.

Current situation

Production in EC 11 increased by approximately 2.2%, to about 16 billion litres in 1987. Average consumption per capita in the EC increased by 4%. A large part of this increase is due to the UK, where consumption per capita rose almost 20%. Total employment grew by 3.6%, reaching 88 582 persons in 1987, but the number of production units within the EC is pursuing a continuing decreasing trend.

Differences between EC countries are very marked. For example, the annual per capita consumption of ready-to-drink beverages in the Federal Republic of Germany is 77 litres but only 27 litres in Portugal. Cola drinks account for 50% of total consumption in Belgium but only 17% in Portugal. Differences in taste, tradition and economic and sociological situation explain these widely variable consumption patterns.

Description of the sector

The largest category of soft drinks are made with extracts of fruits or plants. The market share of fruit-flavoured drinks varies from one country to another. Cola is the predominant flavour, followed by

orange, lemon and other fruits, with some of the more recent products using exotic fruit flavours. In some countries, e.g. the UK, Ireland and to a certain degree, France, concentrates represent a very sizeable volume in comparison with ready-to-drink beverages. Low-calorie soft drinks, in which sugar is replaced by intensive sweeteners, are also new products with a relatively small share of the market but are growing fast. This is particularly noticeable in Germany and the UK.

Consumption

The increase of volumes has been a steady phenomenon ever since the Second World War and can be explained by the preference of the consumers for non-alcoholic drinks, the increase in purchasing power, leading to greater sophistication and diversification of drinks and the development of new packaging systems.

It is to be underlined that in some countries (e.g. Denmark) development has been slower or has stagnated over the past few years. This is largely due to excessive taxation of soft drinks (punitive excise duties and high VAT rates), sometimes combined with obstacles to the development of new packaging systems.

Other negative factors are the stagnation of population growth and the ageing of the population.

Trade

Intra-Community trade has not developed much except in the Benelux countries. This is due, to a large extent, to the fact that the Benelux countries

Table 1
Main indicators, 1987

(million litres)	B	DK	D	GR	E	F	IRL	I	NL	P	UK	EC
Apparent consumption	671	207	4 705	410	2 170	1 663	179	1 540	840	265	3 332	15 982
Total net exports	74	10	12	N/A	30	- 66	11	N/A	184	0	- 44	N/A
Production	745	217	4 717	410	2 200	1 597	190	1 540	1 024	265	3 288	16 193
Consumption (1)	68	39	77	41	55	28	51	27	59	27	59	N/A
Number of enterprises (2)	27	4	150	20	110	61	30	115	14	83	108	732
Employment (number)	2 817	677	17 700	3 170	16 874	12 367	2 700	9 172	2 094	3 371	17 640	88 582

(1) Litres.

(2) Enterprises with 20 or more employees.

Source: Unesda.

Table 2
Consumption by category, 1987

(%)	B	DK	D	GR	E	F	IRL	I	NL	P	UK
Colas	50	30	40	50	37	25	24	34	42	17	38
Other carbonated drinks	49	65	52	42	61	47	76	66	57	70	60
Still drinks	1	5	8	8	2	28	0	0	1	13	2

Source: Unesda.

Table 3
Packaging used, 1987

(%)	B	DK	D	GR	E	F	IRL	I	P	UK
Returnable glass	46	91	69	52	74	35	19	12	87	16
Non-returnable glass	2	0	7	0	3	19	8	6	1	7
PVC/pet	39	0	1	23	13	29	51	60	7	39
Cans	9	0	14	22	7	12	18	16	4	26
Cartons	1	5	0	0	0	2	0	1	1	7
Pre/post mix	3	4	9	3	3	3	4	5	0	12

Source: Unesda.

have harmonized their legislation on soft drinks. On the other hand, the regulations of other countries often differ widely as regards products, packaging, taxation, etc. In the Benelux countries for example, mixed artificial sweeteners are not authorized while they are accepted by the UK legislation.

Structural changes

In all countries, there is a trend towards concentration, and the number of producers is gradually decreasing. The modernization of production methods, equipment, transport, etc. increases the need for concentration as does the imperative of maintaining a sufficient profit margin in the face of stiff competition.

The development of lighter, non-refillable containers, such as cans, plastic (PET) and disposable glasses, has been highly variable from one country to another. While the percentage of refillable glass used for soft drinks is 100% in Denmark and about 90% in the Netherlands and Portugal, the situation is quite

different in most other countries, where other types of packaging have developed to various degrees. A decision of the European Court ruled in 1988 that Denmark could keep its bottle system for soft drinks and maintain its ban on the sale of soft drinks in cans or non-returnable bottles. The Court's ruling thus gave priority to Danish arguments for the protection of the environment from cans littered about the countryside over arguments that this system inhibits free trade in beverages. In the UK, refillable glasses now represent less than 16% of soft-drink packaging.

Outlook

For 1988, the available figures indicate a new increase in volumes in most countries (e.g. 6.2% in Germany, 5.1% in Belgium). Average growth will probably be around 6%.

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TOBACCO

(NACE 429)

Summary

In 1986 the tobacco manufacturing sector supported over 1.7 million full-time jobs. Direct employment in the tobacco manufacturing industry accounts for 0.3% of manufacturing output in the EC. The EC is a net exporter of manufactured tobacco products, but a net importer of tobacco due to large imports of raw tobacco from the United States. A high intra-Community trade accounts for a high percentage of trade in manufactured tobacco products. The sale of tobacco products within the Community resulted in taxes which make up 4% of all central government tax receipts.

Description of the sector

The tobacco industry's backward linkages are the relationships between the manufacturers and the suppliers of the raw materials such as cigarette paper, filters, and machinery. Forward linkages are the relationships between the manufacturer and the distributors and retailers of tobacco.

Manufactured tobacco products can be allocated to three categories:

- cigarettes
- cigars and cigarrillos
- other tobacco products (smoking tobacco, snuff, chewing tobacco, cut cigarette rag and agglomerated sheet).

At the beginning of the chain are the tobacco growers and persons engaged in the leaf processing of the raw tobacco. Both the lighter types of leaf such as light air-cured (e.g. Burley) and flue-cured (e.g. Virginia) and the heavier more oriental types such as the sun-cured and dark air-cured are grown in the EC.

Current situation

Apparent consumption of tobacco products has increased steadily over the past nine years, with a 5.9% growth in 1987 and a 6.0% growth in 1988. Net exports of manufactured tobacco products fell in 1987 to ECU 565 million, but recovered slightly in

1988 at ECU 609 million. Production grew slightly more rapidly than consumption, growing by 7.3% in 1987, 6.0% in 1988 and 7.4% in 1989. Employment has remained fairly steady for the past three years, at around 105 000.

Production and consumption

Tobacco production had a growth rate of 7.3% in 1987, 6% in 1988 and 7.5 % in 1989.

Tobacco growing

Italy has been the largest producer of tobacco leaves throughout the 1980s, with a 40% share of the production; however, Greece has been a close contender and even exceeded Italy's production in 1986. Production of tobacco leaves increased from 382.5 thousand tonnes in 1986 to 386.6 thousand tonnes in 1987. The EEC produced 385 thousand tonnes of tobacco leaves in 1988 — 6% of the world's production. The world's largest producer of tobacco leaves is China, which produced 2 309 thousand tonnes in 1988; other large producers include the USA, Brazil, the USSR and India.

Manufactured tobacco products

Unlike total tobacco production, cigarette production fell from 1985 to 1987 with an increase in production in 1988. Cigarette production accounts for 87.5% of total tobacco production. The Federal Republic of Germany, the largest producer of cigarettes, registered a fall in production after 1986, after having experienced an increase in production since 1982. In 1987 production in the Federal Republic of Germany was 162 940 million pieces. The next largest producers in 1987 were the United Kingdom, Spain, Italy, France and the Netherlands.

The total level of production of cigars and cigarrillos in the EC in 1986 was 8 470 million pieces which was a 13.7% fall from 1982; this reflects higher taxation and prices of these products, and a shift in consumer preferences. Belgium remains the largest producer of cigars and cigarrillos, having produced 2 104 million pieces in 1986. The Netherlands has been the leading producer of other tobacco products. Production of

Table 1
Main indicators, 1980-89 (1)
Tobacco manufacturing

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	19 143	21 469	26 015	28 157	29 500	31 194	32 114	34 006	36 052	N/A
Net exports (2)	435	598	623	752	701	636	808	565	609	N/A
Production	19 578	22 067	26 638	28 909	30 201	31 830	32 922	34 571	36 661	39 402
Employment (1 000)	118.1	121.4	115.9	115.2	108.9	104.0	110.4	103.2	105.7	105.5

(1) 1980 EC 9; 1981-85 EC 10; 1986-88 EC 12 (estimated).

(2) 1988 excluding Greece.

Source: Eurostat (Inde, Bise, Comext).

Table 2
Production of tobacco leaf

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
EC	333.2	353.8	375.2	356.2	394.9	405.8	382.5	386.6		
Belgium	1.2	1.4	2.1	2.0	2.1	2.1	2.3	1.1		
FR of Germany	6.9	7.8	8.1	6.8	7.2	8.1	7.8	7.6		
Greece	116.7	127.4	132.4	110.5	143.1	148.5	148.1	144.1		
Spain	36.9	43.5	42.2	42.6	43.2	42.1	37.5	36.2		
France	44.7	41.6	43.8	36.2	35.1	35.7	37.8	33.9		
Italy	125.5	131.0	145.0	156.1	161.1	165.8	145.3	160.4		
Portugal (1)	1.0	1.2	1.4	2.0	3.1	3.5	3.7	3.3		

(1) Excluding the Azores: approximately 5 000 tonnes in 1982 and 5 160 tonnes in 1986.

Source: EC Tobacco Division; Serv. Nacional de Cult. y Ferment. de Tobacco (E), Pieda.

Table 3
Production of raw leaf

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
World	5 297	5 962	6 890	5 935	6 486	6 994	6 032	6 142	6 433
EC (1)	333	354	375	356	395	406	383	387	385
Five largest non-EC producers									
China	920	1 520	2 205	1 403	1 816	2 450	1 732	1 926	2 309
USA	811	936	905	648	784	686	528	543	592
India	439	481	520	582	493	490	439	460	323
Brazil	405	366	420	393	414	411	387	410	415
USSR	287	268	307	385	378	381	374	303	381

(1) Figures from FAO for 1988.

Source: FAO and Eurostat.

Table 4
Cigarette production

(millions)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
EC	666 392	667 347	631 945	637 616	640 308	649 252	630 849	624 387		
Belgium, Luxembourg	26 454	26 921	28 710	28 042	27 650	28 363	26 928	26 877		
Denmark	9 223	9 802	9 920	9 763	10 583	10 966	11 246	11 162		
FR of Germany	157 900	167 816	148 166	155 942	162 055	165 587	169 048	162 940		
Greece	24 889	25 404	24 533	25 336	27 018	28 523	29 000	28 853		
Spain	85 000	93 500	68 220	63 600	75 100	77 270	76 500	80 500		
France	72 478	62 454	62 510	62 147	60 729	67 376	59 122	54 160		
Ireland	7 887	7 467	8 136	7 534	7 389	7 735	7 720	7 700		
Italy	73 105	72 248	80 550	83 672	80 435	78 674	75 585	70 339		
Netherlands	40 705	38 732	42 977	45 303	45 101	46 711	49 935	52 355		
Portugal	13 133	13 363	13 613	14 329	13 875	14 077	13 743	14 966		
United Kingdom	155 618	149 640	144 610	141 948	130 473	123 970	112 022	114 535		
USA	N/A	N/A	N/A	N/A	662 000	665 000	662 000	654 000		

Source: USDA FT and US Industrial Outlook.

Table 5
Production of other tobacco products, 1982, 1986

(million units)	1982		1986	
	Cigars (⁽⁴⁾)	Other products (tonnes)	Cigars (⁽⁴⁾)	Other products (tonnes)
EC ⁽¹⁾	9 823	72 396	8 470	69 934
Belgium	2 330	4 814	2 104	5 588
Denmark	631	3 904	624	3 752
FR of Germany	1 701	10 899	1 433	9 079
Greece	1	11	1	11
Spain ⁽²⁾	588	2 930	496	1 350
France	906	5 891	825	4 920
Ireland	N/A	3 000	N/A	3 930
Italy	111	668	111	347
Netherlands	2 300	28 900	1 634	32 300
Portugal ⁽³⁾	0	167	2	182
United Kingdom	1 255	11 225	1 240	8 475

(1) Excluding Luxembourg.

(2) Including production in the Canaries.

(3) Including production in Azores.

(4) Including cigarrillos.

Source: Pieda.

other tobacco products fell between 1982 and 1986 by 3.4% to 69 934 tonnes.

Consumption

In no EC country is domestic production below 60% of domestic consumption. There was a slight fall in total EC consumption of cigarettes in 1987, both at an absolute level and per capita. This fall was preceded by a gradual increase in consumption since 1982. Germany has continued to be the largest consumer of cigarettes, consuming 123 998 million pieces in 1987; Greece however has the largest per capita consumption of cigarettes — 2 947 per head in 1987.

Employment

About 1.7 million people were employed in tobacco-related activities in 1986; however, this figure is about three times smaller after revisions for actual involvement in the tobacco industry are taken into account, as an important part of work is part-time or seasonal. It should still be noted that the total number of people engaged in tobacco growing and in specialized tobacco outlets (670 850 persons) far exceeds those engaged in tobacco manufacturing or its supplying companies.

In 1986 94 050 people were employed in tobacco manufacturing; this represents a 19.7% fall from 1982. 835 850 people were employed in tobacco growing (first processing); however, since most tobacco growers produce other cash crops, the real measurement — full-time equivalent (FTE) — is a much better reflection of the industry. The FTE is the estimation of the number of full-time jobs which would provide the equivalent labour expended by all those engaged in tobacco-related activity. In 1986 the FTE was 233 400. The United Kingdom employed the largest number of people in tobacco manufacturing — 21 500, followed by the Federal Republic of Germany with 18 000 people in tobacco manufacturing. Greece has employed the highest number of workers in tobacco growing — 406 400 people, the number of jobs being still high even after being adjusted — 128 100 full-time equivalent jobs.

Industry structure

There are two industrial set-ups; first, the publicly owned monopoly which exists in Italy, Portugal,

Table 6
Cigarette consumption

(billions)	1981		1982		1983		1984		1985		1986		1987	
	Total	Per capita (No)	Total	Per capita (No)	Total	Per capita (No)	Total	Per capita (No)	Total	Per capita (No)	Total	Per capita (No)	Total	Per capita (No)
EC	616.1	1 930	576.0	1 800	576.1	1 797	589.9	1 836	596.6	1 853	581.0	1 801	579.8	1 795
Belgium, Luxembourg	17.0	1 666	19.7	1 608	18.6	1 820	18.1	1 775	16.5	1 611	14.2	1 388	13.1	1 284
Denmark	8.4	1 648	8.3	1 630	8.4	1 646	8.7	1 706	8.8	1 732	8.5	1 669	8.4	1 629
FR of Germany	133.3	2 161	114.3	1 855	117.7	1 917	122.7	2 006	123.2	2 019	121.8	1 996	124.0	2 033
Greece	26.7	2 740	25.7	2 623	25.8	2 620	27.3	2 754	28.5	2 859	28.9	2 888	29.5	2 947
Spain	95.5	2 529	69.3	1 827	64.1	1 680	75.6	1 970	77.9	2 018	76.8	1 979	80.8	2 071
France	85.9	1 585	87.0	1 696	89.6	1 637	95.2	1 731	96.2	1 744	94.6	1 708	94.2	1 694
Ireland	5.2	1 525	7.0	2 005	7.1	2 011	6.5	1 848	6.4	1 798	6.3	1 751	6.2	1 745
Italy	98.0	1 734	106.4	1 879	108.4	1 907	105.8	1 856	112.8	1 977	105.2	1 842	98.4	1 719
Netherlands	22.6	1 582	22.8	1 595	24.6	1 710	17.5	1 214	15.6	1 072	15.9	1 091	15.3	1 044
Portugal	13.2	1 326	13.4	1 339	14.2	1 409	13.7	1 355	13.9	1 368	13.7	1 332	14.9	1 529
United Kingdom	110.3	1 956	102.0	1 811	98.7	1 750	98.7	1 747	96.9	1 714	96.0	1 696	95.0	1 670

Source: USDA FT.

Spain and France and, secondly, the private-sector companies that exist in Belgium, Germany, Greece, Ireland, the Netherlands and the UK. The publicly owned monopolies mainly cater for internal consumption, with foreign brands being priced more highly. The private-sector companies on the other hand have to compete with foreign brands both on the domestic and foreign markets.

Similarly, on the distributing and retailing side, countries such as the Federal Republic of Germany and the UK have fairly varied tobacco distribution networks, whilst countries such as Italy and France have systems of licensed outlets.

Geographic features

The main tobacco leaf growers are Belgium, France, the Federal Republic of Germany, Greece, Italy, Poland and Spain. It is a significant source of income and employment in poorer rural areas. Greece grows more labour-intensive oriental varieties of tobacco, whilst Italy tends to grow the less labour-intensive light air-cured and flue-cured varieties.

The north European countries lead in the second tier of the tobacco industry — manufacturing, with Germany and the UK as the major manufacturers of tobacco products. On a regional basis, the tobacco industry first established itself in Europe in the then centres of industry and population.

Trade

There are two opposing forces in the trade balance. While there has been a net export surplus for manufactured tobacco products, this has been outweighed by a net export deficit for raw tobacco.

The EC external balance of trade for tobacco products was ECU 808 million in 1986 and fell to ECU 565 million in 1987; there was a small recovery in 1988 when the trade balance registered ECU 609 million.

If intra-EC trade flows are excluded, the trend is similar although the actual levels are much lower. There was a net export surplus for tobacco products to countries outside the EC of ECU 526.4 million in 1986. Imports of tobacco products from outside the EC were ECU 83.4 million and exports were ECU 609.8 million. In 1987 the trade balance for tobacco products (again excluding intra-EC trade) fell to 246.8.

The main tobacco product is cigarettes, which have accounted for about 89% of the trade balance. Both cigarettes and other products, which include smoking tobacco, snuff, chewing tobacco and agglomerated sheet have displayed a trade surplus, while the trade in cigars, cigarrillos and cheroots has been more or less balanced. The largest net exporters of tobacco products were the Netherlands, the Federal Republic of Germany and the UK, mainly exporting cigarettes to other EC countries.

Table 7
Employment in the tobacco industry, 1982, 1986

	Tobacco manufacturing		Growing and first processing ⁽¹⁾			
	1982	1986	1982		1986	
			Persons engaged	Full-time equivalents	Persons engaged	Full-time equivalents
EC	117 250	94 050	896 700	253 200	835 850	233 400
Belgium	6 350	5 600	3 300	600	3 300	650
Denmark	2 300	2 250	0	0	0	0
FR of Germany	22 500	18 000	17 650	340	14 350	3 450
Greece	4 050	3 850	414 800	141 100	406 400	128 100
Spain	13 150	10 050	50 100	17 300	54 150	15 700
France	8 400	7 950	87 750	17 450	70 300	16 750
Ireland	2 200	1 800	0	0	0	0
Italy	14 800	13 100	316 400	70 550	272 300	64 800
Luxembourg	350	350	0	0	0	0
Netherlands	8 850	7 450	0	0	0	0
Portugal	1 900	2 150	6 700	2 800	15 050	3 950
United Kingdom	32 400	21 500	0	0	0	0

(1) Includes employment in tobacco reconstitution, but not in first processing for FR of Germany. Excludes employment in tobacco first processing for France and Portugal.

Source: Pieda.

Table 8
External trade
Tobacco leaf

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Imports									
World	1 416	1 502	1 487	1 428	1 433	1 415	1 375	1 394	1 303
EC	628	601	604	617	605	604	577	609	550
Five largest non-EC importers									
USA	196	239	243	209	213	202	207	221	215
USSR	83	105	124	101	103	95	67	54	N/A
Japan	65	83	84	80	75	61	68	88	69
Egypt	25	33	43	49	49	44	47	42	35
Bulgaria	12	14	20	26	42	30	41	21	38
Exports									
World	1 350	1 487	1 429	1 334	1 383	1 391	1 330	1 336	1 341
EC	163	181	216	215	240	222	232	285	270
Five largest non-EC exporters									
USA	272	265	260	238	246	249	217	195	203
Brazil	144	149	166	177	187	199	176	174	175
Zimbabwe	93	129	86	84	90	98	99	100	103
Turkey	84	131	105	70	70	103	82	106	80
India	71	112	110	79	76	64	62	53	58

Source: FAO.

For raw tobacco there is normally a trade deficit. Looking at trade between the EC and the rest of the world in 1986 there was a trade deficit of ECU 1 643.8 million for raw tobacco. This fell to ECU 1 403.1 million in 1987 with imports at ECU 1 622.1 million and exports at ECU 219 million. The US accounted for a high percentage of the trade — about 37.5% of imports of raw tobacco, and about 27% of exports of raw tobacco.

The overall trade balance has therefore been in deficit. Trade between the EC and the rest of the world was ECU 1 138 million in 1985, ECU 1 117.4 million in 1986 and ECU 1 156.3 million in 1987. These

numbers do not include other tobacco-related products such as tobacco machinery, cigarette paper and filters and marketing, etc. which would probably make the EC a net exporter.

If cigarette consumption is declining in the United States and Europe, world cigarette consumption is growing in real terms, especially in Eastern bloc and developing countries. Asian markets are opening too. Estimates given by Euromonitor and published in the *Economist* (26 August 1989) expect a global consumption growth of 1.9 % a year between 1988 and 1992. The number of cigarettes smoked per head, per country in 1988 are the following: Poland

Table 9
External trade
Raw and processed tobacco

(million ECU)	1983		1984		1985		1986		1987	
	Extra-EC	USA	Extra-EC	USA	Extra-EC	USA	Extra-EC	USA	Extra-EC	USA
Raw imports	1 685.9	615.9	1 786.7	672.6	1 984.7	735.6	1 868.3	726.0	1 622.1	634.2
Processed imports	71.5	23.2	193.0	35.1	101.2	50.0	83.4	44.9	346.3	41.6
Total imports	1 757.4	639.1	1 979.7	707.6	2 085.9	785.6	1 951.7	770.9	1 968.4	675.8
Index	84.3	81.4	94.9	90.1	100.0	100.0	93.6	98.1	94.7	86.0
Raw exports	240.2	56.0	257.7	67.0	226.7	54.2	224.5	77.4	219.0	63.4
Processed exports	706.4	23.0	669.7	25.2	721.2	31.2	609.8	24.6	593.1	26.7
Total exports	946.6	78.8	927.2	92.2	947.9	85.4	834.3	102.0	812.1	90.1
Index	99.9	92.3	97.8	108.0	100.0	100.0	88.0	119.4	85.7	105.5
X/M	.54	.12	.47	.13	.45	.11	.43	.13	.41	.13

Source: Eurostat (Comext).

Table 10
External trade
Tobacco products

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Imports								
World	324	398	429	416	403	418	447	479
EC	145	136	152	161	178	195	186	196
Five largest non-EC importers								
USSR	58	74	67	73	75	76	77	49
Saudi Arabia	26	31	33	32	36	34	34	33
Japan	5	6	6	6	7	9	13	30
Colombia	2	2	2	11	11	11	11	11
USA	15	65	81	52	4	5	4	5
Exports								
World	411	438	441	430	445	478	504	552
EC	181	195	218	233	234	254	247	245
Five largest non-EC exporters								
USA	91	89	81	72	73	79	94	125
Bulgaria	69	63	62	61	72	75	72	75
India	11	16	21	9	9	10	12	13
Switzerland	13	14	11	10	10	7	12	13
USSR	2	4	2	2	2	2	2	1

Source: FAO.

(2 615), Japan (2 515), the United States (2 285), the Federal Republic of Germany (1 910), the United Kingdom (1 695), Italy (1 690), France (1 680), the USSR (1 645), the People's Republic of China (1 375 and Brazil (1 090).

Regulatory environment

There can be restrictions on the retailing side. In Greece and Italy 100% of sales are through tobacconists. Although there is no formal licensing system, all products must initially pass through tobacconists in Portugal and Spain, whilst in France, Germany, Ireland and the UK only a small part of the tobacco retail trade is handled by tobacconists.

Outlook

It should be added that the growing fears about the side-effects of smoking have led to new restrictions, such as the banning of smoking from public places (in Belgium, for example). Cigarette advertising has also been restricted, which makes it more difficult to launch new brands.

In order to promote health protection and to harmonize existing legislation on maximum 'tar' yields among Member States, a proposal for a Council Directive to establish a maximum 'tar' yield for cigarettes which can be marketed in the Member States was submitted on 4 February 1988.

The proposal stated that: '... the tar yield of cigarettes marketed in the Member States shall not be greater than 15 mg on 31 December 1992 and 12 mg on 31 December 1995'.

Of the cigarettes sold in the markets of Member States 83% will be ineligible for sale after 1995. This would change both demand and supply patterns for the tobacco industry. To alter the variety of tobacco in order to fulfil Community requirements, manufacturers will have to obtain more of their tobacco leaf outside the Community. This will have major implications for tobacco growers and will worsen the trade balance.

Consumers would have a curb on their choices, and manufacturers will have to bear the costs of following the Directive's requirements, therefore increasing the price of cigarettes.

Written by DRI Europe, based on information provided by Eurostat and Pidea (Planning, Economic and Development consultants)

TEXTILES, LEATHER, CLOTHING AND FOOTWEAR

(NACE 43, 44 and 45)

The economic importance of the industry in the EC economy

In 1988, total EC production of textiles, leather, clothing and footwear amounted to ECU 151 billion. This represented 7% of the EC's total manufacturing production. Compared to 1987, it corresponds to a 6% rise (3% in volume).

Between 1975 and 1985, the trend of EC internal demand of textiles and clothing was very different from that of the USA or Japan: annual growth rates were negative in the EC (-0.2%) and small but positive in the USA (+2%) and Japan (+2.2%). As in the EC, however, US imports increased considerably in recent years. Approximately 25% of the US trade deficit is due to the textile trade deficit. The Japanese balance of trade in textiles and clothing is also negative (ECU -3.95 billion). The EC balance of trade for textiles amounted to ECU -758 million but the deficit was much more considerable for the clothing industry, whose net exports reached ECU -5 198 million in 1988.

For most industrialized countries, the beginning of 1989 was bad as major Western production centres saw a decrease in output and orders. On the other hand, a boom was recorded in Asian countries such as South Korea and Taiwan which benefited from the weakness of the US dollar.

Exchange rate movements have an important impact on the textile and clothing industry, even if trade flows themselves are only affected with a lag of several months. Asian countries whose currencies are linked to the US dollar have emerged as powerful competitors in this respect.

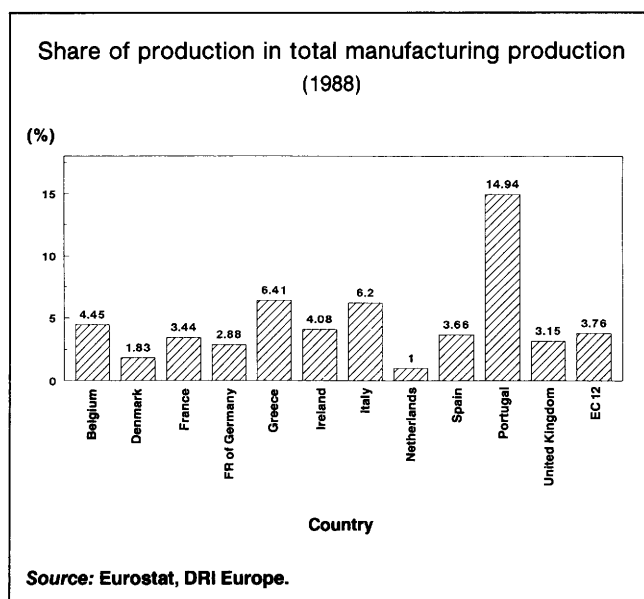
The share of textiles, clothing, leather and footwear in total value-added amounts to 4.4% in Belgium, 1.8% in Denmark, 3.4% in France, 2.9% in the Federal Republic of Germany, 6.4% in Greece, 4.1% in Ireland, 6.2% in Italy, 1% in the Netherlands, 3.7% in Spain, 14.9% in Portugal, and 3.1% in the United

Kingdom. The sector is thus relatively more important in the Mediterranean countries.

In 1988, almost 2.5 million persons were employed by the four sectors considered in this chapter. This represents a small increase compared to the level of 1987 (1.1%), but a fall of 25% compared with the 1980 level.

The share of employment in textiles, clothing, leather and footwear is more or less the same in all Member States, with the exception of Portugal where it reaches 4.4%. In the other countries, this share varies between 0.86% (Denmark and the Netherlands) and 2.2% (in Belgium, Spain, Italy, Ireland and France). All countries experienced job reductions between 1980 and 1988, especially Spain (-36%), the United Kingdom (-27%), the Federal Republic of Germany (-32%) and Ireland (-30%).

Figure 1

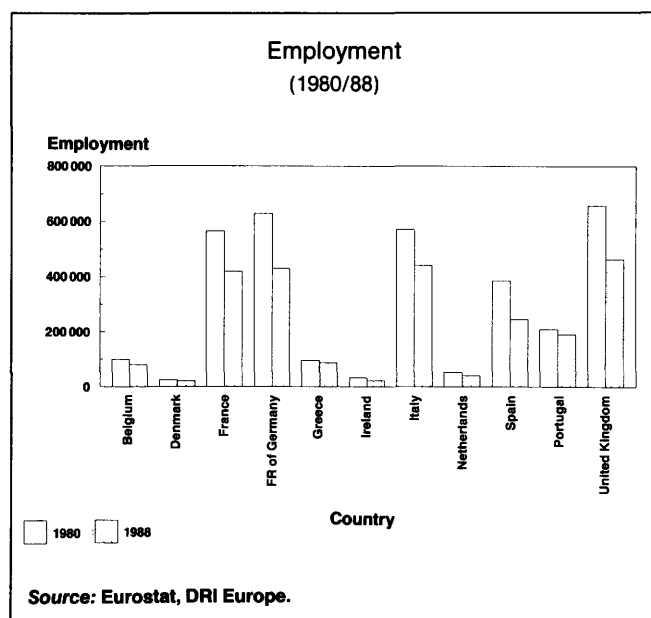


Description of the industry

This sector is covered by NACE code 43, which covers the textile industry (which includes the wool

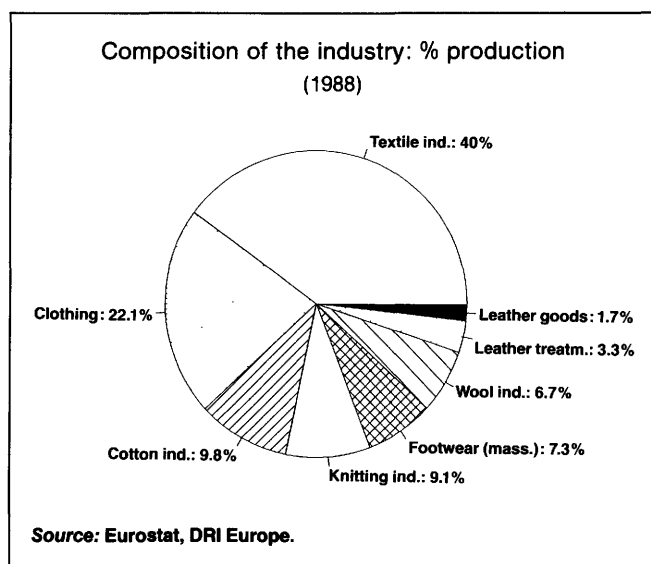
industry (431), the cotton industry (432), the silk industry (433), the preparation, spinning and weaving of flax, hemp and ramie (434), the jute industry (435), the knitting industry (436), textile finishing (437), the manufacture of carpets, linoleum and other floor coverings (438) and miscellaneous industries (439)). The leather industry is covered by NACE code 44, which distinguishes tanning and dressing of leather (441) and manufacture of products from leather and leather substitutes (442). Finally, the clothing and the footwear industries are both included in NACE code 45.

Figure 2



The share of these subsectors is presented in Figure 3.

Figure 3



With a production of ECU 84 300 billion in 1988, the textile industry in its broad sense (i.e. including wool, cotton and knitting industries) is by far the most important of the four sectors considered in this chapter. Its share of the total textiles, clothing, leather and footwear branch amounts to 65.6%. The textiles sector ranks 13th in the list of the 137 most important EC manufacturing industries, and ranks 8th in terms of employment (with 1.55 million employees). During the last decade the industry has been confronted with strong competition and high import rises. This led to a drastic reduction in the number of companies, and severe job losses in most EC countries.

The clothing industry employs about 1 million people, scattered in 28 000 small and medium-sized enterprises. Employment has been following a decreasing trend during the last two decades, due not only to rising competition and imports from low-cost countries, but also to productivity improvements (especially through automation and computer-aided design).

The EC footwear industry has also experienced job reductions as a result of stagnating internal demand and a lack of opportunities on the one hand, and from market share losses on foreign markets or falling external demand on the other hand.

Within the textile industry the knitting industry is the first employer, with 25 000 enterprises and 500 000 workers. 1988 was, in general, a zero growth year for the textile industry. The wool and cotton factories faced difficulties but linen and carpet plants benefited from a more favourable environment.

Consumption of clothing and footwear amounted to ECU 151 billion in 1985. This represented 7.3% of the total household budget in Europe (5.9% for clothing and 1.4% for footwear).

Industry structure

During the last two decades, the sectors of textiles, clothing, leather and footwear have all gone through a restructuring process worldwide. This was principally induced by the sharp increase of imports from developing countries, the slowdown of demand in industrialized countries and fast technological development in the industry. All those factors combined to curtail the rate of growth of production in the middle of the 1970s. One million jobs were lost between 1975 and 1985.

The restructuring that took place in the early 1980s, which raised productivity (thanks to heavy job

reductions, increased mechanization and automation of production), led to higher growth rates between 1984 and 1987. It seems however that the restructuring already implemented may not be sufficient to ensure stable growth in the medium and long run, as competition from low-cost producers such as the Asian countries, or newcomers such as Turkey, Brazil or China, is far from decreasing.

The textiles, clothing, leather and footwear sectors are very fragmented, and the share of small businesses has even tended to increase in recent years. The trend of each subsector in 1988 is analysed in the monographs that follow.

The share of large companies (employing more than 500 persons) in the industry's turnover is the following: 20.9% in Belgium, 40.2% in the Federal Republic of Germany, 43.3% in France, 24.1% in Italy, 23.1% in the Netherlands. In the leather goods industry, the share of small enterprises (less than 20 persons) represents 29.7% of turnover.

Within the EC, Italian producers have improved their relative position in almost all the textiles and clothing subsectors. Production capacities in the textile industry were reduced in France and the United Kingdom, while for clothing, this reduction was mainly observed in the FR of Germany. Despite heavy restructuring and rationalization investment, the British textile industry is less competitive than that of Italy or Germany. One of its characteristics is that its distribution system is far more concentrated.

The coefficients of specialization for the textile, clothing, leather and footwear industries as a whole ranged between 0.33% in the Netherlands and 4.09% in Portugal. The figures amount to 0.84% for Belgium, 0.7% for Germany, 0.52% for Denmark, 1.15% for Spain, 0.89% for Italy, 0.33% for the Netherlands, 0.89% for France, 4.09% for Portugal and 0.71% for the United Kingdom.

Relatively speaking, Italy is the leader as far as exports of clothing are concerned, and the Federal Republic of Germany is relatively more specialized in the textiles sector.

The specialization process over the past decade has allowed productivity improvements and cost reduction. Italy focused mainly on weaving and knitting, Germany on spinning and the United Kingdom on knitting. Along with those product lines, operations were also upgraded primarily in the spinning of yarn and in the weaving, finishing and cutting of fabric.

While the industry is confronted with low-cost foreign producers and subject to large cyclical movements, caused among other factors by changes in domestic demand and exchange rate fluctuations, its restructuring is still under way. On the one hand, many downstream industries (e.g. knitting production) are becoming more and more fragmented, with many small businesses usually working as subcontractors. On the other hand, large groups are being created, with the aim of reaching a European scale. British Coats Viyella, for example, recently made a bid for Tootal, an offer which is currently being investigated by the Mergers and Monopolies Commission in the UK. In France, Leonard was bought by Ratti, Dim was sold to American Sara Lee, Yves Rocher acquired Petit Bateau and Sym. While in France and Italy mergers and acquisitions are often achieved with German or other European groups, British companies tend to remain national.

Medium-sized enterprises seem to have been hit the most by the restructuring, as many plants and factories had to be closed or the workforce reduced.

The EC companies which continue to record the strongest successes are those concentrated on the high segment of the market (e.g. John Foster in the wool sector, known for its luxury clothes). Actually, demand for the most expensive luxury suitings is increasing and EC companies have understood that it may be a promising niche, even if it is bound to remain limited in size.

The wave of delocalization of production of goods whose brands are launched in Paris to Mediterranean or Far East countries for example is continuing.

The clothing manufacturers also resort to outward processing as they face difficulties on the domestic market. This strategy was first adopted by Germany in Eastern Europe, but other European countries are developing contacts with factories in Morocco, Tunisia, Turkey or even Asian countries.

Trade

The main obstacles to trade between Member States that exist at present are the quotas shared between the EC countries. In 1986, about 70% of EC textile and clothing imports were covered by multilateral arrangements. This allowed a more progressive restructuring and adjustment for the EC industry but has probably led to higher consumer prices than would have been the case had the quotas not existed. Differences in import restriction levels in the EC

countries are sometimes responsible for high price differences.

Under the Multifibre Arrangement (MFA), the EC has bilateral agreements with 22 countries, most of them Third-World nations. The trade guidelines of this agreement are to be renewed in July 1991. Negotiations to end it began as long ago as 1986 in Uruguay. No major decisions affecting the textile industry have been taken yet, and none are expected until the final moment of the negotiations in December 1990. The latest statements confirmed that the integration of textile into the normal rules of GATT could only take place if there was a strengthening of GATT rules and discipline. The position of the different EC Member States varies from country to country, the United Kingdom and the Federal Republic of Germany being strongly opposed to it and most of the other countries in favour of its renewal.

In 1988, many MFA quotas reached high levels of utilization but imports from products not subject to quotas rose more significantly. However, provision exists in the MFA agreement for new quotas to be introduced if necessary (systematic evidence of damage or threat of damage to the industry either nationally or in the EC as a whole must be proved). This provision has already been used in the past and more recently by the United Kingdom for example.

In fact, a new generation of Asian suppliers (Bangladesh, Malaysia, Indonesia, Sri Lanka, Pakistan, Singapore, Mauritius) is emerging, with much looser controls under the MFA, allowing substantially higher growth than those applying to the traditional large-scale suppliers such as Hong Kong, Taiwan, South Korea and Macao. One explanation for this may be trans-shipments from the traditional suppliers to the newer ones.

Duties reaching up to 122% are still imposed on EC textile exports to Turkey, including a compulsory contribution to the State housing fund. Tariffs on Turkish imports have however been abolished by the EC.

In December 1988, an agreement was reached between the EC and China, extending the prior arrangement originally negotiated in 1979, allowing further substantial rises of Chinese textile imports in the EC.

Negotiations between the Soviet Union and the EC for an agreement covering Soviet exports of textile and clothing products replacing the existing unilateral restraints on exports to the EC began last July.

Risks and opportunities

As EC competitors usually have lower labour costs, technological issues are essential to EC producers, in order for them to maintain their market shares. To move their specialization skills to high-quality products, improvements in productivity and product design quality are continuously necessary.

In the last decade, there has been rapid progress in textile automation. The development of open-end spinning and shuttleless weaving has helped reduce the labour-intensive character of the production process. This gives the opportunity to EC and North American companies to counter the advantage of low labour costs in Asia. Recently however, the pace of technological change has slowed down. Few technology leaps were made and efforts and investments were more concentrated on improving existing systems. The world's textile companies still invest a considerable amount, part of which benefits the international machinery industry (large orders for spinning or weaving machinery for example were made by the European textile industry whose demand is buoyant for the moment — especially in Italy — but is decreasing in Asia).

Computer-aided design (CAD) and computer-assisted management (CAM) are essential tools for this sector, not only for clothing and footwear but also for textiles and leather. Computers are used to sketch models, select the patterns and fabrics to be used, cut grade and position the fabric to be cut with a laser or water jet.

Within the EC, internal barriers to trade between Member States are relatively low. However, controls at frontiers of quotas for imports from other countries imply that the EC market is far from being fully integrated and this sometimes leads to considerable cross-country price differences (in the clothing sector for example).

Some of the problems mentioned by European enterprises are administrative costs, waste of time at frontiers, labelling constraints, differences in VAT rates. Distribution costs are also considered to be one of the biggest impediments to trade between Member States.

According to *European economy* published in March 1988 by the EC Commission, which gives results of the studies undertaken on the costs of non-Europe, the 'Cecchini report', the removal of customs controls will probably only have a marginal impact on trade between Member States in this sector. The direct reduction of unit costs of production should

amount to 0.1 to 0.3% for the four largest EC countries. Reductions of indirect costs could reach 0.3 to 0.6% of unit costs of production. It is mostly France and the United Kingdom which should benefit from those reductions. For the textile and clothing industry, the costs of barriers are estimated to lie between 0.5 and 1% of total turnover. This represents between ECU 0.7 and 1.3 billion.

Little saving from economies of scale is expected to be observed in the textile industry as a result of '1992', as specialization has already been under way for some years now. In the clothing industry, economies of scale are much more difficult to achieve as mechanization and automation are not easy to use due to product diversity. This is even more reinforced by the fact that European countries tend more and more to move to high-quality products for which it is necessary to remain flexible and attentive to consumers' tastes.

In general, distribution tends to be more and more concentrated. This will help to spread advertising and distribution costs between a larger number of selling units. As a result of reduced customs regulations and economies of scale in marketing and production costs, prices are expected to decline somewhat.

The more competitive environment should induce more direct investment abroad and decisions for tailoring to be done in foreign countries with lower wages.

Important efforts are being made by this sector to take environmental protection measures as, in general, this industry spends more than 3% of its total investment in anti-pollution programmes. In 1986, in the leather industry, the proportion of anti-pollution investment in total investment reached 4.3% in Germany and 4.9% in the Netherlands. In the textile industry, the equivalent figures were 2.6% in Germany, 0.7% in the Netherlands, 1.8% in the USA and 2.2% in Japan (this last figure in 1988).

Outlook

In all EC countries, the future of the industry will depend upon the actual trend in demand (both domestic and foreign), interest rates and external competition but also upon the future of the Multi-fibre Arrangement which is expected to phase out by 1991. As demand even decreased in Europe last year, demand in major foreign markets (especially the USA) is very important, firstly for European exports, but also because its drop could reinforce the pressure from Far East producers on the European market itself.

The boom in construction activity and consequently in demand for furnishing textiles should have a beneficial influence on this sector.

In a report published in the first quarter of 1989 by the Economic Intelligence Unit, the EIU suggests that the current trend towards increasing import penetration will accelerate with the completion of the single European market. It also added that growth in world consumption is likely to slow to an average of 2.4% per annum, with the USA and the EC seeing the smallest increases in demand.

In the four largest EC countries, which together account for 80% of EC production, output is expected to grow by 2.5% annually between 1989 and 1995, with most of the growth taking place in Italy (3.3%) and to a lesser extent in France (3.0%). Production growth will only reach 0.1% in Germany and 2.6% in the United Kingdom. Trend in export growth is forecast to continue its fall, Italy posting the best performance given its high degree of specialization.

Penetration of new markets (such as Japan or some regions of the USA), capitalization or creation of non-cost advantages (such as more flexibility toward fashion, quality) and increased specialization are crucial issues for this sector.

DRI Europe

TEXTILES

(NACE 431 to 439)

Summary

The year 1988 will turn out to be a zero-growth year for the Community textile industry, as is confirmed by all the provisional indicators to hand. The production index shows a drop in the neighbourhood of 1% by volume; production has increased by 2.6% at current prices, but decreased by 0.4% at constant prices.

The fundamental trends that have characterized this sector since the start of the 1980s are continuing: imports are the only area to gain by the increase in end-user consumption, the external trade balance deficit is growing, employment continues to decline, and the investment and restructuring policy is being actively pursued.

Current situation

The underlying trends that have characterized the developments in the textile industry since the start of the decade continued in 1988.

A total of 45 000 jobs were lost in 1988 in businesses with more than 20 employees, which means that the number of jobs lost since the start of 1980 is 400 000. The number of companies fell by 300 in 1988 as compared to 1987.

Two underlying trends are emerging at the present time:

- a fragmentation of production into very small businesses, usually working as subcontractors; this phenomenon is particularly important in downstream processing, especially the knitting industry;
- the creation of Community groups on a Europe-wide scale, with a view to the single market. Italian and French companies, often in conjunction with German companies, have been the most active in this area; similar movements have also been observed in Belgium, in carpets and continuous weaving; in the United Kingdom, concentration continues, but on an essentially domestic base, the objective being to create the

Table 1
Main indicators, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989 (1)
Apparent consumption	59 923	60 613	64 982	68 220	73 424	77 225	80 189	82 290	85 058	N/A
Net exports	-330	782	-522	704	1 423	1 838	869	-151	-758	N/A
Production	59 593	61 395	64 460	68 924	74 847	79 063	81 058	82 131	84 300	89 274
Employment (1 000)	1 948.6	1 827.5	1 761.3	1 722.0	1 693.5	1 630.0	1 603.6	1 577.7	1 547.5	1 563.0

(1) 1989 Eurostat forecast.

Source: Comitextil, UNSO (Comtrade).

Table 2
Industry structure

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Total number of enterprises	75 235	75 443	75 443	75 797	77 176	77 512	78 164	78 380	78 307
Number of enterprises (1)	17 759	16 699	16 074	15 967	15 556	15 369	14 992	14 953	14 632
Employment (1 000)	1 948.6	1 827.5	1 761.3	1 722.0	1 693.5	1 630.0	1 603.6	1 577.7	1 547.5
Employment (1)	1 736.5	1 617.1	1 553.1	1 517.3	1 483.4	1 439.0	1 402.4	1 379.2	1 330.1
Investment (million ECU)	2 391	2 178	2 312	2 756	3 040	3 388	3 842	4 045	4 125
Turnover (million ECU)	57 718	59 951	64 702	68 495	76 596	82 077	87 130	86 156	88 763

(1) Enterprises with more than 20 employees.

Source: Comitextil.

world's largest textile company; however, this phenomenon has as yet barely touched the newer members.

Alongside this ongoing restructuring, investments continue to grow, although the increase was less marked in 1988 than in previous years. Investments per employee more than doubled between 1980 and 1988, so that the European textile industry continues to strengthen its position as the world's most modern industry.

Production

Production and turnover increased by approximately 3% in value in 1988, and decreased slightly in constant prices.

Activity was relatively sustained in the early part of the year, but the situation seriously deteriorated during the second quarter, before stabilizing in the third and fourth quarters at a slightly lower level than in the corresponding period of the previous year.

However this overall situation conceals differences between Member States.

The biggest increase in 1988 was observed in Ireland (up 7.6%), but this merely compensated for the ground lost in 1986 and 1987. The Netherlands also showed an increase, in the neighbourhood of 4%. Activity in Portugal rose by 3%. Italy and Belgium made more modest progress, in the neighbourhood of 1%. Production in France stabilized at a relatively low level, since production in 1988, on a scale on which 1980 represents 100, stood at 83.4%.

The countries where production showed a downward trend are Denmark (down 1.2%), the Federal Republic of Germany (down 2.6%), the United Kingdom (down 2.8%), Greece (down 2.9%), and in particular Spain (down 7.1%).

Consumption

At current prices, apparent consumption increased by 3.4%, slightly more than production proper. The constant price index remained practically at the same level as in 1987.

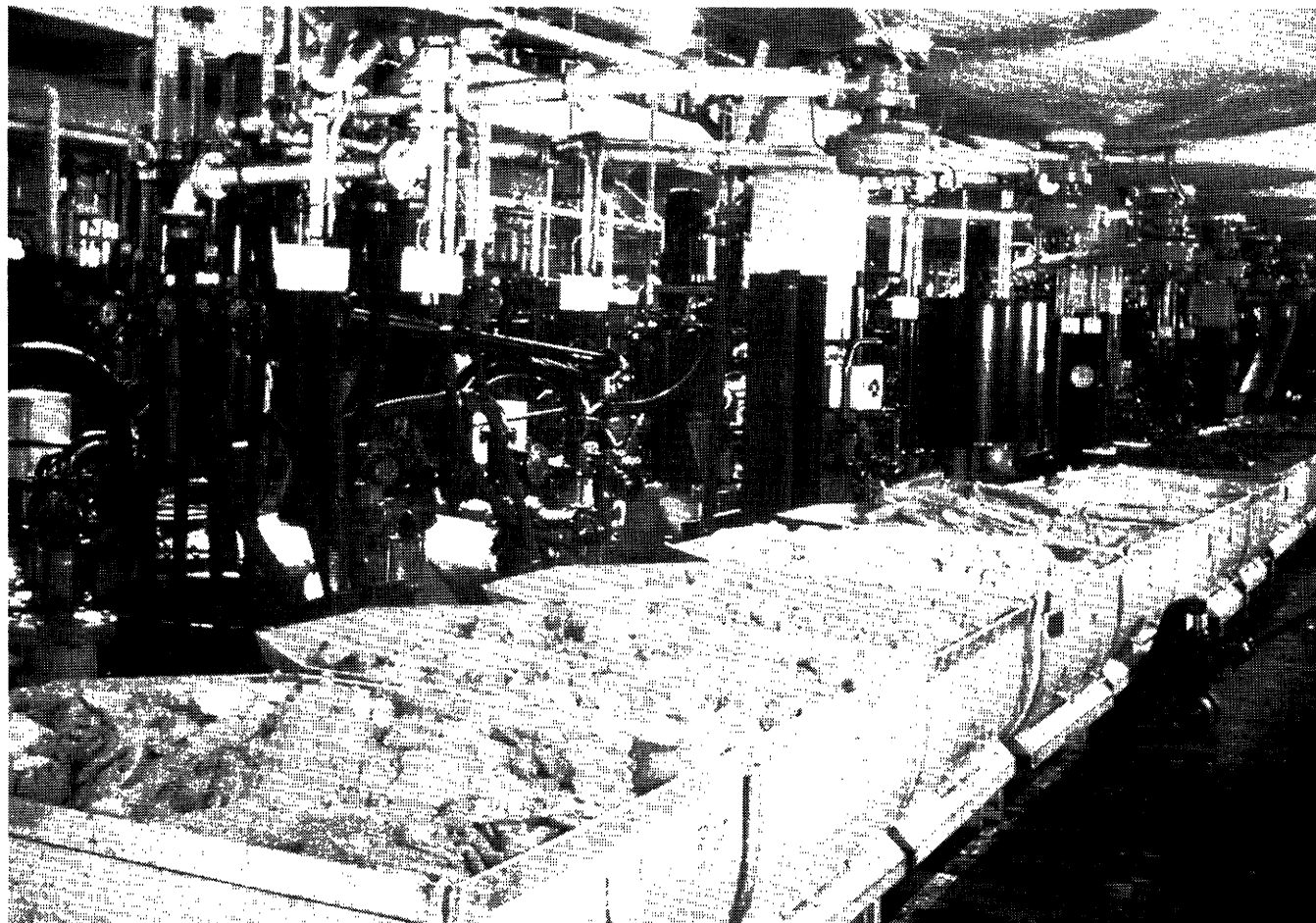


Table 3
Total value of production, 1985

(million ECU)	NACE	EC 10	USA	Japan
Total textile industry	43	75 768	60 150	44 950
Of which:				
Wool industry	431	13 949	1 529	4 320
Cotton industry	432	18 461	16 097	6 103
Silk industry	433	6 923	N/A	N/A
Linen industry	434	904	N/A	N/A
Knitwear	436	16 208	15 441	8 091
Finishing (1)	437	6 746	8 115	5 857
Carpets and other floor coverings	438	5 198	13 517	1 499
Other textiles	439	6 227	5 452	3 110

(1) Independent finishers only.

Source: Eurostat (Inde), Census of Manufactures.

In fact, imports from outside the EC increased faster than exports. However, the import growth rate has progressively declined from one year to the next, owing to the slower pace of the rise in value of the USD and of certain South-East Asian currencies tied to the USD.

Trade

Imports from outside the EC increased by 8.3% in value, while exports grew by 4.1% only.

The consequence was a considerable rise in the balance of trade deficit and a deterioration of the export/import ratio, which confirms the trends existing since 1980.

On this point, it should be observed that the entry of Portugal and Spain, which were traditionally major exporters to the 10, led to a reduction of this deficit in accounting terms in 1986, but did not affect in any way the trend towards progressive deterioration of the EC's external trade.

The market penetration rate of imports also rose by one percentage point. In terms of value, however, this figure is not representative of the true situation, as import prices are generally very low, and therefore the penetration rate in volume terms is markedly higher.

The pressure from the developing countries continued; however, the competition from the dominant countries (Hong Kong, the Republic of Korea, Taiwan) was slightly weakened owing to the revaluation of their currencies. Imports from the People's Republic of China, Turkey, India and Pakistan rose considerably, but it was the Asian countries that did most to fill the gap. Purchases in the United States also increased substantially.

Table 4
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production in current prices									
EC	59 593	61 395	64 460	68 924	74 847	79 063	81 058	82 131	84 300
Index	75	78	82	87	95	100	103	104	107
USA (1)	28 687	37 648	40 756	50 480	59 840	60 150	50 596	45 660	45 896
Index	48	63	68	84	99	100	84	76	76
Japan (1)	24 698	32 680	32 688	37 331	42 819	44 950	43 321	41 619	45 626
Index	55	73	73	83	95	100	96	93	102
Production in constant prices									
EC	73 792	71 415	71 670	75 735	76 807	79 063	84 024	87 280	86 691
Index	93	90	91	96	97	100	106	110	110
EC trade in current prices									
Exports extra-EC (2)	7 234	8 313	8 791	9 551	11 590	12 688	12 499	13 309	13 856
Index	57	66	69	75	91	100	96	102	100
Imports extra-EC (2)	8 824	9 012	9 582	10 510	12 292	12 565	11 630	13 460	14 614
Index	70	72	76	84	98	100	104	120	131
X/M (2)	.82	.92	.92	.91	.94	1.01	1.08	.99	.95
Import penetration (2)	.17	.17	.17	.17	.18	.19	.14	.17	.18

(1) Census of Manufactures and Eurostat estimates.

(2) 1980-85 EC 10; 1986-88 EC 12.

Source: Comitextil, Eurostat (Trend).

Table 5
Structure of imports and exports, 1986

(%)	Imports		Exports	
	Textiles (1)	Knitted goods alone	Textiles (1)	Knitted goods alone
Extra-EC	100	100	100	100
EFTA	10	10	35	55
USA	6	2	16	20
Japan	6	N/A	5	4
Comecon	6	7	8	3
Turkey	7	8	1	N/A
China	6	3	N/A	N/A
Republic of Korea	5	8	1	N/A
Taiwan	4	6	N/A	N/A

(1) Yarns, fabrics, other textiles and knitted goods.

Source: OECD (Foreign trade by commodities).

As regards exports, a decrease was recorded in the following markets: EFTA (down 1%), USA (down 1%), the Soviet Union (down 10.2%) and the Middle East. On the other hand, substantial growth was noted in the Far Eastern markets: Japan (up 26%), Hong Kong (up 31%), Taiwan (up 33%), and Korea (up 23%); although these countries still account for a relatively low percentage of our exports, this development nevertheless bears witness to a gradual opening-up of these markets and to the European textile industry's ability to benefit from it.

In the initial stage, the progress of our exports to these countries was most marked in clothing and fabrics for clothing of prestige brands.

The wool industry

(NACE 431)

After two difficult years, the situation in the European wool industry became more or less stable during 1988; the general production index, which had fallen by 3.4% in 1986 and 3.3% in 1987, finally suffered only a very slight decline in 1988, about 1%. This overall stability is however the result of highly contrasting developments depending on the sector of activity.

In combing, for example, well supported by exports, a marked improvement can be observed, with production up by 3% in 1988, as opposed to a drop of 2% in 1987.

Table 6
Imports (1987/86 change)

(%)	Yarns, fabrics and misc.	Knitwear articles	Total textiles
Extra-EC	21.5	24.7	22.1
Industrialized countries	7.7	9.6	7.9
China	22.2	82.3	30.6
Turkey	19.7	54.8	25.9
Republic of Korea	10.9	7.6	9.6
Others	34.8	24.9	33.0

Source: Eurostat (Comext).

With regard to combed spun wool, however, there is a very serious decline. After a fall of 2.3% in 1987, production decreased again by 4.6% in 1988. This decrease is due not only to the continuous worsening of the situation in the hand-knitting wool sector, where production fell by 25% in 1988 after a drop of almost 20% in 1987, but also to a more recent decline in the hosiery trade wool sector, which lost 8% in 1988.

In the carded spun wool sector, 1988 was characterized by a substantial upturn in the situation: after a 5.4% fall in 1986 and a 5.3% fall in 1987, production rose by 3.5% in 1988.

In the clothing fabric sector the position of European wool fabrics, which had suffered badly in 1986 and 1987 — due largely to exports failing to stand up so well — stabilized overall in 1988, with production roughly equivalent to the 1987 level.

The cotton industry

(NACE 432)

The cotton industry experienced a difficult year in 1988, contrasting sharply with a good year in 1987.

Table 7
External trade, 1987

(million ECU)	Exports			Imports		
	Textile goods	Knitted goods	Total	Textile goods	Knitted goods	Total
EC	10 911	3 000	13 911	9 533	5 032	14 565
USA	2 541	368	2 908	5 643	7 152	12 795
Japan	4 849	131	1 980	2 747	1 832	4 579

Source: OECD (Foreign trade by commodities).

In both spinning and weaving sectors, producers were obliged to lower prices by 15 to 20% in order to compete with abnormally low import prices, whilst at the same time activity and employment in the industry fell.

In the spinning sector, the drop in prices led to limited profitability and several plant closures. Total yarn production fell by 3.1% in relation to 1987, with cotton yarn being particularly badly hit, dropping by 7.2% in a market which was not receptive to pure cotton articles. Artificial fibres, especially viscose, proved more popular and this provoked a sharp decrease in cotton consumption in the spinning industry.

Imports of cotton yarn remained more or less stable against a record year in 1987, whilst knitting imports rose substantially; orders had fallen by 6.5% and stocks had increased by 21.5% by the end of the year. By the beginning of 1989, the rise of the USD and the increase in raw cotton prices combined to push up manufacturing costs, although these costs were not sufficiently reflected in selling prices.

In the weaving sector, the general situation was in slight decline. Total EC production fell by 3.2% in relation to 1987, whilst production in cotton fabrics fell by 6.4%. Prices were affected by unfair competition from abroad, leading to financial losses and plant closures. Total deliveries fell by 6.1% whilst stocks had risen by 8.6% for cotton fabrics by the end of the year.

Total exports rose by 3.3% due to greater demand for viscose and other synthetic fabrics, however exports of cotton fabrics fell by 6.8%. On the import side, the situation remained relatively stable for fabrics against a record year in 1987, whilst clothing imports rose by 10%.

Activity by production breakdown revealed different performances in various areas. In denim and velvet, the situation was bad, with cheap imports proving damaging to production and deliveries in the denim sector, which has led in turn to the opening of an anti-dumping procedure. By the beginning of 1989 there was slight improvement in the sector in line with a general improvement in the clothing industry as a whole. In terry towelling the situation was relatively stable, although demand was weak, whereas the shirting sector suffered from a drop in demand and production. In the bedlinen sector, the situation was stable until September, when, due to worrying price decreases and falling demand, there was a general deterioration: the perspectives for 1989 are not good.

The linen industry

(NACE 434)

The year 1988 was a good one for linen spinning, but it should be underlined that this year's results were better for wet-spun linen than for dry-spun linen. Developments in late 1988 and early 1989 are more worrying, however.

With regard to fabrics, 1987 was slightly better than 1986, and this improvement was confirmed in 1988.

The jute industry

(NACE 435)

Although this industry has practically disappeared in Europe, some enterprises are still producing jute specialities. The production of jute yarns decreased by 2% in 1988, while jute fabrics production was up by 11% in 1988 after a setback of 9% in 1987.

Knitting mills

(NACE 436)

With some 25 000 enterprises and some 500 000 workers, the knitting industry is the first employer of the textile industry. In 1988, the situation varied according to the type of activity involved. The production of knitted and crocheted fabrics decreased by 5% after the strong rise of 1987. This is also true for ladies' stockings (- 3%) as well as for other typical knitted and crocheted articles: jerseys and T-shirts (- 5%), training suits (- 5%), swimwear (- 6%). However, there was a rise or even a recovery in the production of a number of made-up articles. This is the case for men's suits (+ 10%), babies' outergarments (+ 28% in 1988 after a setback of 4% in 1987), petticoats and knitted slips (+ 111%) and babies' underwear (+ 28%).

Unfortunately, external supplies benefited much more from the infatuation for knitted products than European producers since imports of these products grew much more rapidly over the 1986-88 period than the rest of textile products. And if we consider the import penetration ratio by activity sector, the knitting industry, with more than 30%, is the major victim of import penetration.

Finishing

(NACE 437)

Growth in the finishing industry was quite different according to the countries and the sectors concerned. If we analyse performances in detail, we can note that printing did better than dyeing since, unlike the printing sector, dyeing activities decreased. On the whole, however, the output decreased as compared with the production of the previous year. Nevertheless, the turnover increased in most European countries.

Carpets

(NACE 438)

The upward trend recorded in 1987 was continuing in 1988 following the boom in the building sector in 1988 and the increase of carpet consumption per capita in most countries, since the total production grew by 5% and the apparent consumption by 7%. Indeed, the production of tufted carpets increased by almost 3% in 1988 and that of woven carpets by 3.2%. But it is in the needle-punched felts that the increase was the strongest, as in the previous year: + 11%.

Miscellaneous textiles

(NACE 439)

The turnover of the EC narrow fabrics industry has increased by about 5% with a slackening of the growth of imports from the Far East.

The general situation of this industry seems better

than the other textile activities and particularly for labels (because of the fashion trend).

However, the narrow fabrics industry is worried about the problem of anti-dumping measures for synthetic yarns, because the imported finished products from the same countries are not submitted to any duties.

Outlook

The year 1989 should bring with it an improvement in textile industry activity; weather conditions in northern Europe in the spring were such as to favour a recovery in the consumption of items of clothing, the building boom in a number of European countries is a positive factor for furnishing textiles, and fashion, particularly the revival of denim, is regenerating the cotton industry.

The growth of imports should continue to slow down if the USD and the currencies tied to it remain at reasonable levels.

In addition, exports to Asia should continue to increase, and exports to EFTA countries, where consumption seems to be more favourably orientated again, should pick up again.

As a result, the outlook for 1989 is better, but for textiles the short and medium-term future is essentially dependent on the situation in the clothing industry. However, activity in this industry did recover somewhat in early 1989.

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THE CLOTHING INDUSTRY

(NACE 453)

Description of the sector

In this chapter the clothing industry shall be understood to mean the industry that produces garments using industrial methods, essentially with warp and weft fabrics, whose activity comes under NACE 453, and whose products are traded under Chapter 62 of the Combined Nomenclature.

Information regarding knitted garments is contained in the chapter on the textile industry, which also covers the activity of the knitting industry and trade in knitted garments.

Current situation and structure of the industry

The Community clothing industry represents one million jobs in 28 000 firms generating a turnover of ECU 44 billion (1987 figures).

The structure of the industry continues to be characterized by the size, small or medium, of the businesses; almost 75% of the firms have fewer than 100 employees. Moreover, the labour force is primarily female. Finally, the firms are established in well-defined regions of the Community.

Over the years a reduction in employment has been observed, linked both to the economic environment — large volume of imports into the Community of low-priced clothing, restrictions on the industry's export opportunities to many non-Community countries — and to increased productivity.

The clothing industry is constantly adjusting to economic conditions, by choosing strategies that are reflected in developments in production and turn-

over. The weakness of demand, accentuated by unfavourable population trends and the persistence of foreign competition, forces companies to reduce their industrial potential by going over to outward processing, or to look for new gains in productivity by adopting increasingly sophisticated methods. Others endeavour to export more abroad.

While the Federal Republic of Germany was the first country to use outward processing, which is carried on essentially in European countries with state-run economies and in Yugoslavia, this option can be seen to be spreading, albeit in differing proportions depending on the Member State, and extending to the Mediterranean countries, Morocco, Tunisia, Turkey, and even to some countries in Asia.

Consumption

In the course of 1988 textile and clothing consumption was practically stagnant in all Member States with the exception of the United Kingdom, where the rise of almost 5% was of benefit primarily to imports. Within the Community, production expressed in ecus rose by just 2%, which is a derisory figure when compared to the increase in imports (see above).

Introduction of new technologies

The clothing industry, without undergoing a complete technological revolution, is also adopting a series of technical improvements in the various stages of the production process, enabling it to make slow progress towards increasingly far-reaching automation.

Table 1
Main indicators, 1980-91

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988 (1)	1989	1990	1991
Apparent consumption (1)	33 473	34 659	36 788	36 919	41 717	43 909	45 440	47 677	51 712	N/A	N/A	N/A
Net exports (1)	-2 167	-2 291	-2 437	-2 150	-2 514	-2 065	-2 669	-4 206	-5 198	N/A	N/A	N/A
Production (2)	31 306	32 368	34 351	34 769	39 203	41 844	42 771	43 471	46 514	47 863	51 704	55 957
Employment (1 000) (2)	1 275	1 200	1 165	1 144	1 105	1 095	1 097	1 069	1 051	1 064	N/A	N/A

(1) Provisional.

(2) 1985/86 Greece estimated; 1987 Greece and Ireland estimated.

Source: AEIH, Eurostat (Bise), UNSO (Comtrade).

Table 2
National production by country, 1987

(million ECU)	Production
EC 9	42 234
Belgium	1 392
Denmark	830
FR of Germany	10 925
Spain	3 752
France	8 515
Italy	9 226
The Netherlands	600
Portugal	621
United Kingdom	6 373

Source: AEIH.

An increasing number of concrete applications are being introduced in all those functions that can be computer-aided. The computer is involved as early as the pattern and colour of the fabric itself, the sketching of the model and changes in the model depending on the fabric, cutting and grading (digitization), and positioning, which is vital for an optimum cut made using a laser or water jet. Conveyors are increasingly common in sewing shops, to reduce handling operations and ensure a permanent supply for the sewing machines; they save a great deal of time.

While the labour force in the stitching shop is still numerous, major technical progress is being introduced in the sewing machines themselves, more and more of which are driven by electronic control units that can be used to automate a whole series of operations, such as overcasting, hemming, buttonholing, etc.

A great deal of research will however be necessary before total automation of the production process can be achieved, as the 'flexible' nature of the fabric is still a handicap.

Research continues in this direction among others. All manufacturers of hardware and software can be seen to be endeavouring to adjust to the structure of the industries and to the need for flexibility and a quick response. Automatic cutting systems can be used for unit cuts and for cushions of various thicknesses. Moreover, the systems are increasingly compatible with one another.

External trade

As regards external trade, the trend towards an increase of imports of woven garments from outside the EC is confirmed year after year, and had reached

Table 3
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production in current prices									
EC	31 306	32 368	34 351	34 769	39 203	41 844	42 771	43 471	46 514
Index	75	77	82	83	94	100	102	104	111
USA (1)	29 249	39 688	48 454	55 206	64 187	65 212	51 189	45 802	46 522
Index	45	61	74	85	98	100	79	70	71
Japan (1)	7 041	9 830	10 026	11 784	13 493	14 179	N/A	N/A	N/A
Index	50	69	71	83	95	100	N/A	N/A	N/A
Production in constant prices									
EC	39 190	38 184	38 759	38 340	41 649	41 844	42 273	42 432	N/A
Index	94	91	93	92	100	100	101	101	N/A
EC trade in current prices									
Exports extra-EC (2)	2 072	2 599	2 847	3 223	3 969	4 736	5 007	5 033	5 089
Index (3)	44	55	60	68	84	100	100	101	102
Imports extra-EC (2)	4 590	5 098	5 622	5 874	7 171	7 648	7 844	9 432	10 394
Index (3)	60	67	74	77	94	100	110	132	145
X/M (2)	.45	.51	.51	.55	.55	.62	.64	.53	.49
Imports intra-EC (2)	3 874	4 229	4 718	4 974	5 706	6 308	7 595	8 100	8 097
Index (3)	63	67	75	79	90	100	111	118	118

(1) Census of Manufactures and Eurostat estimates.

(2) 1980 EC 9; 1981-85 EC 10. Greece estimated.

(3) Index evaluated using EC 12 estimates.

Source: AEIH, Eurostat (Bise).

ECU 9 431 700 000 in 1987, the year in which the Community was extended to include Greece, Spain and Portugal, 32% more than in 1984. In 1988 imports of woven and knitted garments from outside the EC increased in quantity by 9% over 1987; in the first three months of 1989 they had already increased by 8% over the same period of 1988. In terms of quantity, imports of woven and knitted garments from outside the EC increased by 17%.

Exports of woven garments outside the EC are not increasing in the same proportion (27% by value in 1987 as compared to 1984), and this is leading to an increasing deficit of the balance of trade. In quantity terms, exports of woven and knitted garments outside the EC have increased by only 5%. In 1988, exports of woven and knitted garments outside the EC fell by 3% in quantity as compared to 1987; in three months of 1989, they had dropped by 0.56% from the figure for the same period of 1988.

In 1988 the negative balance of trade in woven and knitted garments was more marked, as the coverage rate of imports from outside the EC was 75%.

The impact of 1992

The advent of the single market will not bring about any fundamental upheaval in intra-Community trade as far as the clothing industry is concerned, since this trade is already governed by a common textile and clothing trade policy; nevertheless a knowledge of the quantities involved in these trade movements is still of fundamental importance; despite the removal of internal borders a statistical information system must be maintained.

The industry should however benefit from the changes that will take place, particularly in services,

such as transport, insurance and banking services. It is not yet possible to assess the precise effects, as thinking on these subjects is still in progress.

There remains the question of harmonization of testing methods and standards. While there are relatively few Community directives on standards and testing methods, Member States have been legislating on all these matters for some time, frequently going in different directions.

The question of harmonization is therefore a technical issue, but above all an economic issue. A proliferation of Community regulations that in the long run would impose such technical and financial constraints on the industry that they would become counter-productive, is not advisable; on the other hand, testing methods must be standardized.

The ESC (European Standards Committee), set up in 1961, and based in Brussels since 1975, and Cenelec (European Electronics Standards Committee) have been assigned the task of harmonizing, creating and promoting European standards.

Their activities will grow in the runup to the single market, and they should contribute to doing away with technical barriers to trade, thereby facilitating the free movement of goods within Europe. These bodies cooperate closely with the ISO (International Standards Organization).

The single market should foster the expansion of sales and procurement markets. We can however expect an even greater impact by imports from non-Community countries.

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LEATHER TANNING AND FINISHING

(NACE 441)

Summary

Over the 1980s, the leather tanning and finishing sector has undergone substantial restructuring, leading to a reduction in both the number of tanneries and the size of the workforce. One reason for this contraction has been the partial relocation of leather product industries, such as shoe manufacturing, to lower labour cost countries. This trend is anticipated to continue, resulting in a forecast decline in production and consumption of leather in the Community. Exports have grown relatively strongly over the past seven years, although export values represent only around 15% of total production. Further restructuring in the industry is expected in the face of strong competition from developing countries; however, European producers, at present, retain their position of leader in terms of product quality and technical innovation.

Description of the sector

The EC tanning industry has successfully combined long-standing traditional skills with technological progress, which together have converted the sector into a highly sophisticated industry, mobilizing large financial resources and exploiting a high degree of design and fashion.

Leather tanning and finishing consists of establishments engaged in tanning, currying, dyeing and finishing of raw hides and skins. The industry is therefore based on the use of an agricultural by-product linked to the production of meat, milk and wool. The fur industry, where the animal's body hair is preserved after tanning, is considered as a separate and distinct sector. However, woollen

sheepskins (double-face) are included in the tanning sector.

The NACE definition is very general, since it covers related industries such as imitation leather (441.2). This cannot be considered as leather, as synthetic substitutes do not possess the inherent qualities of leather as defined by the International Council of Tanners. Substantial efforts have been made to harmonize descriptions and agree on common definitions.

Current situation

In 1988, the value of EC leather tanning production decreased by 1.6% from ECU 7 133 million to ECU 7 017 million. Europe's biggest tanner, Italy, contributed 54% to the total with ECU 3 345 million. This was followed by Spain with some ECU 1 350 million and 19% of EC production. The EC is a relatively large producer compared with the USA, whose tanning output is valued at ECU 1 767.9 million. In constant prices, output rose by 1.3% in 1988. EC leather production reached its maximum output in terms of surface area in 1985 with about 324.7 million m² (up 22% from 1980) and has since decreased steadily. Total leather production fell by about 1% from 313.8 million m² in 1986 to 311.3 million m² in 1987. This decrease is somewhat less than the previous year when it dropped by 3.3%.

However, the situation differs within the EC, as Italy, Spain, Portugal and Greece have registered an increase in their production since 1980, while France, the Federal Republic of Germany, Belgium, Denmark and Ireland all registered a decrease over the same period. The UK suffered a fall in output

Table 1
Main Indicators, 1980-90
Leather tanning and finishing (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Apparent consumption	4 246	4 628	5 110	5 487	6 372	6 939	6 707	6 870	6 781	6 715	6 685
Net exports (2)	-31	82	9	91	191	301	238	263	236	232	226
Production	4 215	4 710	5 119	5 578	6 563	7 240	6 945	7 133	7 017	6 947	6 911
Employment (1 000)	83	83	81	81	80	78	77	75	72	72	70

(1) 1989-90 Cotance forecasts.

(2) Excluding Portugal.

Source: Cotance.



between 1980 and 1988. After holding up reasonably well in earlier years — especially in 1987 — UK output fell back in 1988 due to structural changes in the industry and very high prices which affected demand. Spain and Portugal are enjoying a phase of relative expansion; Spain has increased its production in value terms by 83% (63% in quantity) since 1980, Portugal by 11.4% (23% in quantity).

Industry structure and geographical features

The geographical location of the tanning and leather product industries has registered considerable changes in recent years. The shoe industry has followed a global trend to relocate its activities in countries offering cost advantages and fewer environmental constraints. The EC shoe industry has suffered a decline for several years. Spain and Portugal

have benefited in part from this trend, but their accession to the Community has brought with it strong competition.

European tanneries are highly concentrated geographically; the southern European countries account for 90% of the EC's tanneries. Italy alone represents 77% of them with over 3 000 establishments. Spain follows a long way behind with some 8% and 342 establishments. In both these countries, the tanneries are mainly located along the Mediterranean coast (Valencia, Catalonia, Tuscany, Campania and Veneto). Other important European centres are located in Lombardy, Mazamet, Pirmasens, the Stuttgart area and Northamptonshire.

As hides and skins make up the raw material for the industry, tanneries have tended to locate close to the suppliers in agricultural regions. However, other aspects such as proximity to the buyer, joint use of

effluent treatment plants and links to fashion centres have become leading factors in the choice of geographical location. A recent trend is to locate wet-blue production close to slaughterhouses in order to treat fresh instead of salted hides and skins, and thereby to improve quality. When concentrated geographically, the industry also enjoys better access to availability of qualified personnel and economies of scale for suppliers to the tanneries.

Europe's tanning companies vary in size from small enterprises employing less than 20 people to larger plants such as Cogolo in Italy with a workforce of over 1 000 employees. The EC average is about 20 workers per tannery but figures vary considerably from country to country. The average in Benelux, the UK and the Federal Republic of Germany ranges from 50 to 90 workers. France, Spain and Portugal register a rough average of 30 workers per tannery. The biggest European tanner, Italy, employs on average 11 workers per plant, having developed the concept of microtanneries. However, with 3 000 tanning companies, Italy is now facing the same structural problems as the other Member States. Flexibility and adaptability to the market will determine the capability of the European leather industry to compete on the international stage.

European tanneries are mainly family-owned and family-run. This sometimes indicates lack of financial strength or of a modern approach to management. To improve this situation, some tanneries form consortia to take advantage of collective buying of raw materials and chemicals, market analysis and strategies, to improve their financial strength and benefit from economies of scale.

In some Member States, tanning activities can account for a small part of larger holdings dedicated to related industries, such as chemicals and plastics. In countries facing severe decline of the tanning and leather manufacturing sectors, diversification and market orientation play important roles.

Due to the changing structure of the shoe and leather goods industry, the EC tanning sector has undergone considerable contraction and restructuring in most Member States, with a consequent drop in the number of tanneries and the size of the workforce since 1980. In the early 1980s, the sector accounted for 4 181 tanneries but by 1987 the number had fallen to 3 878, representing a decrease of 7.2%. Northern European countries experienced a bigger decrease in the number of establishments compared with southern Member States.

The entry of Spain and Portugal into the EC added some 500 factories to the EC's tanning sector (of which 342 were in Spain). Portugal is in a unique position benefiting from low labour costs compared to other EC Member States, thereby attracting, for example, the shoe industry.

Important companies in Member States are:

Italy	<ul style="list-style-type: none"> — Gruppo Mastrotto (Vicenza) — Gruppo Danieli (Vicenza) — Faeda e Valle Chiampo (Vicenza) — David Gruppo (Pisa)
Spain	<ul style="list-style-type: none"> — Grupo Colomer — Grupo Lederval — Grupo Picusa-Vila — Grupo Tipel
France	<ul style="list-style-type: none"> — Costil Tanneries de France SA — Tannerie d'Annonay SA — Tanneries Du Puy — Tannerie Pechedo
FR of Germany	<ul style="list-style-type: none"> — Lederfabrik C.F. Roser GmbH — Lederfabrik Louis Schweizer GmbH & Co — Freudenberg, Carl
United Kingdom	<ul style="list-style-type: none"> — Pittard Garnar plc — Strong and Fisher Group plc — The British Leather Co Ltd — Scottish Tanning Industries Ltd
Portugal	<ul style="list-style-type: none"> — Monteiro, Ribas Industrias Sarl — Sociedade Industrial de Curtumes Paulo de Silva Ramito Sarl

Employment trends

Employment in the EC's tanning sector is polarized between the heavy concentration in the southern Member States such as Italy (34 000 production workers or 45% of the EC total) and Spain (13 000 people or 17% of the total), and the northern European countries with some 29% of the total. France, the Federal Republic of Germany and the UK together employ 18 961 tannery workers accounting for 25% of the total. The Benelux countries, Denmark and Ireland have less than five production units in each country and thus very low employment figures.

In the EC, the tanning sector has lost over 40% of its workforce since 1960. This drop is a direct conse-

quence both of internal structural changes and of cheap imports of leather and leather products from LDCs and NICs. Since 1980, the 12 Member States registered a decrease of 10% in employment in this sector; in 1988, 72 000 people worked in tanneries compared to 83 000 in 1980. Over the same period, the USA registered a reduction of 38% of production workers in the tanning and finishing area. By 1987, only 10 000 production workers were employed. Japan's workforce in the tanning sector is estimated to be around 7 000.

The same trend has swept through all industrialized countries, due to the development of large tanning capacities in developing countries and the relocation of the leather product industries to low labour cost countries. Nevertheless, the southern European countries have remained important leather producers, Italy being the second largest producer in the world. Employment in this sector has remained relatively stable in Italy, Greece and Spain since 1980. In Italy, employment increased until 1984, when it peaked at a total of 36 200 workers, although today the figure has fallen to 34 000. The situation of Portugal's tanning industry differs in many ways from other EC countries. Portugal is stepping up its investment to meet the rise in domestic demand due to an influx of leather goods and shoe producers attracted by low labour costs. Portuguese tanneries registered an increase of 4% from 1986 to 1987, and has now some 5 000 production workers. France, the UK and the Federal Republic of Germany lost 7 536 production workers from 1980 to 1987, a reduction of 38%, 28% and 17% respectively. Except in Portugal, this trend does not seem to be slowing down in the EC. Member States will have to brace themselves for average annual reductions of 5% until the end of the decade.

Consumption

The footwear sector remains the tanning industry's largest market, consuming 40% of the EC's leather production by surface area. Nevertheless, this market and its importance has been steadily reduced due to the competition from NICs and LDCs. In 1983, footwear uppers and linings consumed 46.4% of production as against 49% in 1980. Production of heavy tanned leather (used for soles) has decreased by about 23% from 1980 to 1985 when EC countries produced 61 700 tonnes compared to 80 000 tonnes in 1980. The developing countries are progressively increasing their slice of the heavy leather market, at the expense of the industrialized world. As developing countries improve their leather quality, the

remaining shoe industry in Europe and other industrialized countries will face stronger competition even in high-quality products. However, the latter countries still have the lead in fashion, punctual delivery and technical innovation, at least for the time being.

Production of leather goods, such as wallets, handbags and luggage, has also decreased since 1980. Their share in total EC leather production dropped from 16% at the beginning of this decade to 9.9% in 1986, losing their rank as the second largest market. Production of leather clothing and gloves has overtaken them to become the second largest market for EC leather after footwear. Some 21.2% of Europe's leather now goes to the garment industry.

The most impressive rise has occurred in the upholstery market. Consuming only 9.3% of the European leather production in 1980, upholstery is now the third largest client with 13.6%. Italy and the Federal Republic of Germany and to a lesser extent the UK, are the main European producers of upholstery leather.

Hides and skins are by-products of stock breeding. The hides are ultimately treated in industrial processes but none are specifically produced for that purpose. Supply is thus independent of demand, although increasing prices may encourage more effective techniques in the prevention of damages to hides before, during and after slaughtering. The European leather supply is partly affected by the EC's common agricultural policy but also by the world market.

As a group, developing countries emerged as net importers of raw hides and skins, increasing at an average annual rate of 8.8% for raw hides, and 4.5% for goatskins in the period 1980-84. By 1984, developing countries accounted for almost half of the world production of bovine hides and sheepskins. They also make up 22.9% and 25% of world imports of bovine hides and sheepskins, respectively.

The amount of raw materials which are freely available on the world market is constantly reduced as more developing countries enforce export restrictions. In addition, competition for the material which is freely available is becoming more intense, with, for instance, tanners in the Far East importing large quantities of material from sources — such as Europe — which do not restrict exports. One result of this is that prices are becoming increasingly volatile. Industrialized countries produce slightly more than half of the global production of bovine hides, exporting over 90% of them. However, these

countries are net importers of sheep and goatskins, representing more than 75% of world imports.

The availability of raw materials is constantly under pressure as more developing countries enforce export restrictions. Half the world's supply of raw material (bovine) is subject to protectionism: 24% of total supply in developing countries and 18% in the Communist countries. Some of the developing countries with an already highly developed leather industry also continue to benefit from the EC's Generalized System of Preferences, the result being that EC tanners compete against low-priced imported leather.

As the price of raw materials makes up about 50% of production costs, the tanneries are vulnerable to price movements. Prices fluctuate considerably, usually in cycles of four-year periods. At present, both prices and availability of raw materials are decreasing. The future prospects are therefore that prices will rise soon and may well reach the top level of 1979 unless considerable concessions are made by developing countries to open their domestic supply to international markets.

Trade

The leather industry on a global basis is considered an international and trade-active sector, with a yearly international total trade figure of ECU 16 500 million. This is due to the extensive trade in raw materials, tanned leather and manufactured end products. International economic and financial developments have an important influence on the industry.

Industrialized countries account for the largest share of world trade of finished leather with about 80% of world imports. However, developing countries are emerging as the leather product industries are relocating their activities in these countries.

Several EC countries which have a highly integrated production cycle of tanned products are being

forced to channel their energy into export as the downstream industries face a decline. Hence, imports of leather will eventually slow down as apparent consumption is declining. Apparent consumption has already decreased 1.3% since 1985 while imports are still increasing, albeit at a slower rate. EC imports have increased steadily during the 1980s reaching ECU 808 million in 1988. These imports are mainly accounted for by the Federal Republic of Germany and Italy, each with 32% of the total. Other Member States can be divided into two groups according to their importance, with the UK and France representing 10% and 12% respectively and others with around 3% of the total.

EC exports more than doubled over the same period from ECU 141 million in 1980 to ECU 1 044 million in 1988. Europe's main exporters are Italy and the Federal Republic of Germany followed by the UK and France. The Benelux countries are relatively large leather traders compared with their production.

The trade between Member States has increased in value since 1980 but at a declining rate. The progressive increase occurred in the early 1980s levelling down in 1984-85 to some ECU 1 250 million.

Regulatory environment

There are many trade restrictions affecting the EC leather industry, specifically tariff and non-tariff barriers and restrictions on raw materials or semi-finished leather, practised by developing countries such as: Turkey, India, Argentina, New Zealand, Egypt, China, Bangladesh, Brazil, Mexico, Ethiopia, Kenya, Nigeria, the Republic of Korea, Morocco, Pakistan, Taiwan, Tunisia, Uruguay and Zimbabwe.

Not only do these policies restrict the amount of raw material freely available, but they are removing the element of international competition for the material, the price to domestic users being artificially reduced.

Table 2
Community production by type of hides and skins (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Cattle and calf	159.2	162.8	169.3	176.4	186.2	181.0	187.4	191.1	188.5	186.5	185.1
Sheep and goat	100.6	106.1	116.6	115.7	128.9	135.4	120.5	115.4	109.2	106.1	103.0
Others (2)	6.5	5.5	6.2	5.5	6.5	8.3	6.0	4.9	4.8	4.8	4.3

(1) 1989-90 Cotance forecasts.

(2) Excluding Germany.

Source: Cotance.

In the case of India, in particular, the export restrictions have been extended from the raw material to cover semi-finished leather, and a complete prohibition is currently being planned. This situation is exacerbated by a number of countries overtly or covertly subsidizing exports of leather and leather products.

Japan stands out as the only industrialized country exercising lighter tariffs for leather than most developing countries. At present, an agreement exists between the EC Member States and Japan over the period 1986-91, which allows the import into Japan of 342 000 m² of finished bovine leather from all sources subject to a duty of 20%. This represents less than 1% of Japanese domestic production and less than a day's production in the EC. Imports above the quota are subject to duty at 60%. Quotas run for a limited period and the number of applicants ensures that the quotas are fully taken up on the first day they become available. (Their size can be as low as 64m² per importer.) As a result, quotas are traded at a premium (generally 15%) and speculators are left with unused quotas at the end of the time-limit. These and other obstacles, such as the lack of transparency of the Japanese market, preclude normal business practices and increase unit sales costs.

In addition to trade-related problems, EC tanners currently face strong competition from countries whose currencies are linked to the US dollar. The

EC is more and more considered as an alternative future export market.

Environmental protection

National laws for environmental protection differ throughout the EC, as does their implementation. This causes uncertainty and short-term competition problems for those tanners who face stronger environmental constraints than their competitors and therefore have to invest in costly treatment plants.

Conforming to ecological standards is expensive: tanners in Italy, for example, spend 3% of total turnover on these requirements. Importing semi-finished leather such as wet-blue shifts the pollution problem to countries with less or no environmental protection and with a level of technology that makes them less able to cope with pollution problems. But even the use of wet-blue can cause ecological problems, as it is difficult to predict the concentration of the chemicals used. It is thus very easy to exceed the limits established in some EC Member States.

With regard to pollution and environmental problems, harmonization of national legislation, so as to ensure fair competition, would be welcomed by the industry on the basis of a reasonable scheduled environmental programme taking into consideration the possibilities of the sector to implement it. This kind

Table 3
Production and external trade, 1980-88 (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production in current prices									
EC	4 215	4 710	5 119	5 578	6 563	7 240	6 945	7 133	7 017
Index	58	65	71	77	91	100	96	99	97
USA (2)	1 309	1 727	1 789	2 114	2 298	2 153	1 615	1 614	1 850
Index	61	80	83	98	107	100	75	75	86
Japan (2)	633	820	737	817	988	1 145	1 172	1 139	1 252
Index	55	72	64	71	86	100	102	99	109
Production in constant prices									
EC	6 126	6 181	6 208	6 578	6 793	7 240	6 836	6 927	7 179
Index	85	85	86	91	94	100	94	96	99
EC trade in current prices (2)									
Exports extra-EC	441	473	531	639	896	1 087	936	1 057	1 044
Index	39	44	49	59	82	100	86	97	96
Imports extra-EC	442	390	522	548	705	787	699	794	808
Index	56	50	66	70	90	100	89	101	103
X/M	.9	1.2	1.0	1.2	1.3	1.4	1.3	1.3	1.3

(1) Excluding Portugal.

(2) Census of Manufactures and Eurostat estimates.

Source: Cotance.

of programme should take into account the fact that some extra-European countries benefit from a competitive advantage as their environmental legislation is minimal. In addition, a reasonable solution would be to support development of technology leading to, for example, the building of sewerage works or plants to separate out chromium, and research programmes aimed at identifying pollution-free processes. It is important for tanners that EC regulations differentiate trivalent chromium, which is the principal leather tanning agent, from the environmentally toxic hexavalent chromium and that limits are set according to toxicity.

Other areas of potential problems are the EC directives on limits relating to specific chemical species in surface water, such as PCP (pentachlorophenol and its salt) and on some insecticides, notably HCH. In this latter case, the tanning industry is in a particularly difficult position, because it is a 'passive user' of the chemical — i. e. insecticide will have been used on the live animal, or on the skin, well before it

has passed into the possession of the tanner, and in many cases, in a different country.

Outlook

The consumption of processed leather in the EC will probably decrease further as the leather product industries continue to emigrate to developing countries. Export ability, market orientation and the ability of EC tanners to adjust to these changing structures will therefore determine the industry's future.

A quicker response to changing market needs should lead to more flexible production units.

Cotance: Confédération des associations nationales de tanneurs et de mégissiers de la CE/Confederation of national tanners' associations in the EC

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LEATHER GLOVE PRODUCTION

(NACE 422.2)

Summary

The glove industry is still heavily influenced by seasonal factors such as fashion and climate. It currently employs some 64 000 workers in the EC, mainly in medium-sized, usually non-industrial, shops. Since the beginning of the 1980s competition from Asian countries has stepped up and European countries have lost a significant market share. Manufacture of gloves remains a labour-intensive industry and personnel cost differentials are usually the reason behind a transfer of low and middle-range production to the developing countries.

Description of the sector

The glove industry is not limited to the leather glove production and includes gloves manufactured from other traditional material, such as textiles. Substitute products requiring very different, and more industrial, production techniques have emerged in recent times. Gloves made of synthetic materials, e.g. latex, have outpaced leather gloves in many sports activities.

Climate and fashion both have a considerable impact on dress and sports gloves.

In recent years these two factors have worked against each other. Fashion has given a boost to dress gloves but unusually mild winters in Europe have offset this trend.

Work gloves are experiencing an impact from technology and demand from industry, but over a longer stretch of time. On the other hand, work gloves require a certain degree of innovation from manufacturers and are more liable to be replaced by substitute materials.

Generally speaking, the leather glove sector is a labour-intensive industry. Differences in wage costs usually disqualify European gloves in favour of those from the developing countries, especially in the lower range of the market where high technology is less of a prerequisite.

The problem of wage cost differentials is compounded by a lack of available workers in Europe. Experienced workers, who ensure a higher quality product than that offered by the developing coun-

tries, are relatively advanced in age in some European countries.

Current situation

Estimates from the European Federation of the Leather Glove Industry (Fegap) reveal that some 21 500 workers are directly employed in glove manufacturing shops and that out-workers number about 42 000 for the 12 EC Member States. There are 596 glove manufacturers in the EC, mostly in Italy (233), in the Federal Republic of Germany (111) and France (87).

The glove industry in Europe is concentrated in certain geographic zones where it has a significant impact owing to direct employment and the indirect activity generated by the preparation of leather prior to glove-making. Sintra in Portugal, Yeovil in the UK, Millau and St Junion in France, Arzignano and Empoli in Italy are some examples of areas of concentration.

A sizeable number of companies have closed their doors in all the countries of Europe without there being a noticeable number of mergers. In other words, production plants have not been systematically bought up and shops have not, on average, grown from the non-industrial size.

Of the 596 companies active in Europe's glove manufacturing sector, 415 employ between 1 and 20 workers.

Consumption

Protective gloves account for the lion's share of European production and appear to have been helped by EC Directives on protection equipment. Production lots are bigger than in the past and manufacturing techniques are more industrially-oriented. On the other hand, imports of protective gloves from outside the EC also hold a prominent place.

Productivity is remaining broadly stable, while domestic production tends to fall in the EC Member States. This trend is accompanied by large cyclical fluctuations, linked to changing fashions and cli-

matic conditions which have an important impact on the production of sports and dress gloves.

The share of internal production in consumption has declined, owing to differences in production costs in competing countries.

In 1988, EC non-exported production accounted for 34% of all gloves consumed in Europe. This proportion is higher, 67%, in the category of dress gloves and that of sports gloves, 58%, but lower for work and protective gloves where 74% of consumed gloves are imported.

External trade

The European glove industry is gradually losing a significant portion of its market share in Europe. In more concrete terms, this means that, with the exception of Spain and Portugal, all EC Member States have been undergoing a decline on the European glove market, as evidenced by the following market share figures (in %).

		1984	1987
Germany	production	18.5	14.0
	imports	77.7	82.3
Netherlands	production	1.5	1.3
	imports	90.0	90.5
United Kingdom	production	9.8	6.6
	imports	89.4	91.9
Denmark	production	10.8	2.0
	imports	83.9	90.2

Imports have been on a steady increase in France in the last five years. In 1983, France imported some 15.6 million pairs of gloves and by 1988, the figure

increased to 21 million pairs, a rise of 39.7%. The share of national production in consumption dropped from 62.3 to 54.7% between 1984 and 1986.

A look into the reason behind these imports would reveal differences in price between French production and gloves imported from other countries. While French imports from other EC Member States during this same period remained stable at an average figure of 3 million pairs over five years, imports rose by nearly 30%.

China exported to France more than 19 million pairs of gloves between 1984 and 1987, during which its exports underwent a 45% increase. Imports from Pakistan grew by 22% during the same period.

Germany is in a situation similar to that of France. In a span of four years imports grew by 49%, from 53.3 million pairs in 1984 to 73.8 million pairs in 1988.

In the United Kingdom, imports during this same period expanded by 20%. While imports from China amounted to only 86 000 pairs in 1987, this was mainly due to import quotas in force between the two countries. Substantial advances were registered in imports from Hong Kong, Thailand and Pakistan. The direct result of this is that the penetration rate of imports on the UK market of sports gloves rose from 90.1% in 1983 to 93.8% in 1986.

In Italy, imports increased five-fold, advancing from 2.6 million pairs to 14.3 million between 1984 and 1988. National production nevertheless accounted for 85.7% of consumption in 1986. Imports from Pakistan, for example, progressed by 49% and those from Hong Kong by 77%. Imports from China jumped 93% in the same period, from 1 500 000 to 2 900 000 pairs of gloves and India exported to Italy

Table 1
Production and employment by country, 1987

(1 000 pairs)	B-L	DK	D	GR	E	F	IRL	I	NL	P	UK	Total
Production												
Safety	N/A	130	8 000	N/A	250	8 500	N/A	35 000	N/A	7 500	5 000	64 380
Sports	N/A	40	2 000	N/A	500	1 500	N/A	5 000	N/A	150	250	9 440
City	N/A	40	N/A	N/A	2 000	2 500	N/A	10 000	N/A	1 700	4 000	20 240
Total (1)	250	210	10 000	N/A	2 750	12 500	N/A	50 000	255	9 350	9 250	94 565
Total employment	250	200	3 000	N/A	3 500	3 500	N/A	40 000	100	6 800	6 500	63 850
of which homeworkers	N/A	0	1 000	N/A	2 000	1 000	N/A	30 000	N/A	6 000	2 000	42 000
Number of enterprises	12	2	111	50	30	87	4	233	9	9	49	596

(1) Excluding Greece and Ireland for all types of gloves; excluding FR of Germany for city gloves.

Source: Fegap.

2 392 000 pairs of gloves in 1987, a 75% rise over 1984 figures.

Denmark's imports edged forward from 3.5 million pairs in 1984 to 4.3 million pairs in 1988, a 22.8% rise in four years. China tripled the volume of its exports to Denmark during this same period, from 1 353 000 pairs in 1984 to 3 064 000 pairs in 1987.

In Spain, imports grew by 80% between 1984 and 1987.

Belgium and Luxembourg doubled their imports in the same period. In 1985 imports accounted for more than 40% of national consumption and national production represented 3.3% of consumption. In the Netherlands, imports advanced from 12 million to 16.1 million pairs over a five-year period, a 34.2% increase.

Between 1984 and 1988 the total volume of EC imports grew by 50.6%, and the category that underwent the biggest rise was sports gloves.

For the EC as a whole, imports of gloves from Asian countries have been rising steadily and have been encroaching on EC production and trade.

By way of example, Italian glove exports to France plummeted by 50% in the three years between 1985 and 1988, falling from 2 800 000 pairs to 1 400 000 pairs. However, the consumption of gloves in France during the same period did not fall, as imports from other countries apparently replaced Italian gloves.

Between 1984 and 1986, the share of EC trade fell among the Member States in relation to imports,

with the exception of the United Kingdom and Denmark.

Table 2
Major exporting countries to the EC

(million pairs)	1984	1985	1986	1987	1988
China	41.5	51.3	61.8	76.0	76.4
Hong Kong	26.7	32.1	34.3	34.5	25.9
Thailand	11.5	17.8	19.3	27.6	29.2
Pakistan	11.3	16.8	17.0	17.7	17.1
India	11.2	17.9	11.0	12.1	15.9
Others	17.4	15.3	16.1	18.3	17.3
Imports extra-EC (1)	119.5	151.2	159.4	186.1	181.7

(1) 1988 excluding Greece.

Source: Eurostat (Comext).

Between 1984 and 1987 the volume of total exports advanced by 17%, from 18.6 million to 22.4 million pairs.

Moreover, in this same period, trade among the Member States advanced and exports grew by 19%.

But the volume of these exports is low, although it is increasing steadily. More specifically, advances in Portuguese (+3%) and Spanish (+42%) exports are particularly promising.

The Netherlands, Italy, Germany and France are Europe's four biggest glove exporters. Between 1984 and 1987 these four countries together registered more than 80% of total imports of EC-made gloves. However, it is worthy of note that both the Netherlands and the FR of Germany exported more than they produced.

Table 3
Imports and exports by country, 1988

	Imports				Exports			
	Extra-EC		Intra-EC		Extra-EC		Intra-EC	
	(million ECU)	(million pairs)	(million ECU)	(million pairs)	(million ECU)	(million pairs)	(million ECU)	(million pairs)
EC (1)	198.9	181.7	55.3	19.9	33.7	3.9	62.5	17.7
Belgium, Luxembourg	4.7	3.7	7.4	4.2	.2	.0	1.2	.7
Denmark	7.5	4.3	1.1	.3	.3	.1	.3	.1
FR of Germany	85.5	73.8	12.7	3.6	8.3	.9	21.5	3.3
Spain	6.7	8.2	1.7	.9	1.1	.4	2.9	.9
France	25.4	15.6	13.3	6.2	4.5	.8	3.6	.8
Ireland	.8	.9	.8	.7	.0	.0	.6	.1
Italy	17.3	14.3	6.4	.7	13.6	.9	12.8	2.2
Netherlands	15.5	16.1	6.4	2.1	.3	.1	10.0	8.4
Portugal	.3	.2	.7	.4	3.7	.4	8.6	1.0
United Kingdom	35.2	44.6	4.8	.8	1.7	.3	1.0	.2

(1) Excluding Greece.

Source: Eurostat (Comext).

Table 4
External trade (1)

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Exports extra-EC									
Value (million ECU)	18.7	20.9	22.1	22.0	32.3	37.8	35.9	32.7	33.7
Index (2)	56.0	62.6	66.2	65.8	85.4	100.0	95.0	86.5	89.2
Quantity (million pairs)	4.6	6.4	4.1	3.9	4.4	4.7	4.9	4.9	3.9
Index (2)	116.8	162.9	105.0	99.9	94.3	100.0	104.7	104.0	83.8
Imports extra-EC									
Value (million ECU)	165.1	163.5	130.5	134.6	162.7	213.9	193.7	201.8	198.9
Index (2)	78.1	77.3	61.7	63.6	76.1	100.0	90.6	94.3	95.8
Quantity (million pairs)	147.6	136.6	106.7	116.4	119.5	151.2	159.4	186.1	181.7
Index (2)	125.2	115.7	90.4	98.6	79.0	100.0	105.4	123.1	120.5
X/M (value)	.11	.13	.17	.16	.20	.18	.19	.16	.17
Imports intra-EC									
Value (million ECU)	37.1	29.0	32.3	31.3	40.8	49.2	51.5	55.0	55.3
Index (2)	75.7	59.0	65.7	63.7	82.9	100.0	104.7	111.8	112.5
Quantity (million pairs)	15.7	12.5	13.7	13.1	16.1	18.2	16.4	18.3	19.9
Index (2)	97.5	77.7	84.8	81.5	88.5	100.0	89.7	100.0	109.2

(1) 1980 EC 9; 1981-83 EC 10. 1988 excluding Greece.

(2) Adjusted index, giving true year-on-year changes.

Source: Eurostat (Comext).

Table 5
Major export markets

(million pairs)	1984	1985	1986	1987	1988
USA	1.0	1.3	1.0	.8	.6
Switzerland	.3	.4	.6	.4	.4
Austria	.0	.3	.6	.6	.5
Sweden	.3	.3	.3	.2	.2
Canada	.3	.4	.3	.2	.2
Others	2.2	2.2	2.2	2.7	2.1
Exports extra-EC (1)	4.4	4.7	4.9	4.9	3.9

(1) 1988 excluding Greece.

Source: Eurostat (Comext).

Outlook

The trend observed in the 1970s of a shift of middle and lower range production to the developing countries has been confirmed.

A refocusing of production on exclusively upper range production would appear to be a possibility only for a limited number of producers (in France and Italy).

If the sector is to recover significantly, it must become competitive on foreign markets. Exports to Switzerland and Austria of EC-produced gloves have grown, but the EC market share has fallen in the United States, Sweden and Canada to the benefit of China and other Asian countries.

The strategy adopted by the European Federation of the Glove and Leather Trade (Fegap) will single out the areas of activity and the means of development that should be given special attention by the sector's producers.

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FOOTWEAR

(NACE 451 and 452)

Summary

In 1988, the EC footwear industry produced 1 073 million pairs of shoes. The year was characterized by a shift in imports away from Korea and Taiwan, to China, Thailand and other Asian countries. The Korean and Taiwanese producers announced the shift of their production lines to China, Thailand and Malaysia in order to improve their competition and to avoid EC safeguard actions. Imports from Brazil also rose rapidly. Altogether, there was a net increase in shoe imports from non-EC countries of 28 million pairs between 1987 and 1988. The EC industry complains that market access in the main importing countries is very difficult, and views the opening of these markets as a major element in the GATT negotiations. To succeed in the coming years, the Community industry will have to capitalize on its strong points, especially in the upper and medium quality ranges. The EC industry's strength relies on creativity, in which computer-assisted design (CAD) plays a dominant role, and on more efficient distribution. Some large firms have already taken steps in these directions, to reinforce their presence in the market.

Description of the sector

The following products are manufactured by the footwear industry:

- outdoor footwear (dress and sports shoes, as well as shoes for leisure, walking, hunting and work) (NACE 451.1)
- indoor footwear (slippers) (NACE 451.2)

- hand-made footwear (including orthopaedic shoes) (NACE 452)
- special types: dancing shoes, military shoes, etc. (NACE 453).

Though it is traditionally divided into leather, synthetics, rubber, textile, slippers and others, not all these sub-sectors will be covered in detail in the following discussion.

Leather is the most commonly used material in the footwear manufactured by European firms, followed by synthetics (polyurethane).

Current situation

In 1987, the Community footwear industry provided about 11.75% of the total world production of 9.6 billion outdoor and indoor shoes. In 1987, production in the EC 12 was estimated at ECU 16.9 billion (1.137 billion shoes). Between 1982 and 1988, however, the number of pairs produced by the EC 10 fell by 2.2% a year, partly due to increased competition from Far Eastern countries, Brazil and China.

Restructuring of the industry during the 1980s caused a drop in the number of firms producing in the Community, and in the number of jobs provided by this sector. Extra-EC import penetration increased, while the proportion of the EC market that is supplied by intra-Community production fell from 72% in 1982 to just 55% in 1987 (EC 10).

Total exports of the EC 12 continued to expand in the early 1980s, albeit at a very slow rate. Extra-EC exports stagnated, however, and even fell slightly in

Table 1
Main indicators, 1980-91 (1)

(million pairs)	1980	1981	1982	1983	1984 (2)	1984 (3)	1985 (3)	1986	1987	1988	1991
Apparent consumption	1 090	1 068	1 103	1 120	1 149	1 246	1 240	1 281	1 371	1 356	N/A
Net exports	-155	-141	-128	-161	-184	-53	-12	-87	-234	-283	N/A
Production	935	927	975	959	965	1 193	1 227	1 194	1 137	1 073	1 061
Employment (1 000)	346.5	342.7	328.1	311.4	294.6	378.3	371.2	371.0	366.1	348.4	342.0

(1) 1980-84 EC 10.

(2) EC 10.

(3) EC 12, Spain and Portugal estimated by Eurostat.

Source: CEC, Eurostat (Comext).

the last three years. Though labour cost trends vary widely from country to country, the average rate of growth was fairly rapid.

To reverse these trends, the European footwear industry undertook major restructuring, focusing on the medium and high end of the market. Large investment projects were undertaken in some countries, and increased importance was given to improvements in technology.

Production and consumption

The Community's footwear market represented a volume of sales of 1.36 billion pairs of shoes of all types in 1988.

Per capita overall consumption amounted to 4.2 pairs of shoes in 1987, and somewhat less in 1988, placing the EC well below the United States, with 5.6 pairs per capita, and a little below Japan, with 4.4 pairs per capita.

The slow growth of the European population and of household purchasing power in the early 1980s explains the relative stagnation of the European footwear market. In volume terms, consumption grew at an average annual rate of 1.9% between 1982 and 1988 (EC 10).

Employment

In the Community as a whole, some 348 400 persons were employed in the footwear industry in 1988. Between 1982 and 1988 the number of jobs in the EC 10 footwear industry fell by 3.4% a year on average, from 328 140 to 264 239 in 1988. Employment continued to fall in 1988, by 4.8%, more or less in line with the trend in production. The drop in employment was particularly pronounced in Ireland, the Netherlands and Denmark.

Due to national regulation, the number of workers accounting in footwear production is different from one EC member country to another (e.g. in Germany companies with less than 20 do not appear in the production statistics). In Italy, however, one worker is taken in production statistics.

Industry structure

A breakdown of the EC footwear industry by country shows large variations from country to country. In 1988 there were 9 094 firms in Italy, while there were only 23 in Denmark. The southern European countries (Greece, Spain and Portugal) together account for 4 500 firms, or 30% of all European registered companies.

Production patterns have also evolved very differently in the various Community countries. In most Member States, production has been decreasing systematically. In 1988 the index of production (base 1980=100) was 71.7 in Denmark, 61.9 in Belgium-Luxembourg and 66 in the Netherlands. Turnover for the EC 12 that year was evaluated at 16.0 billion ECU, according to the CEC.

Italy is by far the largest producer, with an average annual share of total production of 40.7%. Other large producers are Spain (15.2%), France (15.1%), the United Kingdom (11.5%), Portugal (7.6%) and the Federal Republic of Germany (6.7%). Production in the other countries is marginal, compared to total EC 12 production. Taken together, the southern European countries thus account for 65% of the EC's total Community footwear production.

Trade

Most of the EC market is supplied by intra-Community production, but the European producers' share of the market has been falling in recent years.

Table 2
Comparative European production trends by materials (1)

(%)	1980	1981	1982	1983	1984	1985	1986	1987
Leather	59	60	60	63	63	63	64	64
Synthetics	18	19	20	18	19	19	19	19
Textile	8	7	6	7	5	4	3	4
Rubber	1	1	2	2	1	1	1	1
Other	N/A	N/A	N/A	1	1	N/A	N/A	N/A
Slippers	14	13	12	10	12	12	13	12
Total	100	100	100	100	100	100	100	100

(1) EC 10.

Source: CEC.

In 1988 53% of total imports of the EC 12 came from outside the Community. However, there are sharp variations between the Member States. In Italy, for instance, more than 86% of total imports come from outside the Community, while in Ireland and Belgium-Luxembourg, extra-EC imports represent only 21.5 and 36.78% respectively of total imports; Italy, France and the Netherlands are the most important suppliers of Belgium-Luxembourg, while the United Kingdom is the main supplier of Ireland.

Between 1982 and 1987, imports grew fastest in Greece and Italy, by 250 and 180% respectively. This corresponds to average annual growth rates of 28.5% for Greece, and 22.9% for Italy. During the same period, extra-EC imports were growing at an average annual rate of 11%. Growth was particularly strong towards the end of the period, even reaching 67% in the year to 1987.

In 1987, the top four suppliers were China (29%), Taiwan (22%), the Republic of Korea (16%) and Hong Kong (6%); altogether, more than two-thirds of extra-EC imports come from the Far East. Within Europe, the most important suppliers are Yugoslavia (3.6%) and Austria (2.3%).

The three largest importers of shoes are the FR of Germany (29.6%), France (22.7%), and the United Kingdom (19.8%). Together, they account for more than 72% of total imports.

Between 1982 and 1987, total EC exports increased by an average of 1% per year in volume terms. This

general picture however masks strong variations across countries. In particular, the membership of Spain and Portugal has led to fundamental change in EC export trends.

Analysis of the structure of extra-EC exports reveals a break in the trend between 1982 and 1988. An average annual growth of 5.4% between 1982 and 1985 was followed by an annual average drop of 8.8% between 1985 and 1987. Exports suffered from quantitative barriers to trade in the Canadian, Japanese and Australian markets. Developments varied widely depending on the country: the strongest growth was recorded in Belgium-Luxembourg (23.1% a year), while Ireland registered the most significant drop (29.4% a year). (Note: none of those is an important producer.) Italy accounts for about 50% of extra-EC exports, followed by Spain (23%), France (8%) and the FR of Germany (7.5%).

Over the 1982-86 period, the average shares of the most important buyers outside the EC were as follows: USA (36.7%), Austria (11.2%), Switzerland (10.5%), Sweden (5.8%) and Canada (3.9%).

Investment and related

For the EC 8 — namely Italy, France, the FR of Germany, the United Kingdom, the Netherlands, Belgium and Denmark, investment in the footwear industry increased from ECU 301 million in 1982 to ECU 408 million in 1986. This represents a value

Table 3
Production and external trade

(million pairs)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production									
EC	935	927	975	959	1 193	1 227	1 194	1 137	1 073
Index	N/A	N/A	N/A	N/A	97	100	97	93	87
USA (1)	N/A	N/A	N/A	N/A	N/A	270	244	232	241
Index	N/A	N/A	N/A	N/A	N/A	100	90	86	89
Exports extra-EC (2)	154	188	184	186	264	289	260	243	234
Index (3)	72	86	83	84	91	100	90	84	81
Imports extra-EC (2)	258	282	262	290	314	304	346	483	510
Index (3)	86	94	87	96	104	100	114	159	168
X/M (2)	.59	.67	.70	.64	.84	.95	.75	.50	.46
Imports intra-EC (1)	343	387	385	385	417	446	460	474	459
Index (3)	78	88	87	87	94	100	103	106	103

(1) Census of Manufactures and Eurostat estimates.

(2) Reporting countries: 1980 EC 9; 1981-83 EC 10; 1984-88 EC 12. Partner extra-EC is always taken to be extra-EC 12. 1988 Greek figures are estimated.

(3) Index evaluated using EC 12 estimates.

Source: CEC, Eurostat (Comext).

increase of 7.9% a year on average. A nearly identical rate is observed in Italy, France and the FR of Germany; investment by UK firms increased faster, by 19% a year in value, but the starting level of this investment was markedly lower. Furthermore, UK investment has been mainly concentrated on new technology.

Fifty-three per cent of total investment took place in Italy, 19% in France and 16% in the FR of Germany.

Structural change

In 1988 the EC 10 footwear industry numbered 12 800 firms, (15 218 if Spain and Portugal are included) compared with 15 600 in 1982 and approximately 17 500 in 1980.

Restructuring in the industry produced an annual 3.4% decrease in the number of production units between 1980 and 1988. However, a few groups have developed strong positions in world production over the last few years.

Outlook

In 1989 EC footwear industry could still record a small decline in volume terms, as extra-EC import

penetration continues to increase. The outlook for 1991 points to similar trends in supply and demand, with weak growth in the EC market being met by imports rather than domestic production.

In 1991 EC footwear production should follow the decreasing trend and reach 1 061 million pairs of shoes. This situation can be explained by the low projected rate of population growth, as well as by a stabilization of the number of shoes per capita that are bought.

Faced with stiffer competition from South-East Asian countries, as well as Brazil and China, EC production is shifting from mass products to 'higher quality' products such as upmarket and fashion products. At the same time, efforts in improving distribution and the development of brand names should limit the relative decline of this sector. Furthermore, the industry is in the process of improving competitiveness by introducing new technologies, and making more use of CAD.

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PRIMARY AND SECONDARY PROCESSING OF WOOD

(NACE 461 to 466)

The economic importance of the industry in the EC economy

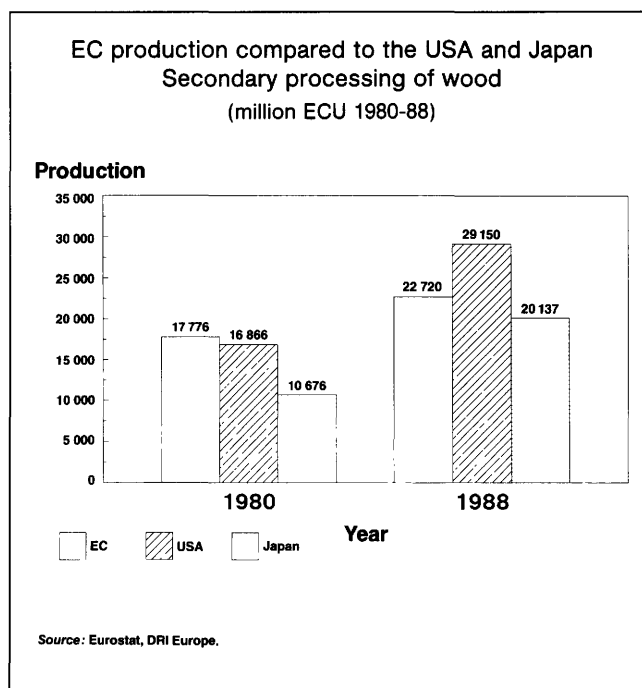
Total production of the woodworking industry in the EC amounted to ECU 22 720 million in 1988. This is an 8% increase compared to 1987 (5% in volume). Production has followed a positive trend throughout the 1980s and is expected to grow at an equivalent pace in the coming years.

Production of the woodworking industry represents 5.6% of total GDP. The EC woodworking industry ranks second in the world behind the USA, where production amounted to ECU 29 150 million in 1988. Japanese production reached ECU 20 137 million and has been steadily growing since 1980. The US production is on the other hand decreasing since 1985. Investment in the EC amounted to ECU 964 million in 1988, which is a 12% increase compared to 1987.

In the 1980-86 period, EC production dropped by about 2.6% a year in volume. One reason for this negative development is the weak demand from the construction and industrial sectors.

In the last two years, however, production in volume has recovered its level of 1981.

Figure 1



Within the woodworking industries, the carpentry, joinery components and parquet flooring sector is the most important with ECU 9 152 million in 1988 (or 40.3% of the total). Production of semi-finished wood products reached ECU 6 708 million (29.5%), other wood manufacturers and articles (19.8%), and

Table 1
Main indicators, 1980-91
Secondary processing of wood

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption (1)	16 637	15 879	15 828	17 111	18 413	18 573	20 830	21 836	23 989	26 062	28 150	30 650
Net exports	-1 417	-1 280	-1 329	-1 501	-1 626	-1 628	-1 133	-1 233	-1 269	-1 253	-1 230	-1 303
Production (2)	17 776	16 973	16 571	17 737	19 027	19 382	19 696	21 000	22 720	24 810	26 921	29 347
Investment	727	618	535	620	701	674	770	858	964	1 083	1 151	1 278
Total employment (2)	454 643	413 082	380 972	372 292	377 342	352 579	335 553	334 006	333 127	334 100	335 800	337 700

(1) 1980 EC 9; 1981-85 EC 10.

(2) EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

Source: Ceibois, Eurostat (Inde).

wooden containers 2 359 (10.4%). The evolution of each subsector will be analysed separately below.

More than 330 000 people were employed in the EC woodworking industry in 1988. This figure has been falling continuously during the 1980s but it is expected to recover slow growth rates in the coming years. The contribution of this industry to total EC employment reached 2.6% in 1988.

It should be explicitly noted that the employment figures quoted here relate exclusively to EC woodworking in the strict sense of the term, as defined in this study.

Companies of carpentry, joinery components and parquet flooring are the largest contributors to employment, followed by firms of other wood manufactures and articles.

The external balance of trade of the European woodworking industry has generally been negative though with ups and downs. 1985 was the most unfavourable year.

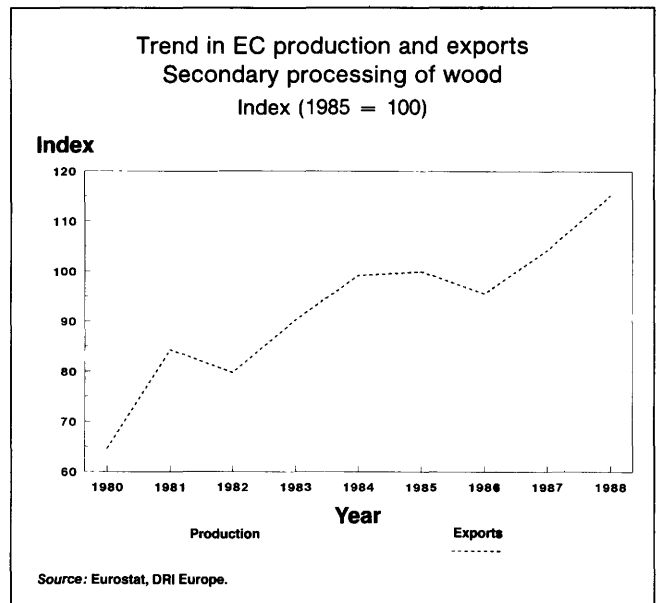
EC exports amounted to ECU 1 671 million in 1988. This is an increase of more than 10% compared to 1987. Another increase of EC exports is expected for the coming years but for the moment they only represent 7% of total EC production. In 1987, only 3.3% of the US production was exported. In Japan, the equivalent figure was 1%. On the other hand, EC imports were worth ECU 2 939 million in 1988, which is an 8% increase in comparison with 1987 and represents 12.9% of EC production. The rate of import penetration was 12.3% but it is following a decreasing trend.

From the international trade figures, it appears that trade between Member States is more extensive than external trade. This is to a large extent explained by the influence of transport costs on the overall price.

The deficit in the Community trade balance is the consequence of:

- the dependence of a few important subsectors, such as external joinery, on tropical hardwood (and on sawn timber);

Figure 2



- large, inexpensive wood reserves outside the EC (North America, Scandinavia); these countries also have a great tradition in the field of woodworking;
- the overwhelming import of, for instance, plywood from South-East Asia (first and foremost from Indonesia) and hardboard from South America (chiefly Brazil);
- the import of wood products from the Eastern bloc countries at dumping prices.

Of course, the EC imports of a number of raw materials, such as tropical hardwood, will go on, if only because these raw materials are not found in Europe. This implies, therefore, that the EC wood-

Table 2
EC production by subsector (1)
Secondary processing of wood

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
NACE 463	7 440	7 022	6 812	7 620	7 910	7 710	7 948	8 496	9 152	9 914	10 905	11 966
NACE 462	5 399	5 183	5 007	5 147	5 659	5 901	5 803	6 183	6 708	7 361	8 024	8 745
NACE 465 & 466	2 998	2 953	2 978	3 217	3 538	3 752	3 886	4 128	4 501	4 960	5 186	5 549
NACE 464	1 939	1 816	1 774	1 754	1 919	2 020	2 059	2 192	2 359	2 575	2 807	3 087
Total production	17 776	16 973	16 571	17 737	19 027	19 382	19 696	21 000	22 720	24 810	26 921	29 347

(1) NACE 462: Semi-finished wood products; NACE 463: Carpentry, joinery components and parquet flooring; NACE 464: Wooden containers; NACE 465 & 466: Articles of cork, straw, plaiting materials, brushes, brooms and other wood manufactures.

EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

Source: Ceibois, Eurostat (Inde).

working industries must continue to have permanent access to these raw materials. The balance in trading relations can, accordingly, only be achieved by means of a consolidation of the industrial system within the EC. In any case, the know-how should be preserved within Europe and may never be allowed to decline.

The use of marginal (agricultural) land may further improve the favourable prospects with regard to the supply of wood. This depends on a clearly understood Community forestry policy, which takes proper account of the possibilities and needs of the woodworking industries.

Description of the industry

According to the NACE, the timber industry, including the manufacture of wooden furniture, belongs to group 46. Broadly, woodworking can be divided into three parts, namely:

(i) the first processing: sawmills and planemills which will be dealt with in detail later (NACE 461);

(ii) the second processing: this phase includes the actual woodworking and covers NACE groups 462 to 466. Although 'Brushes and brooms' (NACE 466.3) are dealt with in detail under another chapter, the figures are inserted with the group 'Other wood manufactures', which includes both NACE group 465 'Other wood

Figure 3

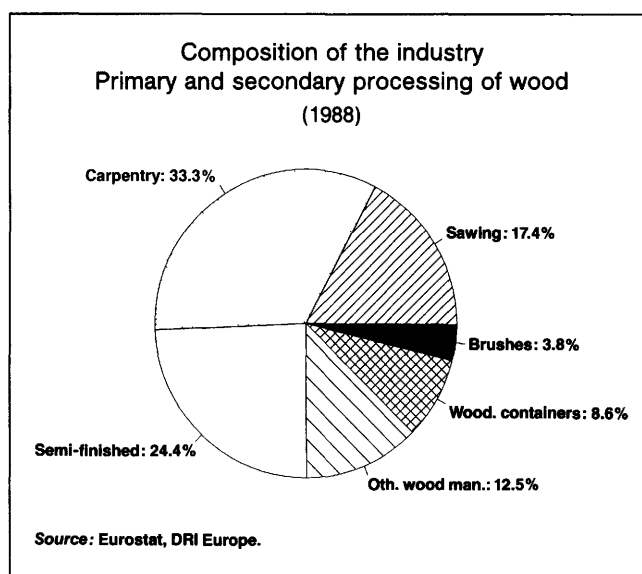


Table 3
Production and external trade
Secondary processing of wood

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Production in current prices												
EC (1)	17 776	16 973	16 571	17 737	19 027	19 382	19 696	21 000	22 720	24 810	26 921	29 347
Index	91.7	87.6	85.5	91.5	98.2	100.0	101.6	108.4	117.2	128.0	138.9	151.4
USA (2)	16 866	21 594	22 572	30 507	37 042	38 758	32 324	29 181	29 150	N/A	N/A	N/A
Index	43.5	55.7	58.2	78.7	95.6	100.0	83.4	75.3	75.2	N/A	N/A	N/A
Japan (2)	10 676	12 185	12 378	14 121	15 587	15 770	16 492	19 023	20 137	N/A	N/A	N/A
Index	67.7	77.3	78.5	89.5	98.8	100.0	104.6	120.6	127.7	N/A	N/A	N/A
Production in constant prices												
EC	22 456	20 189	18 629	19 386	19 863	19 382	19 254	20 158	21 229	22 248	N/A	N/A
Index	115.9	104.2	96.1	100.0	102.5	100.0	99.3	104.0	109.5	114.8	N/A	N/A
Trade (3)												
Exports extra-EC	785	1 022	967	1 095	1 203	1 212	1 386	1 512	1 671	1 842	2 035	2 181
Index (4)	64.6	84.3	79.8	90.3	99.2	100.0	95.6	104.3	115.2	127.1	140.3	150.4
Export rate (%)	4.7	6.4	6.1	6.4	6.5	6.5	6.7	6.9	7.0	7.1	7.2	7.1
Imports extra-EC	2 203	2 301	2 296	2 596	2 828	2 840	2 520	2 744	2 939	3 095	3 265	3 484
Index (4)	77.3	81.0	80.8	91.4	99.6	100.0	102.9	112.1	120.0	126.4	133.3	142.3
Import rate (%)	13.2	14.5	14.5	15.2	15.4	15.3	12.1	12.6	12.3	11.9	11.6	11.4
X/M	35.6	44.4	42.1	42.2	42.5	42.7	55.0	55.1	56.8	59.5	62.3	62.6
Intra-EC trade												
Index (4)	1 526	1 531	1 578	1 720	1 888	2 003	2 634	2 853	3 215	3 640	4 070	4 421
Index (4)	77.6	76.4	78.8	85.8	94.2	100.0	106.2	115.1	129.7	146.8	164.1	178.3

(1) EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

(2) Census of Manufactures and Eurostat estimates.

(3) 1980 EC 9; 1981-85 EC 10; 1986-91 EC 12.

(4) Taking into account changes in EC membership.

Source: Ceibois, Eurostat (Inde).

manufactures' and NACE group 466 (Cork, basketware and wickerwork, brushes and brooms).

(iii) Wooden furniture (NACE 467) is the third group and completes the NACE chapter 46.

In view of (apart from a few exceptions) the typically SME (small and medium-sized enterprise) character of these activities in all the EC countries, the output of these groups is considerably underestimated by the majority of statistical analyses, since the latter generally take no account of smaller businesses.

Eurostat, for example, in most cases only includes enterprises employing at least 20 people, which leads to an underestimation of the level of activity and/or employment of sectors such as the woodworking industries. The enterprises of the EC woodworking industries (NACE 461 to 466) comprising at least 20 people, employed more than 330 000 persons in 1988. But total employment in this sector is much higher. At present, actual employment in these five subsectors is estimated to be at least 550 000 persons.

Industry structure

Since woodworking started as an artisanal activity, the family structure of its small and medium-sized enterprises is still very important. Industrial evolution began around 1965 and the industry enjoyed a rapid growth between 1960 and 1974.

However, the woodworking industry went through a major crisis from the second half of the 1970s, like most sectors of European industry. This crisis lasted until the beginning of the 1980s. Thanks to substantial investment efforts from 1983 onwards, the EC woodworking industries are, however, heading for a positive second half in this decade. This economic growth will even result in a slight increase in employment in the EC woodworking sector towards 1990. One of the indications of this success is the fact that wood is a raw material that is closely connected with the surge of renewed interest in natural materials in general. Moreover, it should never be forgotten that wood is a raw material that can be renewed, and that possesses both interesting aesthetic and technical characteristics. Within the EC, forestry can even be considered as a significant alternative to the present agricultural policy.

In the other wood manufactures and articles sector, 38.5% of total turnover is achieved by enterprises employing fewer than 20 people (*European*

Economy, EC Commission, March 1988). For the sawing, planing and drying of wood industry, the equivalent figure is 36.3% while it reaches 34% for the enterprises producing wooden containers and pallets.

Factory costs amount to nearly 40% of gross value-added. Labour costs constitute the largest component, i.e. 80% of this value-added, which underlines the labour-intensive character of the bulk of this industrial activity.

Risks and opportunities

As emerges from the study by the Economic Commission for Europe (UNO) and the FAO 'European timber trends and prospects to the year 2000 and beyond', demand for wood products will be on the increase in the coming years, even under unfavourable assumptions. This is an additional argument to the effect that the economic basis of the EC woodworking industries is fundamentally healthy, and that this sector, provided that there are no sudden disruptions of an external nature, has good prospects.

At present, the sector is still confronted by a large number of technical barriers to trade between Member States (nationally oriented standards that have already been in existence for a long time, major differences in the procedures for technical approval, various susceptibilities to specific aspects of use, such as the emissions from glue components, moisture-resistance, etc.). In the light of the integration of the EC market in 1992, the sector will be affected by the results of discussions on the short-term implementation of European standards and technical reference documents (Directive on building products, certification, Eurocode 5, CEN standards, etc.). This technical integration will in any case result in an increase in trade between Member States.

Due to the very fast evolution in production techniques, the sector is experiencing increasing difficulty in finding properly trained staff. This implies that considerable attention will have to be paid to higher training standards in this field, as qualified executives are certainly needed, as well as skilled workers and labourers. Furthermore, the absence of sound information concerning the material 'wood' in most architectural and engineering courses is a shortcoming with a direct negative influence on the state of knowledge of the specific behaviour of timber in the building sector.



A final general remark concerns the stringent requirements that some parts of the woodworking industry have had to withstand in recent years, with respect to health and the environment.

This especially applies to the chemicals used in the production processes of wood-based panels, and the wood-preservation industry.

The woodworking industry lives up to its responsibilities in this field through the continuous adaptation of chemicals and production techniques to the most recent discoveries of science and technology. Wood is a renewable raw material with a low energy demand. This can most certainly bear comparison with the use of other materials made from finite resources.

Outlook

Over the coming years, consumption of woodwork in the EC is expected to grow by 8% annually. Production will also follow the positive trend it has known since 1983: growth rates of around 9% are expected. The export/import ratio will increase in the near future, but will still remain lower than 1. Investment, which has been stagnating especially at the beginning of the decade, is expected to be higher than ECU 1 billion. Employment will also benefit from this positive evolution but to a much smaller extent as its growth rate is only expected to reach 0.5%.

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SAWING, PLANING AND DRYING OF WOOD

(NACE 461)

Summary

Though more than half of the EC consumption of sawn, planed and dried timber is met by imports, the restructuring of the industry that took place in the early 1980s had a favourable impact on EC production, and could even lead to a decrease in the market share of imports in the 1990s. Despite a certain upward trend, this industry still consists of a large number of small and medium-sized companies. Recent structural changes have taken the form of increased vertical integration and/or the merging of small production units. This trend is expected to continue in the coming years.

Description of the sector

The first stage in the processing of wood falls under NACE code 461. This code groups companies engaged in the following activities:

- saw milling,
- planing of wood,
- drying and seasoning of wood.

The value of sawn, planed and dried timber used in the European Community was approximately ECU 10 billion in 1988. Following a relatively slow growth in the beginning of the decade, consumption picked up and was 20% higher in 1987 than in 1980.

Most of the intra-EC demand for sawn, planed and dried timber was in fact satisfied by imports. In 1988 the import penetration ratio was 55%. Extra-EC exports, on the other hand, only account for a very small percentage of production (6% in 1988, 4% in 1980). The external balance for sawn, planed and dried timber is thus largely in deficit, witness the fact that, in 1988, only 5% of imports were covered by exports.

EC production amounted to ECU 4.7 billion in 1988. This corresponds to a 27% increase compared to 1980. The rapid growth, which mainly started in 1985, is related to the urge of other sectors which use sawn, planed and dried timber as a raw material, for example for the manufacture of construction elements, furniture, packaging, etc.

The investment that took place in the course of the 1980s contributed to the reorganization of the industry that became necessary in view of the strong competition from non-EC producers. There were three main types of structural changes: the closure of non-profitable enterprises; the merging of small production units and an increased tendency towards vertical integration. Moreover, there is a growing need for highly qualified personnel. In this context, the EC Comett programme is extremely important for the industry.

The EC is also working on the definition of common European standards. The elimination of technical barriers to trade should lead to a faster growth of trade and strengthen the EC's position.

Table 1
Main indicators, 1980-91
Sawing, planing, drying and seasoning of wood

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption (1)	7 737	6 760	7 087	8 001	8 319	7 941	8 547	9 344	10 009	10 680	10 880	11 312
Net exports	-4 512	-3 902	-3 925	-4 618	-4 843	-4 327	-4 434	-4 953	-5 211	-5 441	-5 170	-5 146
Production (2)	3 767	3 563	3 657	3 835	3 948	4 152	4 089	4 392	4 798	5 240	5 710	6 167
Investment	133	111	99	118	128	133	140	150	165	180	200	220
Total employment (2)	97 529	89 683	86 018	83 081	79 883	78 708	73 702	73 281	72 580	72 600	72 900	73 200
Number of enterprises	4 670	4 347	4 309	4 138	3 981	3 906	3 800	3 750	3 700	3 700	3 700	3 750

(1) 1980 EC 9; 1981-85 EC 10.

(2) EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

Source: Ceibois, Eurostat (Inde).

Table 2
Production and external trade
Sawing, planing, drying and seasoning of wood

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Production in current prices												
EC (1)	3 767	3 563	3 657	3 835	3 948	4 152	4 089	4 392	4 798	5 240	5 710	6 167
Index	90.7	85.8	88.1	92.4	95.1	100.0	98.5	105.8	115.6	126.2	137.5	148.5
USA (2)	9 921	11 693	11 363	15 566	18 464	18 971	16 656	15 992	16 348	18 526	19 803	N/A
Index	52.3	61.6	59.9	82.1	97.3	100.0	87.8	84.3	86.2	97.7	104.4	N/A
Japan (2)	8 272	8 754	8 220	8 859	9 493	9 605	10 044	11 586	12 264	N/A	N/A	N/A
Index	86.1	91.1	85.6	92.2	98.8	100.0	104.6	120.6	127.7	N/A	N/A	N/A
Production in constant prices												
EC	4 421	4 040	4 079	4 288	4 091	4 152	4 122	4 423	4 646	4 894	N/A	N/A
Index	106.5	97.3	98.2	103.3	98.5	100.0	99.3	106.5	111.9	117.9	N/A	N/A
Trade (3)												
Exports extra-EC	161	173	175	198	240	259	253	271	289	309	330	354
Index (4)	62.1	66.9	67.5	76.7	92.9	100.0	103.1	110.3	117.6	125.7	134.3	144.0
Export rate (%)	4.3	4.8	4.8	5.2	6.1	6.4	6.1	6.3	6.1	5.9	5.8	5.8
Imports extra-EC	4 673	4 075	4 100	4 816	5 083	4 585	4 687	5 224	5 500	5 750	5 500	5 500
Index (4)	102.0	88.9	89.4	105.0	110.9	100.0	100.7	112.2	118.2	123.5	118.2	118.2
Import penetration rate (%)	60.4	60.3	57.9	60.2	61.1	57.7	54.8	55.9	55.0	53.8	50.6	48.6
X/M	3.4	4.2	4.3	4.1	4.7	5.6	5.4	5.2	5.3	5.4	6.0	6.4
Intra-EC trade	314	329	347	408	513	538	728	758	845	913	967	1 026
Index (4)	58.6	61.2	64.4	75.8	95.2	100.0	103.6	107.9	120.3	129.9	137.6	146.0

(1) EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

(2) Census of Manufactures and Eurostat estimates.

(3) 1980 EC 9; 1981-85 EC 10.

(4) Taking into account changes in EC membership.

Sources: Ceibois, Eurostat (Inde).



Some 3 700 enterprises employing more than 20 persons operate in the first stage of the processing of wood in the EC as a whole. Altogether, about 72 580 persons were working in this sector in 1988. Despite an obvious upward trend, the sector is dominated by small and medium-sized enterprises so that the total employment figure is likely to be even considerably greater than this.

Outlook

The EC production of sawn, planed and dried timber is expected to continue to rise in 1989, to ECU 5.2 million (a 9% increase over 1988). In a parallel development, domestic consumption of wood by the EC Member States is expected to rise by 7%, to ECU 10.6 billion.

In the medium term, production is expected to continue growing, reaching ECU 6.1 billion in 1991 (a 28% increase compared with 1988); for the first time, the import penetration ratio could fall below 50% (to around 48.8%).

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SEMI-FINISHED WOOD PRODUCTS

(NACE 462)

Description of the sector

The manufacture of semi-finished wood products is the second largest woodworking sector, and concerns 29% of the second woodworking industry.

This group mainly covers wooden board material, which is in turn classified as an intermediate product in the furniture industry or in building (the 'inter-industry' circuit), or as a finished product (the 'do-it-yourself' circuit). According to Eurostat, about 1 600 firms are involved in the manufacture at present, with employment of about 67 000 persons. The average number of employees per firm is thus about 40, which is relatively high for the woodworking industries. The total value of production rose from ECU 5.4 thousand million in 1980 to ECU 6.6 thousand million in 1988 (22%). For the period 1988-91, a nominal growth of 28% is expected.

Since Eurostat does not provide production data at a four-digit level, the group 'manufacture of semi-finished wood products' (NACE 462), is broken down below on the basis of the *Yearbook of Forest Products* (FAO), which amongst other things, collects data on veneer and wood-based panels.

The section thus deals with the production of:

- Veneer, plywood and blockboard;
- Chipboard;
- Variants of chipboard such as oriented strand board or particleboard bonded with inorganic binders; and
- Fibreboard.

These products are considered in more detail below.

Veneer, plywood and blockboard

Description of the product

These products are based on thin sheets of wood. Depending on the way in which the wood is cut, thin sheets are obtained that are suitable for covering all kinds of surfaces (furniture panels, wainscoting, etc.). With an odd number of different (thicker) layers glued together, on the other hand, a very interesting board material results. In accordance with what is placed between the two surface sheets, a distinction can be made in the case of this product between two large groups: plywood and blockboard.

In the preparation of veneer, the basic material for these products (large cylindrical wooden trunks) is unrolled. These sheets are then glued crossways to offset the internal forces. Next the boards are sawn and sanded. In this way, plywood with three or more layers is obtained. In the case of blockboard, the filling between the two cover layers consists of sawn laths, which are glued together in such a way that the internal forces counterbalance each other.

These boards have an excellent ratio between their mechanical properties and their weight and are very easy to process. According to the surface sheets used, extremely aesthetic finishings can also be obtained.

These wooden boards have applications in building, packaging and the furniture industry, but a distinction is usually made between interior and exterior work. In the case of the exterior, different glues are used.

Table 1
Main indicators, 1980-91
Manufacture of semi-finished wood products

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption (1)	5 629	5 653	5 452	5 716	6 250	6 457	7 023	7 058	8 010	8 641	9 272	9 997
Net exports	-1 065	-1 124	-1 080	-1 268	-1 344	-1 322	-1 220	-1 271	-1 302	-1 280	-1 249	-1 252
Production (2)	5 399	5 183	5 007	5 147	5 659	5 901	5 803	6 183	6 708	7 361	8 024	8 745
Investment	270	246	179	211	257	237	300	350	400	450	450	500
Total employment (2)	97 160	90 715	83 389	76 200	76 343	72 784	67 312	66 534	66 549	66 600	66 900	67 200
Number of enterprises	2 491	2 750	2 893	2 408	2 104	1 801	1 700	1 650	1 600	1 550	1 500	1 500

(1) 1980 EC 9; 1981-85 EC 10.

(2) EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

Source: Ceibois, Eurostat (Inde).

To simplify, it can be stated that in the EC plywood industry, tropical wood is practically only valued for its aesthetic qualities, whereas for mechanical performances, other slow-growing types of wood are chiefly used.

Production and trade

According to the FAO publication *Yearbook of forest products*, European production (EC 12) of plywood amounted to 1 600 000 m³ in 1987 (last year for which figures are available), which is equivalent to a production value of ECU 1 thousand million. Total exports (inside and outside the EC) in the same year amounted 684 000 m³ (ECU 370 million). Imports, on the other hand, were much more considerable: 3.2 million m³ (ECU 1.1 thousand million), leading to a large trade deficit for this product.

Industry structure

Until recently, this industrial sector was rather labour-intensive. Technological development and computer applications in production control and the operation of machinery have, however, lowered production costs to a great extent, and have at the same

time enabled a substantial reduction in the percentage of wood waste. The sector is still highly suited to product diversification, certainly given the production methods that allow the manufacture of small series of special, custom-made goods.

Apart from a few exceptions, all the enterprises in this sector are family SMEs with rural locations. Their most important competitive advantage over the large single-product producers in the USA and Indonesia is that the European industry is specialized in the processing of very different types of wood.

Chipboard

Description of the product

The basic raw material for chipboard, in contrast to plywood, consists of wood residues obtained from forestry or woodworking products, e.g. sawing, planing and veneer manufactures. Chipboard is, therefore, essentially an ecologically sound product, in the sense that part of the material used, i.e. the roundwood, would not have found other industrial applications.

Table 2
Production and external trade
Manufacture of semi-finished wood products

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Production in current prices												
EC (1)	5 399	5 183	5 007	5 147	5 659	5 901	5 803	6 183	6 708	7 361	8 024	8 745
Index	91.5	87.8	84.9	87.2	95.9	100.0	98.3	104.8	113.7	124.8	136.0	148.2
USA (2)	5 124	6 398	6 567	8 620	10 383	10 831	9 100	8 312	8 022	N/A	N/A	N/A
Index	47.3	59.1	60.6	79.6	95.9	100.0	84.0	76.7	74.1	N/A	N/A	N/A
Japan (2)	4 995	5 241	5 292	6 013	6 339	6 413	6 707	7 736	8 189	N/A	N/A	N/A
Index	77.9	81.7	82.5	93.8	98.8	100.0	104.6	120.6	127.7	N/A	N/A	N/A
Production in constant prices												
EC	6 120	5 720	5 385	5 471	5 853	5 901	5 669	6 037	6 434	6 768	N/A	N/A
Index	103.7	96.9	91.3	92.7	99.2	100.0	96.1	102.3	109.0	114.7	N/A	N/A
Trade (3)												
Exports extra-EC	240	243	267	267	311	343	362	399	446	493	551	600
Index (4)	69.4	70.8	77.7	77.7	90.6	100.0	99.8	109.7	122.7	135.9	151.7	165.2
Export rate (%)	4.4	4.7	5.3	5.2	5.5	5.8	6.1	6.5	6.7	6.9	7.0	7.0
Imports extra-EC	1 304	1 367	1 346	1 535	1 655	1 665	1 583	1 670	1 747	1 773	1 800	1 852
Index (4)	78.2	82.1	80.8	92.2	99.4	100.0	104.3	110.0	115.2	116.9	118.6	122.0
Import penetration rate (%)	23.2	24.2	24.7	26.9	26.5	25.8	22.5	23.7	21.8	20.5	19.4	18.5
X/M %	18.4	17.8	19.8	17.4	18.8	20.6	22.9	23.9	25.5	27.8	30.6	32.4
Intra-EC trade												
Index (4)	74.2	75.6	77.7	85.1	93.8	1 004	1 240	1 316	1 558	1 780	2 003	2 202
Index (4)	74.4	75.3	77.3	84.8	93.4	100.0	106.1	112.6	133.2	152.3	171.3	188.4

(1) EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

(2) Census of Manufactures and Eurostat estimates.

(3) 1980 EC 9; 1981-85 EC 10.

(4) Taking into account changes in EC membership.

Sources: Ceibois, Eurostat (Inde).

At the first stage of the production procedure, the wood is mechanically machined, then dried, sieved and glued. During the gluing phase, products can also be added to give the end-product specific properties, such as resistance to moisture and fungi or render it fire-retardant.

With the aid of the glued chips, a mat is formed by means of spreader stations, which is then compressed at a temperature ranging from 120 to higher than 200 °C. It used to be compressed mainly in so-called layer presses, whereas this process can now also take place continuously, which however requires a far greater basic investment. The advantage of the continuous process is that it provides greater flexibility with regard to dimensions. After sanding and sawing, the chipboard is ready for a wide spectrum of applications, mostly in the furniture and building industries. The do-it-yourself business has become relatively more important in recent years.

Unlike plywood and covering with veneer, which was well established as a technique in the old days, chipboard was only fully launched after the Second World War, although a patent had been taken out as early as 1901 in the USA.

Production and trade

According to the FAO data, EC production of chipboard (EC 12) amounted to 15.4 million m³ in 1987

(value ECU 3.8 thousand million). In the same year, total EC exports (inside and outside EC 12) amounted to 3.4 million m³ (ECU 698 million) which is offset by an import figure of 5.1 million m³ (ECU 949 million). These imports principally originate from the EFTA (Austria amongst others) and the Eastern Bloc countries. Between 1980 and 1987, the chipboard sector experienced a 52% increase in production value, which is significantly greater than the increase in production value experienced by all other EC woodworking industries together. It is expected that this trend will continue in the coming years, with regard to both production and consumption.

Industry structure

The chipboard industry is the most capital-intensive of all the EC woodworking industries. Production is practically fully automated and the investment threshold, especially for the continuous production lines, is high. All these circumstances imply that an average chipboard firm exceeds the SME dimension of the sector and that the added value in the case of this activity is lower than in the rest of the woodworking industries, where the high percentage of labour costs raises the added value. The sector has gone through a major shape-up and it is seen that a certain concentration has taken place with it.

Table 3
Manufacture of plywood
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption	1 483	1 687	1 610	1 574	1 739	1 770	1 792	1 788	1 807	1 833	1 846	1 896
Production												
Current value (1)	945	1 021	962	845	969	1 008	1 058	1 050	1 100	1 150	1 200	1 250
Index	93.8	101.3	95.4	83.8	96.1	100.0	105.0	104.2	109.1	114.1	119.0	124.0
Volume (2)	1 750	1 722	1 586	1 467	1 527	1 534	1 612	1 600	N/A	N/A	N/A	N/A
Index	114.1	112.3	103.4	95.6	99.5	100.0	105.1	104.3	N/A	N/A	N/A	N/A
External trade (3)												
Value of exports	306	329	363	356	389	361	356	370	403	437	474	484
Index	84.6	91.1	100.4	98.5	107.8	100.0	98.5	102.4	111.6	121.0	131.2	134.0
Volume of exports	655	658	694	683	686	602	659	684	N/A	N/A	N/A	N/A
Index	108.8	109.3	115.3	113.5	114.0	100.0	109.5	113.6	N/A	N/A	N/A	N/A
Value of imports	844	995	1 011	1 084	1 159	1 123	1 090	1 107	1 110	1 120	1 120	1 130
Index	75.1	88.6	90.1	96.6	103.2	100.0	97.1	98.6	98.9	99.7	99.7	100.6
Volume of imports	2 599	2 745	2 509	2 787	2 753	2 668	3 227	3 254	N/A	N/A	N/A	N/A
Index	97.4	102.9	94.0	104.5	103.2	100.0	121.0	122.0	N/A	N/A	N/A	N/A
X/M (value)	.36	.33	.36	.33	.34	.32	.33	.33	.36	.39	.42	.43
X/M (volume)	.25	.24	.28	.25	.25	.23	.20	.21	N/A	N/A	N/A	N/A

(1) 1980-87: current value = production volume x export value/m³; 1988-91: production is based on estimates by Ceibois.

(2) 1 000 m³.

(3) Intra-EC trade is included both in imports and exports; value data after 1987 are based on estimates by Ceibois; volume data are in 1 000 m³.

Sources: FAO, Ceibois.

Regarding raw materials, the sector is particularly dependent on glue suppliers, which have an oligopoly position. Both glue prices, on the one hand, and the price of small roundwood and wood residues on the other are to a substantial extent also determined by fluctuations in the price of energy products.

Research and development

In the case of chipboard, a great deal of R&D is taking place, the object of which is to differentiate the basic product. Resistance to moisture, fungi and fire are important areas of investigation, which have already been touched on elsewhere. In addition, considerable efforts are being made to develop completely new boards on the basis of composite material consisting of a combination of wood, chemicals and/or cement.

Although the manufacturing process of chipboard is already fully automated, there is a great deal of investment in computer-controlled processes and quality control. In view of the rather large contribution made by energy to the total cost price, the search for energy-saving improvements is an ongoing concern. The development of non-destructive testing methods for the measurement of mechanical properties is a final important area in which the EC chipboard industry is carrying out a substantial amount of research and development.

Product development

There are two basic products currently under development in the chipboard sector:

- Oriented strand board (osb);
- Particleboard bonded with inorganic binders.

Oriented strand board

From a production point of view, osb can be loosely considered as a variant of chipboard but with significant differences in wafer or strand production and mat formation.

Os b derives its enhanced properties from the precise production of the wafers or strands, thickness and length being critical. In order that strength should be increased in a specific direction, the strands are oriented in this direction. On the basis of its identifiable characteristics as a product, osb can, therefore, be compared more with plywood than with chipboard.

Os b, which has only been produced in Europe since 1985, is, together with waferboard, established in North America. Os b and waferboard account for 40% of the plywood market in the construction industry in the USA. It is estimated that this portion will rise to 80% by the year 2000. Currently, high grades of os b are being produced in the UK and

Table 4
Manufacture of particle board
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption	2 739	2 731	2 742	3 255	3 501	3 810	3 968	4 109	4 250	4 525	4 855	5 100
Production												
Current value (1)	2 558	2 567	2 563	3 055	3 278	3 594	3 764	3 858	4 000	4 300	4 650	4 900
Index	71.2	71.4	71.3	85.0	91.2	100.0	104.7	107.3	111.3	119.6	129.4	136.3
Volume (2)	14 756	13 918	13 366	13 537	13 591	14 100	14 707	15 475	N/A	N/A	N/A	N/A
Index	104.7	98.7	94.8	96.0	96.4	100.0	104.3	109.8	N/A	N/A	N/A	N/A
External trade (3)												
Value of exports	407	444	466	447	514	601	640	698	750	825	875	900
Index	67.8	73.9	77.6	74.4	85.7	100.0	106.7	116.3	124.9	137.4	145.7	149.9
Volume of exports	2 751	2 661	2 567	2 538	2 759	3 089	3 217	3 438	N/A	N/A	N/A	N/A
Index	89.1	86.1	83.1	82.2	89.3	100.0	104.1	111.3	N/A	N/A	N/A	N/A
Value of imports	589	608	645	647	737	817	845	949	1 000	1 050	1 080	1 100
Index	72.1	74.5	79.0	79.2	90.3	100.0	103.5	116.2	122.5	128.6	132.3	134.7
Volume of imports	3 965	3 958	3 786	3 899	4 211	4 660	4 876	5 139	N/A	N/A	N/A	N/A
Index	85.1	84.9	81.2	83.7	90.4	100.0	104.6	110.3	N/A	N/A	N/A	N/A
X/M (value)	.69	.73	.72	.69	.70	.74	.76	.74	.75	.79	.81	.82
X/M (volume)	.69	.67	.68	.65	.66	.66	.66	.67	N/A	N/A	N/A	N/A

(1) 1980-87: current value = production volume x export value/m³; 1988-91: production is based on estimates by Ceibois.

(2) 1 000 m³.

(3) Intra-EC trade is included both in imports and exports; value data after 1987 are based on estimates by Ceibois; volume data are in 1 000 m³.

Source: FAO, Ceibois.

France and the product has reached a high standard of acceptability in these and several other European countries.

In the UK and France the product has been certified or is currently being tested for several principal constructional uses. It is anticipated that within the next decade it will become a major product in the European panel industry.

Particleboard bonded with inorganic binders

In addition to the wood-based particleboard bound with glues (chipboard and osb as described above), a family of particleboards bound with inorganic binders has been developed in western Europe and elsewhere. In this family the wood content is significant but is outweighed by the binder content. The recognized board types include cement-bonded particleboards (the notable variants of which are bonded with Portland cement, magnesium silicate, or furnace slag) and gypsum particleboard (alongside which gypsum fibreboards may also be mentioned as a separate board type). These boards have either internal or external construction, according to the type. Production is world-wide, and it is estimated that production capacity in western Europe amounted to about 1 000 m³/day in 1987.

Fibreboard

Description of the product

Fibreboard also belongs to the range of wood-based panels. This product is classified under NACE item No 462.21 (Nimexe 44.11, harmonized system 44.11).

Unlike in the manufacture of chipboard, where the raw materials are broken down mechanically to chips of a uniform size, to make fibreboard the wood is ground to the level of the individual fibres, which then undergo a chemical preparation to become a cake. If this cake is compressed, hardboard is obtained which, whether or not provided with a finishing coating, is generally used as an intermediate raw material in the packing and furniture sectors. If, on the other hand, the cake is not compressed, but thoroughly dried, softboard is formed, which is used mainly for (acoustic) insulation.

Production and trade

According to the FAO data, in 1987 EC production of fibreboard (EC 12) amounted to 1.3 million m³, having a value of ECU 383 million. Total exports (intra- and extra-Community) amounted to 565 000 m³, which is offset by imports (intra- and extra-Community) of about 1.4 million m³. The apparent consumption consequently amounted to 2.2 million m³.

Table 5
Manufacture of fibreboard
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption	440	450	444	475	488	521	535	548	579	656	726	765
Production												
Current value (1)	319	332	324	360	376	386	373	383	421	510	600	640
Index	82.6	86.0	83.9	93.3	97.4	100.0	96.6	99.2	109.1	132.1	155.4	165.8
Volume (2)	1 326	1 335	1 155	1 257	1 299	1 297	1 293	1 336	N/A	N/A	N/A	N/A
Index	102.2	102.9	89.1	96.9	100.2	100.0	99.7	103.0	N/A	N/A	N/A	N/A
External trade (3)												
Value of exports	80	94	99	118	137	133	135	154	167	189	219	225
Index	60.5	71.1	74.6	88.6	103.0	100.0	101.3	115.9	125.7	142.3	164.8	169.3
Volume of exports	414	407	365	426	482	471	493	565	N/A	N/A	N/A	N/A
Index	87.9	86.4	77.5	90.4	102.3	100.0	104.7	120.0	N/A	N/A	N/A	N/A
Value of imports	202	213	219	233	249	268	297	319	325	335	345	350
Index	75.4	79.5	82.0	87.1	92.9	100.0	110.8	119.2	121.4	125.2	128.9	130.8
Volume of imports	1 125	1 085	973	1 024	1 050	1 097	1 303	1 439	N/A	N/A	N/A	N/A
Index	102.6	98.9	88.7	93.3	95.7	100.0	118.8	131.2	N/A	N/A	N/A	N/A
X/M (value)	.40	.44	.45	.50	.55	.50	.45	.49	.51	.56	.63	.64
X/M (volume)	.37	.38	.38	.42	.46	.43	.38	.39	N/A	N/A	N/A	N/A

(1) 1980-87: current value = production volume x export value/m³; 1988-91: production is based on estimates by Ceibois.

(2) 1 000 m³.

(3) Intra-EC trade is included both in imports and exports; value data after 1987 are based on estimates by Ceibois; volume data are in 1 000 m³.

Sources: FAO, Ceibois.

For about a decade, traditional hardboard and softboard have been outstripped by a new sort of fibreboard, i.e. Mdf or 'Medium-density fibreboard', which has characteristics (density amongst others) comparable to those of solid wood, and in addition, is a very homogeneous material, which is easily processed. Mdf is now used for laquered furniture and implements with sharp edges and/or contours, while recently applications in the building sector have also

been discovered. Mdf thus completes the range of available board material. Since Mdf is at the beginning of its product life cycle, it is clear that it has a good future — first and foremost as a substitute material for more expensive types of solid wood.

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WOODEN BUILDING COMPONENTS

(NACE 463)

Description of the sector

The wooden building components sector accounts for 40% of the production value of the second wood-working process, making it the main subsector in the EC 12.

This subgroup, which, in the NACE definition, bears the title 'Manufacture of carpentry and joinery components and of parquet flooring' (Nimexe 44.23 and 44.13, harmonized system 44.18 and 44.07), depends heavily on the trends in the building sector. Nevertheless, in the past decade, certainly in the case of wooden building components, a substantial opportunity has opened up in the field of renovation work; this development has made this subsector a little less dependent on new building construction, enabling it to continue to preserve market share. With regard to the building of private housing, even the single EC market will not be able to change the fact that for building components, well-defined regional markets will continue to exist within Europe. This has less to do with the standards laid down by the various authorities than with the specific climatic conditions and local building traditions and styles. The most ideal form of enterprise for coping with this situation is a small or medium-sized enterprise that optimizes its size in accordance with clearly determined geographical limits and a technical specialization.

In addition, there is the international project market, where the situation is completely different, and where it is clearly a question of increasing standardization.

The demand for wooden joinery and parquet flooring in private housing has unequivocally been on the increase in recent years.

In general, it can be stated that, in the case of demand for wooden building components, besides characteristics such as thermal and acoustic insulation, fire- and burglar-proofing properties are becoming more and more important, certainly for use in the non-residential building sector. Products such as fire-resistant wooden doors may give rise to some amazement. It is, however, the high degree of dimensional stability of the wood that provides these doors with a competitive advantage over metal or synthetic products, which become deformed more

quickly at high temperatures. The same characteristics regarding performance are to be found again in the glued laminated rafters.

This subsector, however, is not restricted to wooden doors, frames and rafters. Wooden façade components, partitioning and other walls, wooden screens, staircases, etc. also belong to it.

In practice, even the 'wood protection' industry can be considered as belonging to a large extent to the building related sectors. This branch of industry, which was in the past principally geared towards the impregnation of railway sleepers and poles for electricity distribution and telephone connections, has to a large extent switched over to the delivery of protected wood for building and external uses. Incidentally, this switch-over has also led to the use of other means of impregnation. Thus, at present, in addition to the traditional creosote, increasing quantities of inorganic salts and products in organic solvents are used.

About 4.5 million m³ of wood are protected industrially per year in the European Community, of which about 3.5 million m³ are used in relatively new applications (agriculture, vineyards and horticulture, fruit-growing, enclosures, playgrounds, hydraulic engineering, but also as impregnated building components, such as rafters). The surplus value from this impregnation amounts to about ECU 200 million per year.

The significance of wood protection for the wood-working industries in general is especially apparent from the fact that through this process, the use of wood has been made possible in applications where generally rapid biological attacks are to be feared. This means that wood can win market shares in these fields from competing building materials.

Production and consumption

As mentioned before, the wooden building components subsector is the most important in the whole woodworking industry (excluding sawmills and furniture). In 1988 the value of production in the EC 12 amounted to more than ECU 9 billion, which accounts for 40% of the EC woodworking industries.

Table 1
Main indicators, 1980-91
Manufacture of carpentry, joinery components and parquet flooring

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption (1)	6 632	6 075	5 993	6 775	7 093	6 909	7 856	8 376	9 004	9 733	10 686	11 757
Net exports	30	189	121	134	122	61	92	120	148	181	219	209
Production (2)	7 440	7 022	6 812	7 620	7 910	7 710	7 948	8 496	9 152	9 914	10 905	11 966
Investment	278	224	192	208	261	237	250	270	300	340	380	425
Total employment (2)	197 106	179 782	162 099	164 125	169 021	153 231	145 975	145 927	145 606	146 000	147 000	148 000
Number of enterprises	16 614	15 510	14 549	15 168	15 044	15 227	15 300	15 350	15 450	15 500	15 500	15 550

(1) 1980 EC 9; 1981-85 EC 10.

(2) EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

Sources: Ceibois, Eurostat (Inde).

The apparent consumption of the EC 12 is ECU 9 billion, of which ECU 380 million (or 4.3%) is derived from imports from outside the Community.

contrary to most other subsectors of the wood-working industries, the wooden building components subsector has a positive trade balance. In 1980 there was a trade surplus of 14%, which had grown to 39% in 1988.

Trade

Exports to non-EC countries (ECU 528 million) are higher than the corresponding imports (ECU 380 million). In other words 5.8% of the European production is exported outside the EC. As a result and

Employment

According to Eurostat, employment amounted to 145 000 persons in 1988. It should be kept in mind that only direct employment is concerned here, this

Table 2
Production and external trade
Manufacture of carpentry, joinery components and parquet flooring

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Production in current prices												
EC (1)	7 440	7 022	6 812	7 620	7 910	7 710	7 948	8 496	9 152	9 914	10 905	11 966
Index	96.5	91.1	88.4	98.8	102.6	100.0	103.1	110.2	118.7	128.6	141.4	155.2
USA (2)	10 016	13 079	13 501	18 978	22 996	24 283	20 350	18 324	18 497	20 969	21 641	N/A
Index	41.2	53.9	55.6	78.2	94.7	100.0	83.8	75.5	76.2	86.4	89.1	N/A
Japan (2)	751	837	961	956	1 085	1 098	1 148	1 324	1 401	N/A	N/A	N/A
Index	68.4	76.2	87.5	87.1	98.8	100.0	104.6	120.6	127.6	N/A	N/A	N/A
Production in constant prices												
EC (1)	10 088	8 807	7 944	8 500	8 330	7 710	7 804	8 116	8 467	8 808	N/A	N/A
Index	130.9	114.2	103.0	110.2	108.0	100.0	101.2	105.3	109.8	114.3	N/A	N/A
Trade (3)												
Exports extra-EC	232	427	343	429	439	371	400	480	528	581	639	654
Index (4)	62.3	115.0	92.4	115.7	118.4	100.0	90.4	108.5	119.3	131.3	144.4	147.8
Export rate (%)	2.9	5.7	4.7	5.3	5.3	4.8	5.0	5.7	5.8	5.8	5.8	5.4
Imports extra-EC	202	237	222	296	318	310	308	360	380	400	420	445
Index (4)	65.2	76.6	71.5	95.4	102.5	100.0	111.0	129.8	137.0	144.2	151.5	160.5
Import penetration rate (%)	3.0	3.9	3.7	4.4	4.5	4.5	3.9	4.3	4.2	4.1	3.9	3.8
X/M	114.6	179.9	154.6	145.3	138.3	119.7	130.0	133.3	138.9	145.3	152.1	147.0
Intra-EC trade												
Index (4)	330	313	305	352	376	370	446	500	558	626	688	743
Index (4)	90.7	84.6	82.5	95.1	101.6	100.0	107.6	120.4	134.5	150.9	165.8	179.1

(1) EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

(2) Census of Manufactures and Eurostat estimates.

(3) 1980 EC 9; 1981-85 EC 10.

(4) Taking into account changes in EC membership.

Sources: Ceibois, Eurostat (Inde).

having no connection with the installation activities in the building yards. This form of indirect employment in the field of wooden building components is in fact considerable.

Outlook

The prospects up to 1991 cannot be seen as bad, especially since in the forthcoming years a certain general revival is expected in the building sector, following the slump that was observed in some Members States in the first half of the 1980s. Accordingly, the value of wooden building components produc-

tion is expected to reach approximately ECU 12 thousand million towards 1991. This expected growth in production will be supported by a substantial increase in investment, the latter being expected to grow by about 10% per year in 1989 and 1990.

With regard to the corresponding employment, it is projected to remain stable, or even rise slightly. The way has also been cleared for exports outside the EC, which are expected to post a healthy growth.

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WOODEN CONTAINERS AND PALLETS

(NACE 464)

Description of the sector

According to the NACE, these products fall under group 464 of the 'manufacture of wooden containers'. This group contains two subgroups: on the one hand, the manufacture of boxes, crates and pallets (NACE 464.1) and, on the other, the 'manufacture of barrels and coopery products' (NACE 464.2). In the NACE annex, these products are further specified as 'boxes, crates for fruit and vegetables, crates and other packing which is made in whole or in part of sawn, cut or peeled wood, from plywood, fibreboard or chipboard or reinforced wood, as well as parts of boxes, pallets, staves, watertight barrels, other coopery products and accessories'.

The corresponding data for foreign trade are found under Nimexe items 44.21 (wooden boxes), 44.22 (barrels, casks, etc.) and finally item 44.28.992 (pallets) (harmonized system: 44.15 and 44.16).

In general, all types of wooden containers of a temporary nature are used during the processing, transport, storage or display of products for the purpose of promoting their manoeuvrability. It is apparent from this description that both light structures and containers that must be able to withstand rough handling are included. The raw materials used are mostly local types of wood such as poplar and pine. The fact that wood is used as a raw material for containers and boxes makes these products very useful in custom-made manufacturing.

The pallets have to a large extent been standardized with regard to their dimensions, which makes them

highly suitable for use on several occasions or for being interchanged with one another. Some of the international circuit of pallets is, moreover, 'invisible' because consignments with empty pallets are included in the customs statistics, whereas loaded pallets are not.

Industry structure

In 1988 there were 1 400 firms in the EC, which together employed nearly 40 000 persons. These establishments are mostly situated in the vicinity of the available raw materials and/or major transport centres, such as harbours and airports. The corresponding value of production of these 1 600 firms amounts to ECU 2.3 thousand million, or an average turnover of ECU 1.6 million per firm, which clearly underlines the SME nature of this sector. It is then obvious that production is directed first and foremost towards the requirements of the local markets. Foreign trade in wooden containers (outside the EC) should thus be qualified as rather limited in scale. Both imports and exports (outside the EC) amount to only a fraction of consumption (1.7%) or production (2%) respectively and this trend will, in all probability, continue in the future. All in all, the wooden container, nevertheless, accounts for 10% of the value of production of the EC woodworking industries (EC 12), with the exception of sawmills and furniture.

By and large, it can be stated that wood, together with paper and cardboard, and glass and plastic, is amongst the most important packing materials.

Table 1
Main indicators, 1980-91
Manufacture of wooden containers

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption (1)	1 646	1 524	1 595	1 559	1 708	1 730	2 055	2 187	2 352	2 564	2 791	3 069
Net exports	-15	-6	3	10	2	4	4	5	7	11	16	18
Production (2)	1 939	1 816	1 774	1 754	1 919	2 020	2 059	2 192	2 359	2 575	2 807	3 087
Investment	60	52	54	56	48	53	60	66	72	80	87	96
Total employment (2)	59 064	51 862	47 154	44 163	44 498	41 902	40 478	40 230	39 756	40 000	40 200	40 500
Number of enterprises	2 560	2 223	1 909	1 760	1 971	1 657	1 550	1 500	1 400	1 400	1 450	1 500

(1) 1980 EC 9; 1981-85 EC 10.

(2) EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

Sources: Ceibois, Eurostat (Inde).

Table 2
Production and external trade
Manufacture of wooden containers

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Production in current prices												
EC (1)	1 939	1 816	1 774	1 754	1 919	2 020	2 059	2 192	2 359	2 575	2 807	3 087
Index	96.0	89.9	87.8	86.8	95.0	100.0	102.0	108.6	116.8	127.5	139.0	152.9
USA (2)	1 178	1 411	1 669	1 905	2 550	2 585	2 001	1 790	1 837	2 061	2 139	N/A
Index	45.6	54.6	64.6	73.7	98.6	100.0	77.4	69.2	71.1	79.7	82.7	N/A
Japan (2)	820	1 027	1 006	1 108	1 273	1 288	1 347	1 554	1 645	N/A	N/A	N/A
Index	63.7	79.7	78.1	86.0	98.8	100.0	104.6	120.7	127.7	N/A	N/A	N/A
Production in constant prices												
EC (1)	2 252	2 016	1 922	1 899	2 000	2 020	2 030	2 141	2 267	2 377	N/A	N/A
Index	111.5	99.8	95.2	94.0	99.0	100.0	100.5	106.0	112.3	117.7	N/A	N/A
Trade (3)												
Exports extra-EC	15	19	22	30	30	34	37	41	46	52	57	60
Index (4)	43.0	57.1	66.7	90.2	87.8	100.0	85.7	95.0	106.5	120.4	132.0	139.0
Export rate (%)	.8	1.1	1.3	1.7	1.5	1.7	1.8	1.9	2.0	2.0	2.0	2.0
Imports extra-EC	29	25	20	21	28	30	33	36	39	41	41	42
Index (4)	97.2	84.0	66.3	69.0	91.7	100.0	97.4	106.3	115.1	121.0	121.0	124.0
Import penetration rate (%)	1.8	1.7	1.2	1.3	1.6	1.7	1.6	1.6	1.7	1.6	1.5	1.4
X/M (%)	50.3	76.2	112.6	146.4	107.3	112.0	112.1	113.9	117.9	126.8	139.0	142.9
Intra-EC trade												
Index (4)	31	32	35	32	33	39	55	59	67	76	83	89
Index (4)	80.9	82.1	89.4	82.9	85.8	100.0	107.6	114.8	130.8	148.4	162.1	173.8

(1) EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

(2) Census of Manufactures and Eurostat estimates.

(3) 1980 EC 9; 1981-85 EC 10.

(4) Taking into account changes in EC membership.

Sources: Ceibois, Eurostat (Inde).

Cardboard in particular is used increasingly as a substitute for wood for cheap packaging, whereas wood commands a better position in the high segment of exclusive packaging. In spite of the specific qualities of wooden packing material, mention can nevertheless be made of a certain saturation in demand. It is expected that the consumption of

wood containers between 1987 and 1991 will increase by about 4.0% per year (in current figures).

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OTHER WOOD PRODUCTS

(NACE 465 and 466)

Summary

Miscellaneous wood products is a very heterogeneous category, covering things like wood fibre and wood flour, to wickerwork and cork products. Some of the products which fall under this category are subject to strong competition from non-EC producers — particularly the low-wage and developing countries, but the share of EC demand that is satisfied by imports is still limited, at less than 20%. The entrance of Spain, and particularly Portugal, in the EC in January 1986 has considerably increased the total EC's trade balance for these products, bringing the ratio of exports over imports up to 84.2%.

Description of the sector

The products that are part of this sector are very heterogeneous wood products. The NACE category 465 includes the production of wood flour (465.2), wood wool and wood fibre (465.3), and wooden shoes (465.4), as well as miscellaneous wood manufactures (465.1). These are products for carpentry, or woodwork for the textile industry.

On the other hand, the NACE category 466 includes not only the manufacture of products out of cork, such as material for isolation (466.1), but also the manufacture of basketware, wickerwork and other articles of plaiting materials, with the exception of cane and wicker furniture, or brushes and brooms (Nace 466.3), which are analysed in a separate section.

The production of goods falling in these two NACE categories amounted to ECU 4.5 billion in 1988; about 75% of this comes from NACE 465, and the last quarter from products in NACE 466.

Total employment in those two sectors was estimated at 82 216 persons in 1988.

Despite the fact that this sector is likely to be strongly exposed to competition from low wage countries (for instance for plaiting materials or brushes), it is interesting to note that the import penetration ratio from non-EC countries has been edging downwards in the past: it fell from 21.1% in 1982 to 16.2% in 1987. The opposite happened to the export intensity ratio, which increased from 10% in 1980 to 14.6% in 1988. The result of these two developments is that the external balance for these products improved sharply, and the export/import ratio jumped from 44.8% in 1980 to 84.2% in 1988. This improvement is largely a result of the entrance of Spain and Portugal, the latter a large cork producer, in the EC in January 1986.

Approximately a fourth of the production is traded within the European Community.

Outlook

In the medium term, the apparent consumption of these products in the EC is expected to rise by 27% in value terms between 1988 and 1991, which corre-

Table 1
Main indicators, 1980-91

Manufacture of articles of cork, straw, plaiting materials, brushes, brooms and other wood manufactures

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption (1)	2 730	2 627	2 788	3 061	3 362	3 478	3 895	4 215	4 623	5 125	5 402	5 827
Net exports	-368	-339	-373	-376	-406	-371	-9	-87	-122	-165	-216	-278
Production (2)	2 998	2 953	2 978	3 217	3 538	3 752	3 886	4 128	4 501	4 960	5 186	5 549
Investment	119	96	109	146	136	147	160	172	192	213	234	257
Total employment (2)	101 313	90 723	88 330	87 804	87 480	84 662	81 788	81 315	81 216	81 500	81 700	82 000
Number of enterprises	4 435	3 889	3 897	3 829	3 580	3 702	3 700	3 750	3 750	3 800	3 800	3 900

(1) 1980 EC 9, 1981-85 EC 10.

(2) EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

Sources: Ceibois, Eurostat (Inde).

Table 2
Production and external trade
Manufacture of articles of cork, straw, plaiting materials, brushes, brooms and other wood manufactures

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Production in current prices												
EC (1)	2 998	2 953	2 978	3 217	3 538	3 752	3 886	4 128	4 501	4 960	5 186	5 549
Index	79.9	78.7	79.4	85.7	94.3	100.0	103.6	110.0	120.0	132.2	138.2	147.9
USA (2)	548	706	835	1 004	1 113	1 059	873	755	794	913	964	N/A
Index	51.7	66.7	78.8	94.8	105.1	100.0	82.4	71.3	75.0	86.2	91.0	N/A
Japan (2)	4 110	5 080	5 119	6 044	6 890	6 971	7 290	8 409	8 902	N/A	N/A	N/A
Index	59.0	72.9	73.4	86.7	98.8	100.0	104.6	120.6	127.7	N/A	N/A	N/A
Production in constant prices												
EC (1)	3 996	3 646	3 378	3 516	3 681	3 752	3 751	3 864	4 062	4 295	N/A	N/A
Index	106.5	97.2	90.0	93.7	98.1	100.0	100.0	103.0	108.3	114.5	N/A	N/A
Trade (3)												
Exports extra-EC	299	333	335	369	423	464	587	592	651	716	788	867
Index (4)	64.6	71.7	72.1	79.4	91.1	100.0	95.6	96.5	106.0	116.6	128.3	141.2
Export rate (%)	10.0	11.3	11.2	11.5	12.0	12.4	15.1	14.5	14.6	14.8	15.2	15.6
Imports extra-EC	667	672	708	745	829	835	596	679	773	881	1 004	1 145
Index (4)	77.3	80.5	84.8	89.2	99.2	100.0	102.9	117.1	133.4	152.0	173.3	197.6
Import penetration rate (%)	24.4	25.6	25.4	24.3	24.6	24.0	15.3	16.1	16.7	17.2	18.6	19.6
X/M %	44.8	49.5	47.3	49.5	51.0	55.6	98.4	87.3	84.2	81.3	78.5	75.7
Intra-EC trade												
Index (4)	77.6	72.9	78.2	82.0	91.6	100.0	106.2	116.5	122.9	137.9	154.3	165.2

(1) EC 10: enterprises with 20 or more employees. Spain and Portugal: all enterprises.

(2) Census of Manufactures and Eurostat estimates.

(3) 1980 EC 9; 1981-85 EC 10.

(4) Taking into account changes in EC membership.

Sources: Ceibois, Eurostat (Inde).

sponds to a stable growth pattern, and a continuation of past trends.

The 33% investment growth that is expected to take place over the same period is a good indicator of the high degree of confidence of companies operating in this sector.

This is also expected to lead to a small rise in the number of plants, and in employment.

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THE BRUSH INDUSTRY

(NACE 466.3)

Description of the sector

The sector's activities are listed under NACE code 466.3 (subdivisions 466.1 and 466.2 are cork and basketwork respectively).

The data published below is essentially taken from information furnished by FEIBP, since Eurostat has little or no data on such a detailed level. The figures for Denmark and Ireland include all of sector 466. Luxembourg does not produce any brushes.

For external trade purposes, the sector is included in Chapter 96 (EC combined schedule: 9603). The major categories of brushes are: household brushes (indoor brooms, dusters, clothes brushes, street-sweeping brooms), toilet brushes (hair brushes, toothbrushes, nailbrushes), fine brushes (make-up brushes, watercolour brushes), paintbrushes and rollers (round, oval, flat), and industrial brushes (cylinder brushes, rotary brushes, brushes for machines and tooling).

Production and consumption

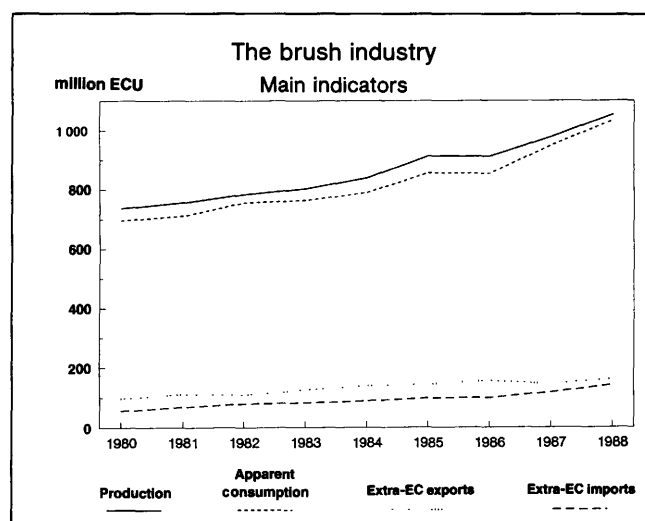
Production and consumption developments between 1980 and 1988 are shown in Table 1 and Figure 1.

In 1988 overall production and consumption were in excess of ECU 1 billion. Table 2 shows a breakdown by country.

Employment

The increase in production has not been reflected by a similar trend in employment. The reduction in employment is to a great extent the result of automation and the import of finished products, since:

Figure 1



- for reasons of internal and external competitiveness European producers must equip their plant with efficient equipment;
- imports from outside the EC account for 15% of consumption. A substantial proportion of the ECU 142 million worth of brushes imported from non-Community countries comes from the newly industrialized countries (NICs) of the Far East (Republic of Korea, Hong Kong, Taiwan). Low value accounts for huge quantities. It should be pointed out in this connection that a 69% anti-dumping law has been introduced on Chinese paintbrushes;
- production automation is implemented by highly efficient machines which perform in a single cycle the insertion of the wires, the attachment of the wires to the frame, and the levelling of the bristle material. In this way toothbrushes, nailbrushes,

Table 1
Main indicators
Brushes and brooms

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	696.9	712.3	755.8	763.8	790.1	856.3	854.2	949.4	1 032.5
Net export earnings ⁽¹⁾	41.4	45.1	28.6	38.8	50.0	56.3	57.1	28.0	19.8
Production ⁽¹⁾	738.3	757.4	784.4	802.6	840.1	912.6	911.8	977.4	1 052.3
Employment (1 000) ⁽¹⁾	24.1	22.6	21.8	20.3	20.0	20.2	19.7	19.3	19.3

⁽¹⁾ Excluding Greece and Portugal.

Source: FEIBP, Eurostat.



etc. are produced in enormous quantities. The packing and labelling of brushes of this type are also performed automatically. The manufacture of artists' paintbrushes, particularly fine paintbrushes, is less automated, although progress is being made here too;

Table 2
Production by country, 1987

(million ECU)	Production
Belgium	17.6
Denmark (1)	24.2
FR of Germany	321.0
Spain	28.1
France	188.6
Ireland (1)	12.3
Italy	176.6
The Netherlands	14.5
United Kingdom	194.5
EC Total (2)	977.4

(1) Denmark and Ireland: enterprises with 20 or more employees.

(2) Excluding Greece, Luxembourg and Portugal.

Source: FEIBP.

- labour is still an important factor in certain operations (e.g. the manufacture of artists' paintbrushes). As a result of automation, it is increasingly persons with technical knowledge of machines and tooling that are required.

While overall consumption is increasing in terms of value, this probably does not always reflect an increase in quantities, but rather the consumption of products of higher value. We will quote by way of example the factors capable of having a positive or negative influence on the use of brushes: the type of indoor floor covering, the type of outdoor woodwork, the use of dishwashers, hair and make-up fashions, etc.

External trade

Exports outside the EC are important for certain countries and/or products; on the other hand, the European industry is highly sensitive to imports from outside the EC, in particular those from certain countries with a state-run economy, and certain Far Eastern countries. The sector has already invoked Article 115 of the EEC Treaty, and completed an anti-dumping case file regarding Chinese paintbrushes.

The balance of extra-EC trade

Table 3 shows that between 1980 and 1988:

- exports increased by less than imports (by value), which rose by a factor of 2.5;
- the balance of trade dropped considerably in 1987; in 1988 it stood at just 47% of its 1980 value.

In Table 4 the major product families are examined in detail for 1986 and 1988. The result for each product family is shown in millions of ECU.

Substantial differences can be observed between the developments in different products, for example: imports of toilet brushes increased by ECU 20 million between 1986 and 1988 (toothbrushes up 6 million, hairbrushes up 6 million, others up 8 million); as regards fine brushes, the ECU 8 million increase between 1986 and 1988 to a great extent reflects only the developments in the external trade in make-up brushes.

Table 3
Production and external trade
Brushes and brooms

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production (1)									
Current value	738.3	757.4	784.4	802.6	840.1	912.6	911.8	977.4	1 052.3
Index	80.9	83.0	86.0	87.9	92.1	100.0	99.9	107.1	115.3
Constant value	932.8	882.5	876.4	881.1	878.6	912.6	854.6	991.0	1 014.7
Index	102.2	96.7	96.0	96.6	96.3	100.0	93.7	108.6	111.2
Trade (1)									
Exports extra-EC	97.7	111.2	109.1	121.9	139.4	154.1	156.2	145.1	160.7
Index	63.4	72.2	70.8	79.1	90.5	100.0	101.4	94.2	104.3
Imports extra-EC	56.4	67.1	80.6	83.1	89.3	97.8	99.1	117.1	140.9
Index	57.7	68.6	82.4	85.0	91.3	100.0	101.3	119.7	144.1
X/M	1.7	1.7	1.4	1.5	1.6	1.6	1.6	1.2	1.1

(1) EC10, excluding Greece and Portugal.

Source: FEIBP, Eurostat.

Table 4
Evolution of EC external trade balance
by product family (1)

(million ECU)	1986	1988	1988/86 diff.
Brooms	3.5	4.5	1.0
Toilet brushes	9.2	-16.0	-25.2
Fine hair brushes	-5.5	-12.1	-6.6
Paint brushes/Rollers	7.2	5.5	-1.7
Industrial brushes	15.1	16.8	1.7
Domestic brushes	7.5	11.4	3.9
Other	16.8	9.6	-7.2

(1) The above product families are defined as follows:

Brooms: CN 960310; Toilet brushes: CN 960321 & 29; Fine hair brushes: CN 960330; Paint brushes/rollers CN 960340; Industrial brushes: CN 960350; Domestic brushes: CN 960390(10+91); Other: CN 96039099.

Source: FEIBP, Eurostat.

Regulatory environment

In certain EC countries the legislation includes provisions regarding bristle quality designations. National standards also exist. In addition the sector has drawn up a guide to safety for rotary brushes. The FEIBP (European Brush Industry Federation) also took part in the drafting of an ISO standard on the hardness of toothbrush bristles.

The sector is also behind the creation of ESC Technical Committee 173, which will deal with specific standards as well as a basic standard. Primarily as a

result of hygiene directives, it will be necessary to set technical criteria for brushes and to follow certification procedures.

Distribution

The European distribution trade in general just keeps on growing. It calls upon and/or is called upon more directly by non-EC products, for direct or indirect import.

As the production units are small or medium in size, they should be structured to face up to these changes in distribution. Of course for certain types of products (upmarket make-up brushes and/or artists' brushes, certain toilet brushes and toothbrushes, etc.), the distribution mode is more suitable and more selective.

In view of the product and its market approach, the European industry should reinforce its position in the market, the better to negotiate the move to the single market.

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Table 5
EC external trade by product family

(million ECU)	1986	(%)	1987	(%)	1988	(%)
Brooms						
Exports extra-EC	8.9	5.8	9.0	6.2	9.4	5.8
Imports extra-EC	5.4	5.4	4.7	3.9	4.9	3.5
Toilet brushes						
Exports extra-EC	42.6	27.7	37.9	25.9	37.7	23.4
Imports extra-EC	33.4	33.2	41.2	34.6	53.7	37.8
Fine hair brushes						
Exports extra-EC	18.0	11.7	16.8	11.5	18.9	11.7
Imports extra-EC	23.5	23.3	29.3	24.6	31.0	21.8
Paint brushes/Rollers						
Exports extra-EC	18.8	12.2	18.8	12.9	20.7	12.8
Imports extra-EC	11.6	11.6	12.2	10.2	15.2	10.7
Industrial brushes						
Exports extra-EC	20.2	13.2	21.4	14.6	25.7	15.9
Imports extra-EC	5.1	5.1	5.9	4.9	8.9	6.3
Domestic brushes						
Exports extra-EC	17.7	11.5	16.5	11.3	26.2	16.3
Imports extra-EC	10.2	10.2	13.2	11.0	14.8	10.5
Other						
Exports extra-EC	28.0	18.2	25.3	17.3	22.8	14.1
Imports extra-EC	11.2	11.2	12.5	10.4	13.2	9.3
ECTotal						
Exports extra-EC	154.2	100.0	145.8	100.0	161.4	100.0
Imports extra-EC	100.4	100.0	119.0	100.0	141.7	100.0

Source: FEIBP, Eurostat.

FURNITURE

(NACE 467 and 316.6)

Economic importance of the industry in the EC economy

Production of furniture amounted to ECU 38 665 million in 1988. Thereof, ECU 4 867 million was produced by the office furniture sector. After a stagnation in the beginning of the 1980s, which barely affected the office furniture industry whose production continued to show positive growth rates, production in the industry as a whole has started rising again, growing by 6.5% in 1987 and 4% in 1988 (in value).

The European furniture industry employed 723 000 persons in 1987, which makes it the 7th industry out of 97. Within the furniture industry, 59 000 persons were employed by the office furniture sector in 1987. Most of them are skilled workers.

In the USA, production amounted to ECU 20 907 million in 1988, which is a little less than in 1985. In Japan, the industry has enjoyed considerable growth over the last few years and its production reached ECU 13 974 million in 1988.

Figure 1

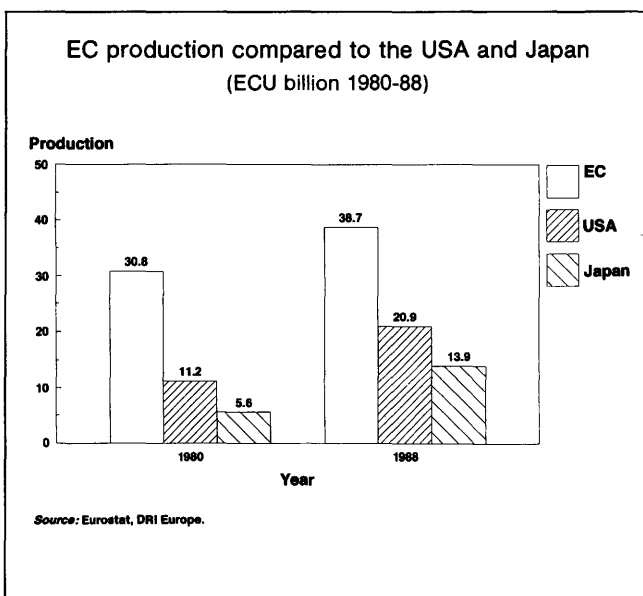
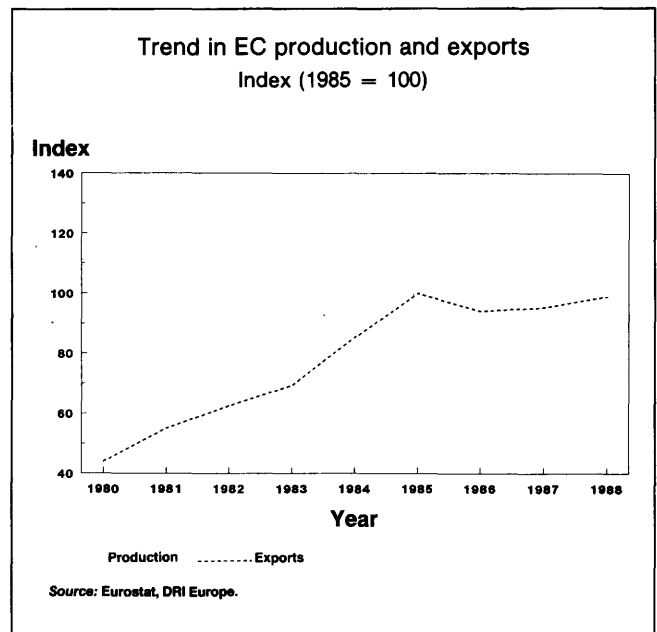


Figure 2



EC exports were ECU 4 347 million in 1988, while imports amounted to 2 204 million, leaving a positive trade balance worth ECU 2 143 million. Net exports increased between 1980 and 1985 but have been following a downward trend since; this trend is expected to continue in the future.

Description of the sector

The furniture industry is mainly covered by NACE code 467, which includes the manufacture of wooden furniture and that of office furniture, which will be analysed in more detail in the rest of this chapter. Manufacture of metal furniture, which is also included in this chapter, is covered by NACE code 316.6 (which also includes safes).

Industry structure

Medium-sized enterprises predominate in the industry as a whole. Technical and market reasons imply a high degree of specialization. However,

although the average size of companies in this sector has been increasing over the last three decades, concentration is and will probably remain low in the industry.

The office furniture industry accounts for 12.6% of total furniture production in 1988 and 8.3% of employment. It is composed of several hundred firms, mostly small and medium-sized, and it is a fast growing sector, thanks to the rising demand for systems furniture (see below).

The furniture industry as a whole is highly exposed to short-term cyclical fluctuations of demand. This applies not only to domestic furniture (for which one important factor is the demographic component of demand) but also to office furniture.

One of the important developments in recent years has been the emergence of dynamic trade concerns and purchasing cooperatives, who are expected to become increasingly internationalized. National

cooperatives will surely also become more influential in the furniture market.

Outlook

Total furniture production is expected to grow by 4% (in value) in the coming years. A somewhat higher growth is forecast for apparent consumption (4.7%), leading to a decrease of the external balance surplus. Imports are projected to grow by almost 15% annually up to 1991, while the rate of growth of exports is expected to reach 3.8% only.

For the office furniture industry, prospects are even more favourable. A growth of 10% is forecast for production in value for 1989, exports accounting for an increasing part of this growth. Interest in ergonomics and working conditions will ensure a dynamic demand for this sector.

DRI Europe

FURNITURE

(NACE 316.6 and 467)

Summary

The European furniture industry is a comparatively large manufacturing sector, employing over 700 000 people. This sector is expected to expand by an average annual growth rate of 3 to 4% between 1989 and the mid-1990s. The creation of the single market should result in concentration on the retail side, and to a lesser extent on the manufacturing side. Environmental and safety issues are gaining increasing importance for the sector.

Description of the sector

The furniture industry includes NACE 316.6, which is the manufacture of metal furniture (including safes) and NACE 467, which covers wooden furniture. This comprises domestic furniture (467.1), office and school furniture (467.2), chairs and other seats (467.3), upholstered and/or stuffed chairs and other seats (467.4), miscellaneous furniture (467.5), coffins (467.6), cane and wicker furniture (467.7), mattresses (467.8) and activities ancillary to the furniture industry (467.9). As office furniture is an important and specific chapter, it will be analysed separately.

Current situation and industry structure

Although the fabrication of furniture is one of the most ancient skills, furniture manufacturing is one of the youngest industries. At present, in most European countries, production is already industrialized. It is only in Greece, Spain and Portugal that smaller firms of a skilled/small-industrial character still predominate.

In the European furniture industry as a whole, medium-sized enterprises predominate. This applies both to the manufacture of domestic furniture in the narrow sense, and that of other furniture (fabrication of office furniture, laboratory furniture, furniture for public buildings such as airports, universities, schools, etc.).

Typical large-scale enterprises are rare in this industry, but do exist in nearly every European country. The technology of furniture production forces enterprises to specialize in certain products

(e.g. upholstered furniture, kitchens, chairs and tables, office furniture) and particularly in the field of domestic furniture in view of design activities where the manufacturer produces modern or period-style furniture. At the same time, specialization in quality articles is the rule, for market and technical reasons. The furniture trade is also specialized in satisfying particular needs (e.g. the mass furniture market for the lower and medium income groups). Different equipment is needed to build veneered furniture or furniture with plastic surfaces.

Since 1950, the average size of companies has continuously increased. As the national and international environment become more competitive, companies had to use CN/CNC (computerized numerical controlled) manufacturing installations which require a certain business size to be profitable.

A critical size is also needed to compete successfully on national and international markets. Manufacturers selling only on local markets have weak positions in comparison with manufacturers selling at a national level; furthermore, manufacturers only selling at a national level will have smaller chances in comparison with their competitors selling to an international market.

This tendency is expected to be reinforced by the advent of the single European market.

Yet, depending on products and markets, the optimal company size could lie between 50 and 300 employees.

The degree of concentration in the furniture industry remains relatively low and is expected to remain well below the average degree of concentration in other industries.

The southern European countries are, nevertheless, in the most difficult position today, since they have to modernize their production structure and undertake large investment projects when competition in the sector is already stiff.

Without undergoing a major restructuring, the furniture industries in Greece, Spain and Portugal, may not be able to sustain their positions in their own markets (and on the European market), even if the level of employees training in these countries is fairly high.



Employment

In the European furniture industry, the ratio of labour costs in total costs was rather high in the 1960s due to skilled manufacturing. This ratio largely exceeded 50%.

Since then, this ratio has fallen due to increased industrialization, and nowadays it amounts to about 35% in the most technically advanced furniture industries in Europe; in a few large factories, it even lies well below 20%, but such factories are and will remain the exception.

The considerable decrease in the number of employees during the first half of the 1980s (accompanied by a significant number of closures), with

reduction in the workforce of as much as 20% in some countries between 1980-85, was due to the depressed economic situation in Europe. As for all durable goods, demand for furniture is very sensitive to downturns in economic activity; in northern and central Europe, house-building activities also decreased significantly, with consequent negative effects on furniture sales.

Thanks to the recent moderate recovery in furniture manufacturing, the downward trend in employment has been halted; in some regions, the number of employees is even slightly increasing. At present, about 723 000 people earn their living in industrial furniture production; about 300 000 are employed in furniture-producing craft industries.

Table 1
Main indicators, 1980-91
Furniture

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption	29 891	29 433	27 547	27 141	28 674	29 547	32 399	34 904	36 522	38 234	40 050	41 982
Net exports (1)	929	1 266	1 568	1 745	2 132	2 668	2 481	2 274	2 143	1 978	1 770	1 511
Production	30 820	30 699	29 115	28 886	30 806	32 215	34 880	37 178	38 665	40 212	41 820	43 493
Employment (1 000)	771	741	704	677	661	691	662	723	N/A	N/A	N/A	N/A

(1) Excluding Greece for 1980 and 1988.

Source: UEA, Eurostat (Comext).

Despite the introduction of CNC manufacturing in many European furniture factories (particularly in the Federal Republic of Germany, in northern Italy, partly in Scandinavia and starting in France and the UK), the technical restructuring has not led to job cuts. Even in the Federal Republic of Germany where enterprises are, at present, well equipped technically, the proportion of production/staff has remained constant over the recent years, for the following reasons:

- in Europe, the share of demand for replacement goods is increasing, at the expense of first purchases. Besides, demand patterns are becoming increasingly selective. Consequently, the manufacture of 'main' products is being dropped and specific products, which are more labour-intensive, are becoming more important. This compensates for the effects of mechanization on staffing;
- working time is gradually decreasing;
- the proportion of employees indirectly working in the production process is increasing due to the extension of the market (increasing exports).

At present, this basic trend is followed by the furniture industries of all Member States, except Spain and Greece — the latter having a clearly lower per capita sales rate than the other EC countries (future development is expected to be similar in Portugal).

For these countries (similarly to the evolution in Northern and Central Europe during the 1950s), the effects of mechanization on the labour force are expected to be less important than the increase in mass demand, provided that these industries remain competitive and do not lose their share of the market.

Wood and furniture industry employees are mainly skilled workers. Since natural resources (wood, leather, wool, stone) are still being used, fundamental skilled training is and will remain important. Clearly, workers are little qualified to handle electronic manufacturing.

This partly results from a lack of training possibilities in many small and medium-sized industries; pilot projects would help to solve the problem. This applies even more to the Mediterranean EC Member States.

Consumption

Furniture represents high-value, long-life goods, the demand for which is very cyclical. It depends on income developments, household formation (and divorce rates), demographic factors, the average age of the existing stock of furniture, and fashion.

The furniture industry is extremely sensitive to short-term economic changes; it is important to note that the cyclical component of demand is more pronounced in countries with a high living standard. Because existing households are well equipped, the elasticity of demand to income and prices is particularly high. New purchases may be postponed for years.

Table 2
Labour costs in the European furniture industry, 1988

	Working time hours/week	Average pay ECU/hour
Belgium	37.5	5.9
Denmark	40.0	10.5
FR of Germany	38.5	7.0
Greece	38.5	2.3
France	39.0	4.6
Ireland	40.2	4.4
Italy	40.0	7.4
United Kingdom	39.0	4.4
Norway	40.0	8.2
Sweden	40.0	7.1
Switzerland	43.0	7.1

Source: UEA.

Although this is particularly true for domestic furniture, the other major furniture sector — office furniture — is also exposed to short-term economic changes. At present, it is benefiting from external impulses because of the conversion to modern electronics in the office sector; companies as well as public authorities tend to cut back on office equipment in times of limited funds.

Regarding the demographic component of demand, recent developments are more favourable than had been feared not so long ago. A few countries, and very small ones, still have a high birth rate, namely Ireland and Portugal. Immigration surpluses are being reduced because of restrictions introduced in immigration and asylum policies in most European countries. Nevertheless, the demographic evolution as regards the total population in the EC countries will be more favourable in the first half of the 1990s than was previously forecast.

Wealth evolution also has considerable influence on furniture sales. In fact, it depends less on the development of the population's total wealth and the proportion of cash capital than on the distribution of wealth. If wealth is distributed evenly, as for example in the Scandinavian countries, Belgium, the Federal Republic of Germany and Switzerland, its increase and consequently households' rising returns on capital, stimulate furniture sales. If wealth is

unevenly distributed, development in cash capital in a country is rather insignificant.

The most decisive factor for furniture sales is the number of households and young households in particular. Irrespective of size, each household needs basic equipment, e.g. a kitchen and a living room. In that sense, the single European market means a market of 100 million households.

Given the large proportion of young people in most European countries, the number of new households is rising fast; this trend will last until 1995, but then reverse and even start falling sharply from 2000 onwards.

The furniture industry is benefiting from the unusually long growth period within the EC, and it is likely that furniture sales will follow the general growth rate overproportionally between 1990 and 1995, as happened in the past. In 1987 and 1988, furniture production increased by approximately 3.5% each year.

Consumption reached ECU 36 522 million in 1988 and, because of the positive influence of the demographic development, real growth rates in furniture sales are expected to be about 4% on average between 1990 and 1995.

Production

It must be noted, however, that furniture production in the EC in 1989 will still be about 7% lower than the peak of 1979.

Housing construction dropped considerably within the EC in the beginning of the 1980s and a number of EC countries even recorded negative growth rates of construction in the first half of the 1980s.

The furniture industry is not expected to reach its hitherto highest production level (1979) before 1991. Like consumption, production follows a rising trend. There are, however, important differences both in quantity and quality from country to country.

Structural changes

The European furniture industry has been working on an international level for a long time, although there are still large cross-country differences. The furniture industry has enormous international experience, as indicated by the high export figures already reached by some European furniture industries such as Italy, Denmark and Belgium.

The Single European Act and the White Paper have further accelerated international efforts. Large pur-

Table 3
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Production in current prices												
EC	30 820	30 699	29 115	28 886	30 806	32 215	34 880	37 178	38 665	40 212	41 820	43 493
Index	95.7	95.3	90.4	89.7	95.6	100.0	108.3	115.4	120.0	124.8	129.8	135.0
USA (1)	11 157	14 705	16 369	19 885	25 353	26 897	22 228	20 254	20 907	23 583	24 642	N/A
Index	41.5	54.7	60.9	73.9	94.3	100.0	82.6	75.3	77.7	87.7	91.6	-37.2
Japan (1)	5 563	7 021	7 227	8 476	9 016	9 886	10 299	13 083	13 974	N/A	N/A	N/A
Index	56.3	71.0	73.1	85.7	91.2	100.0	104.2	132.3	141.4	-101.1	-101.1	-101.1
Production in constant prices												
EC	40 566	37 160	32 788	31 552	32 188	32 215	33 982	34 301	34 558	N/A	N/A	N/A
Index	125.9	115.4	101.8	97.9	99.9	100.0	105.5	106.5	107.3			
Trade (2)												
Exports extra-EC	1 934	2 418	2 742	3 039	3 745	4 388	4 131	4 188	4 347	4 513	4 685	4 863
Index	44.1	55.1	62.5	69.3	85.3	100.0	94.1	95.4	99.1	102.8	106.8	110.8
Imports extra-EC	1 005	1 152	1 173	1 294	1 614	1 720	1 650	1 914	2 204	2 535	2 915	3 352
Index	58.4	67.0	68.2	75.2	93.8	100.0	95.9	111.3	128.1	147.4	169.5	194.9
X/M	1.9	2.1	2.3	2.3	2.3	2.5	2.5	2.2	2.0	1.8	1.6	1.5
Intra-EC trade												
Index	3 186	3 299	3 508	3 751	3 972	4 384	5 212	5 871	6 690	7 560	8 542	9 653
	72.7	75.3	80.0	85.6	90.6	100.0	118.9	133.9	152.6	172.4	194.8	220.2

(1) Census of Manufactures and Eurostat estimates.

(2) Excluding Greece for 1980 and 1988.

Source: UEA, Eurostat (Comext).

chasers, i.e. so-called trade concerns and purchasing cooperatives, are able to react more quickly and more successfully. This leads to a considerable increase in cooperation as well as in concentration in purchasing and trade.

It is much more difficult to establish cooperatives in the industry itself than in the furniture trade.

A decisive factor is possibly the fact that furniture trade companies within a cooperative do not usually compete with each other, because their activities are concentrated in local markets.

Successful efforts to cooperate within the furniture industry are first and foremost to be found in Denmark, where companies have grouped while keeping a certain degree of independence, and in Italy, where medium-sized producers cooperate to a large extent without formal organizational structures. In the export area as well, Scandinavians often cooperate.

Large trading companies are usually department stores, mail order companies and companies divided into branches. With one major exception (IKEA), there are hardly any important branch companies on an international level. Furthermore, among non-specialists, the Metro group is highly internationalized.

It is difficult to forecast whether the single European market will lead to strong internationalization of branch companies in the furniture sector.

Within most sectors, however, multinational retail companies as well as mail order firms are internationalizing to a large extent, first and foremost through takeovers of other purchasing chains.

Internationalization of department stores is equally very likely. This internationalization will play a major role in the furniture market in the single European market in the second half of the 1990s at the latest.

There is a North-South division as regards the stage of development of purchasing cooperatives. Cooperatives in the Scandinavian countries are well developed, often based on franchising. In the Federal Republic of Germany, the degree of cooperation is probably the highest within the European furniture sector. It is also considerable in the Netherlands, but very low in Belgium. In the UK, franchising is much more important than cooperatives. In France, the number of cooperatives is more important than their market influence. Even less important for the market are such systems in Por-

tugal, Spain and Italy. They play nearly no role at all in Greece.

In the furniture sector, one important cooperative (European Furniture Union) is already active on an international level. But otherwise, existing cooperatives are either limited to national States or, if they go beyond national frontiers, within linguistic frontiers.

A higher degree of internationalization can be reached by an amalgamation of national associations, by cooperation between national associations, or by recruiting new members abroad, which would then most likely establish national subgroups.

However, linguistic barriers still create problems, which even affect the functioning of associations within multilingual countries.

Other factors may create difficulty: differences in the structure of the target group, assortment policies, advertising, types of companies.

Thanks to the well-known dynamics of purchasing cooperatives, it should be possible to solve such difficulties if a Euro-management is established. However, national market philosophies can only hardly be exported. European associations systems can only be successful if they manage to carefully analyse national specificities and transnational common denominators in order to integrate them into the cooperatives' policies.

But, on the whole, it can be forecast that, in the first phase, national cooperatives will become more influential in the furniture market. In the medium term, internationalization will probably progress faster. Already now, an increasing internationalization of purchasing is taking place.

In conclusion, this means that in furniture purchasing, increasing internationalization runs parallel with increasing concentration. The concentration process must also include the furniture industry. Only a few industrial companies will be large enough to be able to counterbalance the new company structures in trade and cooperatives.

Numerous industrial companies will expand and/or become better performers thanks to a tightening or profiling of their selection policy.

Selective sales systems including various kinds of franchising will become increasingly important. It is, however, a weakness that the number of brands in the European furniture industry as a whole is too low.

Regulatory environment

In 1988, the European furniture industry has been confronted with the British Furniture and Furnishing (Fire Safety) Regulation containing obligatory safety standards for furniture. This measure is an important barrier to trade within the single market. In order to eliminate this barrier and enhance consumer safety all over Europe, the European furniture industry asked the EC Commission for the elaboration of a European directive regulating this problem. The EC is currently studying the problem and is expected to announce regulation measures in the near future.

Indirectly connected to this, the furniture industry has asked the CEN/Cenelec for the creation of a technical committee for furniture responsible for the necessary standardization within the furniture industry in the EC and EFTA countries. This request was supported by the EC Commission and recently, the creation of CEN TC 207 Furniture was accepted

by the Technical Bureau of the CEN. This is a major step towards the completion of a single European furniture market.

Environmental protection

The destruction of tropical forests is reaching an alarming level. Tropical hardwoods only represent a very minor raw material for the furniture industry in Europe. In many countries, the use of tropical hardwoods for the manufacture of furniture is almost non-existent. However, the furniture industry opposes a boycott of tropical hardwoods as a possible solution to this problem. There is no clear connection between the export of tropical wood and the shrinkage of the tropical rainforests.

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UEA

OFFICE FURNITURE

(NACE 467.2)

Summary

The European office furniture industry is one of the fastest growing industries in the European Community.

The industry covers several hundreds of companies, mostly medium-sized and small, employing over 50 000 people. The estimated turnover of the European office furniture industry in 1987 was ECU 4 867 million. Total exports amounted to ECU 996.3 million in 1988, and exports towards non-EC countries accounted for approximately 43% of total exports. EC imports of office furniture amounted to ECU 574 million in 1988.

Description of the sector

The office furniture industry is one of the fastest growing industries in Europe. The reasons for this growth can be found in growing white collar employment, the continuing expansion of office automation and the strong growth of the European economy as a whole.

The increasing computerization of office work has led to a considerable rise in productivity in the office. In order to accommodate the computer and to improve productivity further, the demand for systems furniture has risen considerably. Since 1982/83 the number of new programmes of office furniture that have come onto the market has increased steadily. This systems furniture was created with attention to various points, like utility, design, ergonomics, safety and standardization. Most manufacturers have systems furniture in their programme.

The price of systems furniture is only a fraction of the cost of the work area, and a fraction of the cost

of office staff. Calculations have shown that the ECU 2 500 investment required for a complete work station will be repaid in a few years, while the station itself will last up to 10 years.

Geographic features

Of the total production (in value) of the office furniture industry, 80% is concentrated in four countries, the Federal Republic of Germany, France, Italy and the United Kingdom. If Spain is included, over 86% of production is concentrated in five countries.

Employment in the industry is slightly less concentrated, the four major countries employing about 73 per cent of the total labour force.

Production

The total production of the European office furniture manufacturers amounted to ECU 4.867 million.

The production of office furniture in the EC increased sharply during the period 1980-88 by a total of 121%. Most European countries saw a rise in the value of production of this order of magnitude with the exception of Belgium and France where production grew at a much lower rate.

The production of office furniture is subdivided into two major types; seating, and other types of furniture like desks, tables, cupboards and cabinets. In 1988 seating accounted for roughly one-quarter of total sales, compared with a share of only 14% in 1980; this indicates an increasing importance of seating, especially in value terms.

Table 1
Main indicators, 1980-88
Office furniture industry

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	N/A	N/A	N/A	N/A	N/A	3 022.1	3 465.9	3 969.2	4 664.5
Net exports	N/A	N/A	N/A	N/A	N/A	256.2	247.2	213.4	202.4
Production ⁽¹⁾	2 072.7	2 135.8	2 341.8	2 491.6	2 820.2	3 278.3	3 713.1	4 182.6	4 866.9
Employment (1 000) ⁽¹⁾	53.7	53.2	51.9	53.8	53.2	54.9	56.5	59.9	59.0

⁽¹⁾ 1980-88 excluding Luxembourg; 1980-86 excluding Ireland, Greece; 1980-84 excluding Denmark.

Source: FEMB, Eurostat (Comext).

Table 2
Production and employment by country, 1988

	Production (million ECU)	Employment (1 000)
EC (1)	4 866.9	59.0
Belgium	135.9	1.7
Denmark (2)	192.6	2.8
FR of Germany	1 535.4	15.0
Greece (2)	64.0	.9
Spain	316.3	4.7
France	630.0	9.5
Ireland (2)	34.9	.5
Italy	954.5	9.8
Netherlands	210.8	2.2
Portugal	40.5	2.4
United Kingdom	752.0	9.5

(1) Data for Luxembourg are not available.

(2) Production estimated for Greece and Ireland; employment estimated for Denmark and Greece.

Source: FEMB.

Another distinction that can be made in the office furniture industry is the distinction between wooden and steel office furniture. The market share of wooden office furniture in the total office furniture market is estimated to be about 53% in 1988, for the EC as a whole. This share has been rising only slightly from 47% in 1980. There are however considerable differences between the various countries. For instance, the market share of wood in the Federal Republic of Germany is estimated to be 74%, whereas the market share of wood in the Netherlands is estimated to be only 15%. The distinction between wooden and steel furniture is becoming less significant in the market of office furniture.

Table 3
Productivity by country, 1988

	EC = 100
Belgium	97
Denmark	84
FR of Germany	124
Greece	86
Spain	82
France	80
Ireland	85
Italy	118
Netherlands	116
Portugal	35
United Kingdom	96

Source: FEMB.

Employment

As production in the industry increased considerably, it is not surprising to find that employment also increased. Employment in the office furniture

industry grew by 9.8 % in the period 1980-88. Total employment is estimated at 59 000 persons in 1988.

Table 4
Imports and exports (1) by country, 1988

(million ECU)	Imports		Exports	
	Intra-EC	Extra-EC	Intra-EC	Extra-EC
Belgium, Luxembourg	76.0	4.6	17.7	1.1
Denmark	8.7	9.9	32.4	40.9
FR of Germany	50.3	27.4	197.5	113.9
Greece	N/A	N/A	N/A	N/A
Spain	8.9	.3	18.9	13.2
France	116.6	24.7	60.2	34.6
Ireland	13.0	.4	3.7	.2
Italy	16.9	4.7	122.1	92.7
Netherlands	95.5	8.6	40.7	4.2
Portugal	4.4	.4	2.4	1.6
United Kingdom	122.7	44.1	47.9	25.1
EC	513.0	125.1	543.5	327.5

(1) Imports and exports are defined as: CN 940310, 940330, 94013010.

Source: Eurostat (Comext).

Productivity in the European office furniture industry improved by an average 7.5% per year between 1980 and 1988. Again, however, there are large cross-country differences, as shown in Table 3.

Table 5
External trade (1)

(million ECU)	1985	1986	1987	1988
Exports extra-EC	333.9	324.5	307.1	327.5
Index (1)	100.0	97.2	92.0	98.0
Imports extra-EC	77.7	77.4	93.7	125.1
Index (1)	100.0	99.6	120.6	161.0
X/M	4.3	4.2	3.3	2.6
Intra-EC trade	263.4	328.9	393.2	513.0
Index (1)	100.0	124.9	149.3	194.8

(1) Imports and exports are defined as: CN 940310, 940330, 94013010.

Source: Eurostat (Comext).

Trade

Total extra-EC exports of the office furniture industry amounted to some ECU 327.5 million in 1988. Exports are also concentrated in a few countries (Germany and Italy especially, followed by France, the United Kingdom and Denmark). In general, the EC office furniture industry does not depend heavily on exports. Extra-EC imports amounted to ECU 125.1 million in 1988.

Total extra-EC imports reached ECU 125.1 million. These grew by 60% between 1985 and 1988. Intra-EC

imports are much more important as they amounted in 1988 to ECU 513 million.

Outlook

The outlook for the office furniture industry in 1989 remains favourable. The continuing investment in office automation, the high level of investment in office buildings and the growth in the service sector will push demand for office furniture. A growth of 10% in value is anticipated in 1989. Exports are expected to grow by a similar amount during 1989, underlining the growing interest in foreign markets, and specialization in the branch.

While it is difficult to anticipate developments in the long run, there is no doubt that attention focused on the office work station during the past few years will continue to increase.

It is also certain that the ergonomic situation and the working conditions in the office will make greater demands than ever on office designers, so that much of the office furniture currently in use will eventually be considered obsolete.

All manufacturers of office furniture operate more or less internationally within the EC markets, and all will attempt to strengthen their positions.

The office furniture sector will continue to be sensitive to the general economic situation, although perhaps to a lesser extent than in the past. The saying 'If things are going well in the car sector, the furniture industry is also doing all right', is in fact not unfounded.

European standards will also have an influence, but manufacturers are flexible enough to be able to adapt quickly and efficiently.

There are presently no clear consequences to be seen in the many takeovers, mergers and joint ventures which have been initiated all over the EC.

The service sector will continue to grow. In the Federal Republic of Germany there are 11 million people working at a desk; this is one desk, one desk chair and one storage cabinet for every five inhabitants of the country. Many European countries have not yet reached this figure. It is they that provide the great challenge to this dynamic industry.

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PULP, PAPER, PRINTING AND PUBLISHING INDUSTRY

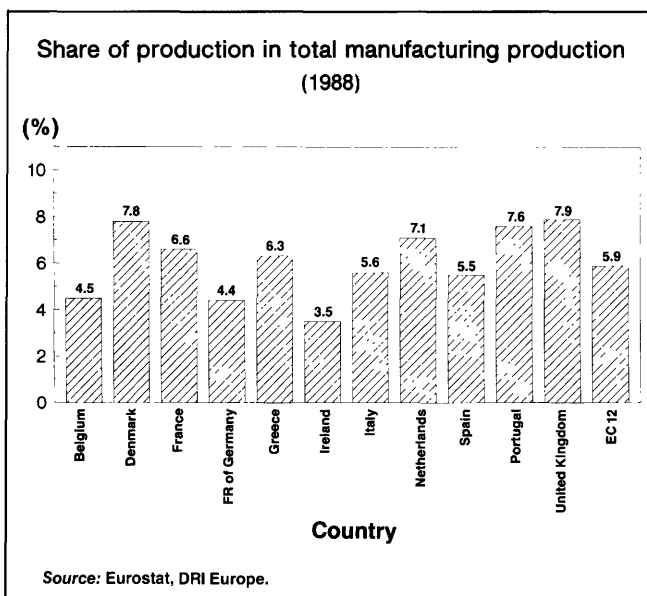
(NACE 47)

The economic importance of the industry in the EC economy

With a production of ECU 125.9 billion, this industry represents 5.9% of the EC's total manufacturing production. Since 1982, its production has experienced relatively high growth rates, both in volume and in value. A 9% growth was recorded in 1988 (5.6% in volume) and a further increase of 10.6% is expected for 1989 (4% in volume).

The share of the pulp, paper, printing and publishing industry in total manufacturing production in each EC Member State is shown in Figure 1.

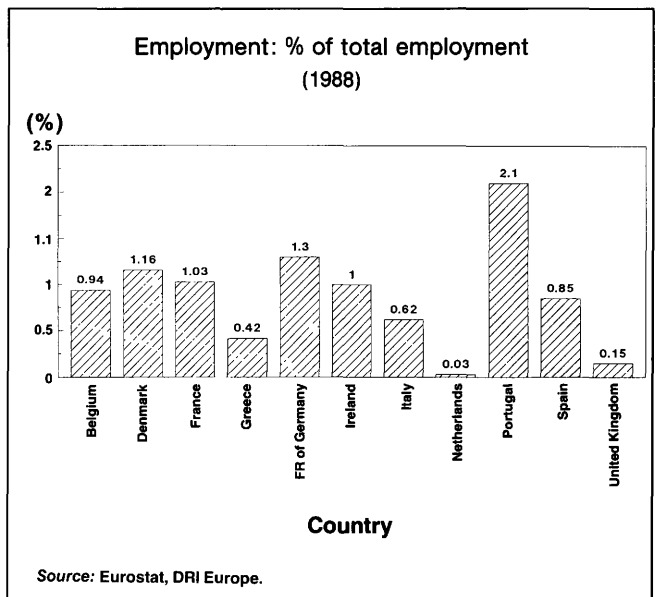
Figure 1



With 1 315 339 employees, this industry accounts for approximately 1% of total EC employment. The number of employees has followed a decreasing trend throughout the 1980s. Starting from an employment level of 1.56 million in 1980, employ-

ment in this sector fell by 1.8% per year on average between 1980 and 1988.

Figure 2



The European paper and board market is the second largest in the world. Per capita consumption of paper and board is however slightly lower in the EC than in North America, Scandinavia or Japan.

Since 1987, the boom experienced by the paper, printing and publishing sector is mainly due to fast growing demand from the industry itself. Profit margins have however been shrinking recently, since the rate of growth of materials prices, the cost of which represents approximately 60% of turnover, is too high to be fully passed on to finished products' prices. Exchange rate fluctuations have also played an important role in the competitiveness of the industry, and accentuated the pressure on margins. Since the beginning of 1988, capacity utilization rates are approaching 95%, delivery delays are increasing and bottlenecks are beginning to form. As

a result, imports have recently increased, and this trend is expected to hasten in the coming years.

Description of the sector

This sector is covered by NACE code 47. This includes the manufacture of pulp, paper and board (NACE 471), the processing of paper and board (NACE 472), printing and allied industries (NACE 473) and publishing (NACE 474).

The first activity of the industry is the manufacture of pulp, paper and paperboard from straw pulp. Straw has its main customers in the pulp, paper and board converting industry, as well as in the printing sector, the packaging sector (mainly food packaging) and to a lesser extent the construction industry (wallpaper for example) and households.

Production of pulp, paper and board represents 20.3% of the sector's production and 13% of total employment in 1988. This subsector has a negative balance of trade of almost ECU 12.5 billion, as 37% of its apparent consumption is met by imports.

The processing of paper and board accounts for 28.4% of total production, and employs 365 000 persons which represents 27.7% of total employment. Its external trade balance is positive, with a surplus of about ECU 420 million in 1988. As explained in the monographs that follow, there are considerable national and regional differences within the EC.

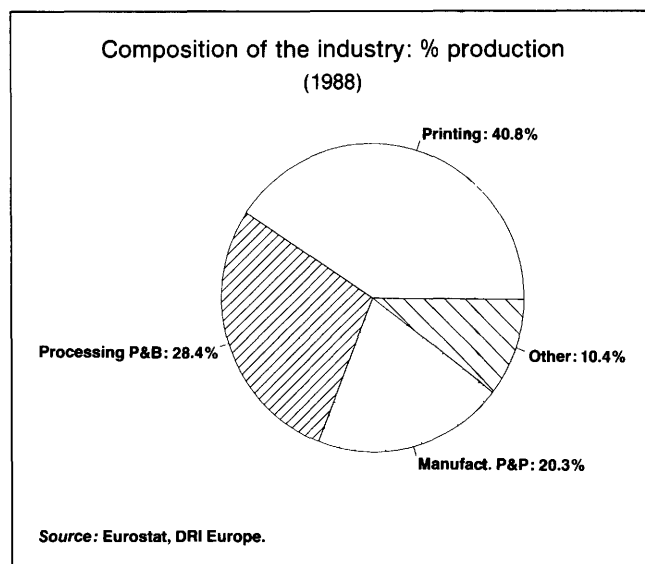
The printing industry, with more than 60 000 establishments of all sizes and 670 000 employees, is the largest subsector of this chapter. It accounts for 40.8% of total production and 50.9% of total employment in 1988. It is a highly technological industry, where specialization and investment play an increasing role.

The last subsector is the publishing of books, pictures, music, newspapers and periodicals. It represents 10.4% of total production. Only the publishing of daily newspapers and of periodicals will be analysed separately below.

Industry structure

Originally, the pulp, paper and board industry mainly consisted of small, family-run companies. Over the last decade however, the industry has undergone an important restructuring, at a much faster pace in the EC and Scandinavia than in North America or Japan.

Figure 3



During the last 18 months, this sector has experienced a rapid wave of acquisitions, joint ventures and mergers which will probably continue within the near future. North American, European (mostly British, French, Spanish and to a lesser extent German firms) and especially Nordic companies are trying to build strong positions on a market which is becoming more and more competitive and homogenized.

Scandinavian companies, whose number has been significantly reduced recently, are particularly aggressive. An important part of their output is exported to EC countries, so that they believe that it is essential for them to own some manufacturing facilities in the EC market before 1992.

It is mainly the manufacture of paper and board which is undergoing restructuring, with the consolidation of the sector into large corporate and production units. The paper and board converting industry still remains mainly composed of small and medium-sized companies. This enables them to be more flexible and adjust quickly to changes in market conditions. Companies of this industry are usually located near food processing firms, since most of their output is used for food packaging and is difficult and costly to transport over long distances.

Here are some examples of the numerous acquisitions, mergers and joint ventures in the industry: The Federal Republic of Germany's largest and France's second largest paper makers, Feldmuehle and Beghin Say reached an agreement to each take a 50% stake in Beghin Say's new paperworks in northern France; Sweden's second largest paper

group SCA bought Italian Italcarta; British DRG was sold to Swedish Korsnas; Aussedat-Rey, the French paper maker, was taken over by American International Paper, which is the world's largest producer of pulp and paper products.

In the printing sector, the pace of mergers and acquisitions has been even more rapid, and the market is now mostly led by large conglomerates: The Australian-American media baron Murdoch acquired for example a stake in Pearson (UK), in Reed International (UK), and in the Scottish book publisher William Collins, while Pearson exchanged shares with Dutch publisher Elsevier; Hachette (France) bought Spain's fifth largest publisher Salvat; Poligrafieri Editoriale (Italy) acquired a stake in German Springer Verlag and vice versa, Robert Maxwell bought Dun & Bradstreet's official Airlines Guide and won the legal battle in the bid for MacMillan group, etc.

With the exception of the recent creation of the world's largest media and entertainment group, with the merger in the USA of *Time* and Warner (which will have global sales of about ECU 2.5 billion in the publishing industry), American companies seem to have lost initiatives in a market where international groups such as Bertelsmann (FR of Germany), Hachette (France), Maxwell (UK) and Murdoch (Australia/USA) are dominating.

Risks and opportunities

The main impediment to trade between EC Member States in this sector is probably administrative barriers (transport regulations, delays and costs at frontiers), distribution costs and differences in VAT rates. In this context, the creation of a single European market by 1992 is likely to create an even more competitive climate.

Economies of scale, continued improvements in product quality and services, well organized and established distribution networks, access to new technological development (especially in the printing sector) will be key issues in the coming years. There will, however, still be a place for smaller

specialized paper companies oriented toward specific niches of the market.

Demand in advertising and commercial printing media (such as catalogue or direct mail) has strongly increased over the last 10 years in the EC as well as in the USA. This will probably sustain growth for companies in this sector up to 1992.

Large investment programmes were undertaken last year and more are expected for 1990. These are mostly expansion investments, designed to raise the level of production capacity, to react to the high utilization ratios that were reached in the last few years. One of the most massive pulp investments due to come in the early 1990s is for example a project (led by Shell in partnership with Scott Paper) to plant eucalyptus seedlings in Chile; this latter country has recently emerged as a potential major supplier of forestry products.

Outlook

The four largest EC countries account for 80% of the total production of the industry, and, within these major four countries, the Federal Republic of Germany's production represents 25.8%, France's 28.8%, the United Kingdom's 25.4% and Italy's 19.9%. Between 1989 and 1995, a 2.9% growth (in volume) is expected. The United Kingdom and the Federal Republic of Germany should enjoy slightly higher growth (+3.7%), while in France, growth is forecast to reach 2.8% a year on average, and only 1.8% in Italy.

The outlook for this sector thus remains fair, thanks both to the large investment projects undertaken over the last years, but also to the recent boom of demand for paper and board products. Margins will however remain highly sensitive to exchange rate fluctuations, and so will this sector's external competitiveness.

An expansion of inter-industry trade and trade between EC Member States is also expected, leading to a faster rate of growth of both imports and exports than that of production.

DRI Europe

PULP, PAPER AND BOARD MANUFACTURE

(NACE 471)

Summary

The total value of paper and paperboard production in the EC in 1988 was about ECU 23.7 billion, 10.8% more than in 1987. This impressive performance reflects not only a new record volume of 35 million tonnes, but stronger pricing as well. This is particularly true of market pulp output: value grew almost 11% to ECU 1.7 billion on a volume increase of about 2.5%. While demand for most of the industry's products has remained satisfactory through the first half of 1989, growth rates have slowed from the 1988 levels. Profit margins in some sectors are under pressure due to both the higher cost of market pulp and increased competition.

Description of the sector

According to the NACE, the pulp, paper and carton-board industry belongs to group 471 which is divided in three sub-groups: manufacture of pulp other than macerated straw pulp (NACE 471.1), manufacture of paper and board from straw (including production of straw pulp)(NACE 471.2) and manufacture of paper and board (NACE 471.3). This last sub-group includes manufacture of printing and writing paper, manufacture of kraft paper and board and wrapping paper, manufacture of thin paper and manufacture of cartonboard.

From the point of view of their utilization, papers and boards are generally considered to fulfil three broad functions:

- Communications — the press, education and culture, publicity, office and administration. These grades are called graphic papers.
- Packaging and protection — for handling, storage, transport and presentation of products for sale. These are packaging papers and boards.
- Other functions or special applications — hygienic and sanitary, fiduciary (money, cheques, securities); construction (wallpaper); technical (filters, insulation); cigarettes, etc.

Current situation

The EC's pulp and paper industry has enjoyed steady and strong growth during the 1980s, above the rate of Community GDP. Strength in publishing, information technology, food distribution and consumer marketing continue to support healthy market developments for the industry.

The vigorous pace of capital investment and active restructuring was maintained during 1988, allowing the industry to strengthen its international competitive position. The continued expansion of exports to non-EC countries is a clear proof of this situation.

Since 1984, the EC industry's production growth rate (2.9%/year) has equalled that of the USA (2.9%), but has been substantially slower than that of Japan (5.3%) and Canada (4.1%).

The combined production value of pulp, paper and board in the EC is estimated for 1988 at ECU 25.5 billion.

The combined turnover of the paper industry together with the related sectors of paper converting and printing represent 4.6% of the total turnover of manufacturing industries.

The total world production of paper and board in 1988 was about 227 million tonnes.

The EC, with a production of 35 million tonnes and total consumption of 47.2 million tonnes of paper and board in 1988, represented 15.4% of world production, and 20.8% of world consumption. It is thus the world's second largest producer and consumer, after the USA. The respective percentages are virtually unchanged from the previous year.

Total international trade in paper and board (excluding intra-EC trade) is estimated at around 43 million tonnes. The Community's 14.8 million tonnes of paper and board imports accounted for over 34% of the world's imports, while the EC's exports of 2.6 million tonnes account for 6% of total world trade.

For market pulp, total international trade (excluding intra- EC trade) is around 22 million tonnes. The EC



is by far the world's largest single market: the 8.5 million tonnes imported in 1988 was almost 39% of the world total.

The deficit in the external balance of trade for the entire pulp, paper and board sector grew again last year, both in volume and value. The value deficit grew far more sharply than the volume, due to higher international price levels, particularly for market pulp.

External trade deficit

	1987		1988	
	million tonnes	billion ECU	million tonnes	billion ECU
Paper and board	11.33	6.87	12.16	7.79
Market pulp	7.92	4.12	8.04	4.68
Total deficit	19.25	10.99	20.20	12.47

Source: CEPAC.

As indicated, the combined tonnage deficit increased by about just over 1 million tonnes or 5.5% to over 20 million tonnes in 1988. In terms of value, the deficit increased by 13% to ECU 12.4 billion, virtually half the combined production value of the entire sector.

The paper and board sector

Paper and board production has grown steadily since the recession of 1981-82, and is projected to continue to advance into the 1990s at an average rate of around 2 to 3% per annum.

The EC's 1988 production of 35 million tonnes is only about half that of the United States (69.8 million tonnes), but is 50% greater than Japan's output (24 million tonnes). The EC thus remains the world's second largest producer of paper and board.

Over 93% of Community production, or 32.4 million tonnes, was sold on the internal EC markets. This volume represents a domestic market share of 68.6% of EC consumption. The domestic market share of the EC industry has declined slowly, but steadily from 72.8% in 1980, despite the fact that exports have grown at a significantly faster rate than imports.

Exports rose again to a new record 2.6 million tonnes. These exports now account for 7.6% of total production. The export rate has grown steadily in recent years and should continue to advance as more production capacity comes into operation within the EC.

Table 1
Main indicators, 1980-88
Pulp, paper and board

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Apparent consumption	21 240	23 755	24 174	25 087	30 636	30 924	31 205	33 994	38 110
Net exports	-6 343	-7 494	-7 579	-7 925	-9 742	-9 438	-9 523	-10 992	-12 472
Production	14 897	16 261	16 595	17 162	20 894	21 486	21 682	23 002	25 638
Employment (1 000)	225.9	212.1	203.6	192.6	186.3	179.0	178.9	175.0	173.0

Source: CEPAC, Eurostat (Comext).

Imports of paper and board are predominantly from the Nordic countries and North America, and are concentrated in lower value-added bulk or 'commodity' grades of paper and board.

The import penetration rate is highest for kraftliner (77.2%) and newsprint (60.9%). These two 'commodity' grade sectors alone account for almost 5.7 million tonnes or 41.5% of all EC imports.

Most EC exports are in high value-added grades such as coated graphic papers (a 12.8% export rate in 1987) and folding boxboard (11.4% export rate).

The market pulp sector

Total EC production of wood-pulp for papermaking was up sharply by 10% to 9.4 million tonnes. Included here is pulp directly integrated to paper and board production and 'market pulp' (pulp dried and sold to third parties). In contrast to the previous

year, the main growth in 1988 was in integrated pulp, as market pulp output rose by only 2.5% to 3.45 million tonnes.

Net imports of market pulp rose by only 1.6% to just over 8 million tonnes, due largely to the sharp rise in market pulp prices during the year. The effect, however, of these higher prices was a strong increase in the net external deficit in market pulp (+13% to ECU 4.65 billion).

The small rise in pulp imports, coupled with the growth of EC pulp production (mostly in mechanical pulps), raised the EC's self-sufficiency rate slightly to 26.2%. This continues the gradual improvement in self-sufficiency during this decade.

Total consumption of market pulp (all used to make paper and board or hygienic products) rose by only 1.9% to 11.5 million tonnes, well below the rate of paper and board production growth.

Table 2
Production, external trade and investment
Paper and board

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production									
Value	14 192	15 350	15 680	16 190	19 596	20 184	20 406	21 460	23 769
Index	70.3	76.1	77.7	80.2	97.1	100.0	101.1	106.3	117.8
Quantity (1 000 tonnes)	27 759	27 534	26 885	27 637	30 039	29 771	30 994	32 799	35 011
Index	93.2	92.5	90.3	92.8	100.9	100.0	104.1	110.2	117.6
Exports extra-EC									
Value	1 144	1 263	1 277	1 442	2 086	2 279	1 998	2 282	2 652
Index	50.2	55.4	56.0	63.3	91.5	100.0	87.7	100.1	116.4
Quantity (1 000 tonnes)	1 474	1 401	1 318	1 497	2 046	2 123	2 002	2 326	2 645
Index	69.4	66.0	62.1	70.5	96.4	100.0	94.3	109.6	124.6
Imports extra-EC									
Value	4 796	5 403	5 689	6 220	7 479	7 854	8 020	9 150	10 446
Index	61.1	68.8	72.4	79.2	95.2	100.0	102.1	116.5	133.0
Quantity (1 000 tonnes)	9 842	10 022	10 040	10 778	11 696	11 638	12 672	13 652	14 809
Index	84.6	86.1	86.3	92.6	100.5	100.0	108.9	117.3	127.2
X/M	.24	.23	.22	.23	.28	.29	.25	.25	.25
Gross investment	1 078	927	796	777	1 150	1 589	1 610	1 840	N/A

Source: CEPAC, Eurostat (Comext).

Table 3
Production, external trade and investment
Market pulp

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production									
Value	705	911	915	972	1 298	1 302	1 276	1 542	1 869
Index	54.1	70.0	70.3	74.7	99.7	100.0	98.0	118.4	143.5
Quantity (1 000 tonnes)	2 190	2 240	2 241	2 528	2 535	2 917	3 124	3 363	3 458
Index	75.1	76.8	76.8	86.7	86.9	100.0	107.1	115.3	118.5
Exports extra-EC									
Value	78	112	101	119	172	192	156	209	243
Index	40.6	58.3	52.6	62.0	89.6	100.0	81.3	108.9	126.6
Quantity (1 000 tonnes)	237	275	250	336	323	472	379	447	446
Index	50.2	58.3	53.0	71.2	68.4	100.0	80.3	94.7	94.5
Imports extra-EC									
Value	2 769	3 466	3 268	3 266	4 521	4 055	3 657	4 333	4 921
Index	68.3	85.5	80.6	80.5	111.5	100.0	90.2	106.9	121.4
Quantity (1 000 tonnes)	7 776	7 522	6 874	7 366	7 675	7 701	8 034	8 363	8 486
Index	101.0	97.7	89.3	95.6	99.7	100.0	104.3	108.6	110.2
X/M	.03	.03	.03	.04	.04	.05	.04	.05	.05
Gross investment	118	104	92	106	82	93	85	85	N/A

Source: CEPAC, Eurostat (Comext).

Total consumption of all pulp (integrated and market) was 16.83 million tonnes, up 3.4%, also less than paper and board production increase.

The difference was made up by strong growth in wastepaper consumption, up 8.2% to another new record of 16.8 million tonnes in 1988. This recycled fibre accounts for over 42% of all papermaking raw materials, and over 49% of fibre raw material used by the industry. This is one of the highest levels in the world, and represents a further increase from the previous year.

Employment

Total employment in paper and board mills declined slightly (-1.1%) in 1988 to about 173 000. Another 11 100 people are employed in market pulp mills in the Community. Both figures are expected to stabilize at these levels for the near term. There is even a rising trend in employment in the sector in several EC Member States, where the industry is growing strongly (the Federal Republic of Germany, Italy, the Netherlands and Portugal).

Total employment has dropped by 23% since 1980, while output has climbed almost 25%. Thus the industry's productivity per employee has risen by 50% since 1980: from 123 tonnes per year to 185 tonnes in 1987.

Table 4
Hourly labour costs, 1987

	(ECU)
Belgium	17.0
FR of Germany	15.3
France	10.1
Italy	15.1
Netherlands	13.5

Source: CEPAC.

Industry structure

Average unit size and productivity of paper mills have risen dramatically during the 1980s. The closure of smaller, less efficient mills has been coupled with the steady growth of large-scale production facilities.

The number of EC paper mills defined as large (over 100 000 tonnes/year production) increased by 17% in 1988 to 1995. This number represents only 10% of the total operating units, yet these mills account for an estimated 40 to 45% of total Community production. At the same time, the number of small mills in the Community (under 5 000 tonnes/year) declined by 8% to 253.

There were about 820 companies active in the industry last year, operating a total of 1 019 pulp, paper or board mills.

The ongoing consolidation into larger corporate and production units has a major impact on the industry's ability to develop and apply new technology. This includes not only production processes, but the increasingly sophisticated and costly technology involved in environmental protection.

It is expected that the recent EC regulations regarding mergers will enable further, rational consolidation of the paper industry on an EC-wide scale. Continued consolidation is necessary to maintain a strong, internationally competitive industry.

Table 5
Number of companies and mills in the EC

	Paper and board		market pulp	
	No of companies	No of mills	No of companies	No of mills
1980	961	1 220	23	29
1981	932	1 179	22	28
1982	909	1 158	22	28
1983	871	1 098	22	28
1984	848	1 068	23	29
1985	831	1 037	23	29
1986	818	1 014	23	29
1987	793	990	35	46
1988	782	975	33	44

Source: CEPAC.

Trade

The average value of EC paper and board exports rose at 4.5% to ECU 995 per tonne last year; the average value of imports, however, rose at about 7% to ECU 701 per tonne.

Although extra-Community paper and board exports have grown strongly throughout the decade (at a faster pace than imports), the EC remains a large and growing net importer. The trade deficit in paper and board is of the order of 12.1 million tonnes, valued at ECU 7.8 billion (up 12.9% from 1987).

Dependence on imports of market pulp (net imports of 8.04 million tonnes or a 74% import rate) constitutes one of the industry's principal weaknesses, as many mills are either non-integrated or only partly integrated to pulp. Trade in market pulp resulted in a further net external deficit of about ECU 4.65 billion in 1988.

The total external trade deficit for the industry thus reached ECU 12.4 billion in 1988, a 13% increase from the previous year.

While the dependence on imported market pulp is partially compensated by the excellent availability of wastepaper, it is clear that efforts must be intensified within the EC to improve collection and utilization of wastepaper.

Further, the EC has reasonable climatic conditions and forest resources for improving wood supply and thus the potential for increasing pulp production. The industry encourages both better utilization of existing forest resources and the creation of new resources.

Consumption and production

The EC's total apparent consumption of paper and board increased by almost 7% last year to a record 47.2 million tonnes. This level is second in the world after the USA (around 70 million tonnes). Since 1985, Community consumption has grown by 20%.

Paper and board production followed closely with an increase of 6.7% to another record high of 35 million tonnes. This was the third straight year of record production.

Table 6
Production by country, 1988

(million ECU)	Paper and board	Market pulp	Total
EC	23 769	1 869	25 638
Belgium, Luxembourg	1 220	137	1 357
Denmark	234	50	284
FR of Germany	7 027	76	7 103
Greece	251	0	251
Spain	2 181	248	2 429
France	4 317	498	4 815
Ireland	20	0	20
Italy	3 953	125	4 078
The Netherlands	1 544	0	1 544
Portugal	442	735	1 177
United Kingdom	2 580	0	2 580

Source: CEPAC.

Performance through the first quarter of 1989 indicates a definite slowdown of this strong growth. First-quarter 1989 production was 3.7% above 1988 at slightly over 9 million tonnes. Since then, some markets have slowed further. For 1989 it may be expected that consumption and production of paper and board will advance by around 1.5 to 2%, to about 35.6 million and 47.8 million tonnes, respectively.

EC trade between Member States in paper and board increased by over 12% to 8.5 million tonnes.

This follows an 11% rise in 1987, and means that almost 25% of all paper and board produced within the Community is traded to another EC partner.

Imports of paper and board rose 8.4% to 14.8 million tonnes. The import penetration rate thus continued its upward trend, exceeding 31% for the first time. It has increased every year since 1980, when it was 27.2%.

Geographical features

There are significant differences among the Community Member States in the structure of production and markets.

In wood resources, for example, Italy is disadvantaged, and the United Kingdom has just begun to reduce its heavy deficit.

Production of various grades of pulp and paper is also unevenly distributed. Market pulp production is concentrated in Portugal, Spain, France and Belgium. Newsprint is made mostly in the Federal Republic of Germany, the United Kingdom, France and the Netherlands; coated graphic papers in the Federal Republic of Germany, France and Italy; kraftliner mostly in France; uncoated graphic papers in the Federal Republic of Germany, the United Kingdom, Italy and Spain; to give but a few examples.

The dependence on imports of paper and board varies greatly among Member States. Import penetration rates (in % of consumption) for 1988 were: Denmark 69.5, Ireland 53.3, UK 46.9, the Netherlands 38.9, Belgium 33.0, the Federal Republic of Germany 31.3, Greece 29.0, France 22.2, Italy 20.6, Spain 14.1 and Portugal 13.7.

In exporting paper and board, Belgium leads with an export rate (in % of production) of 15.1%, followed by Denmark at 13.3%, the Netherlands at 10.1% and Germany at 10%. Greece, Ireland, Portugal, Spain and the United Kingdom are all under 5%.

Major differences exist as well, for many reasons, in the average size of mills and machines. The most significant increases were in Belgium and the Netherlands, due to the start-up of new, large machines.

The difference in average mill size between the EC industry and that of the Nordic countries and Canada (both much larger), may be explained by the following reasons:

- The EC's paper industry developed originally to supply all grades of paper and board to individual national markets. Only in recent years has the industry begun to supply the broader EC market.
- In contrast, the paper industries of the Nordic countries and Canada, supported by vast forest resources, have concentrated on exports of mass consumption grades. Recently there has been diversification into higher value added products, mainly destined for the EC market.

Almost 90% of all imports enter duty free, mainly from countries of EFTA, but also from Canada and other GATT and non-GATT countries, and from developing countries, notably Brazil.

Raw materials

Wood fibre, which includes both virgin fibre and wastepaper, is the dominant raw material for paper-making. It accounts for over 85% of the total raw material input for the industry's production. Thus, pulp and paper manufacturing represents a forward integration of the forestry sector. As such it is directly influenced by forestry management and policy, both within the EC and in other major paper-making countries, which tend to either supply wood pulp as raw material to the EC or to compete with its paper and board products, or both.

Other cellulosic fibres are used to only a very small degree in the EC, generally for specialty grades such as filter papers or banknote and security papers. Production of pulp from annual plants (cotton, sugar cane bagasse, bamboo, abaca, sisal, rice and wheat straw, and reeds) is concentrated in tropical countries and/or those lacking wood.

Inorganic filler materials (china clay, kaolin, talc, calcium carbonate) and binders (starch and latex) account for 12 to 15% of total raw material input tonnage.

The table shows the composition of raw material input for the EC in 1988. Wood pulps, both integrated and market, represent the largest single raw material with 44% of total input.

Total input normally exceeds total output by 12 to 14% in tonnage volume in the EC. This is due to normal process losses, augmented in the case of the EC industry by the high utilization of wastepaper which involves somewhat higher losses than virgin pulp.

Table 7
Raw material input for paper and board production, 1988

	(1 000 tonnes)	(%)
1. Wood fibre:	33 942	
a. Pulp	17 018	42.9
Integrated-EC	5 520	
Market-EC	3 458	
Net imports	8 040	
b. Wastepaper	16 924	42.7
2. Inorganic fillers, coating pigments	4 600	11.6
3. Binders, other additives	1 170	2.9
TOTAL INPUT	39 710	100.0
TOTAL OUTPUT	35 011	88.2
INPUT/OUTPUT RATIO	1.14	

Source: CEPAC.

Wood

It takes roughly 5 steres of wood to produce one tonne of bleached chemical pulp, and about half this amount for a tonne of mechanical pulp.

The price of wood is the major cost factor in production of all pulps. The higher the degree of processing and value-added, the smaller the share of the wood price in the total product cost. Thus, wood cost is a major factor (30 to 40%) in the cost of newsprint, but much less in the case of coated graphic papers (15 to 20%).

The Community is largely self-sufficient (97%) in wood at the current level of pulp production, both integrated and market. However, substantial expansion of pulp capacity will be difficult without intensified silvicultural activity, both for higher utilization of existing forests and, particularly, for extension of fast-growing plantation forests in Spain and Portugal.

Some additional forest resources exist in the EC to permit further expansion of pulp production. The resources are mainly in France, the Federal Republic of Germany and the UK.

Coniferous species (spruce, pine) were traditionally the main raw materials for the industry, but in recent years deciduous or hardwood species (birch, eucalyptus) have found greater application. In particular, fast-growing eucalyptus has become a preferred papermaking fibre. Its availability in Spain and Portugal where it is grown in special plantations is a major advantage for the EC industry.

Pulp and market pulp

To supply paper and board manufacture, the EC produced almost 9 million tonnes of wood pulp, or 5.2% over 1987. This includes both pulp directly integrated into paper and board production and pulp which is dried and sold on the market, known as 'market pulp'.

In comparison, the United States leads the world with a total production of 54 million tonnes of wood pulp (1988), followed by Canada with about 23 million tonnes and Sweden with 10.3 million.

Production of integrated pulp (mechanical and chemical) in the EC rose by 7.2% last year to 5.52 million tonnes (61% of the total). The big increase was in mechanical pulp, mostly associated with new printing paper machines. EC-produced market pulp, almost all of it bleached chemical pulp, rose only slightly (+0.3%) to 3.49 million tonnes.

Total EC-produced pulp, however, accounts for only about half (53% in 1988) the total pulp consumed for paper and board production. The rest is imported as market pulp.

Dependence on imports of market pulp was, however, substantially reduced by the entry into the EC of Spain and particularly, Portugal, several years ago. More recently, the acceptance of improved mechanical pulps have led to increased investment in these facilities.

EC import dependence for market pulp has dropped from almost 80% in 1980 to under 74% today. And the share of market pulp imports in total pulp consumption dropped further in 1988 to 47%.

Market pulp is produced in seven Member States, but almost 90% of the total is accounted for by Portugal, Spain and France, in that order. It is in these countries where future expansion of market pulp capacity is likely to occur, though some additional capacity is being added in Belgium soon.

Despite these developments, the EC will remain heavily dependent on pulp imports, with all the consequences this implies for the non-integrated mills (currency fluctuations, etc.). The main suppliers of market pulp are Sweden and Finland, Canada and the USA, and Brazil and Chile. North America and, particularly, South America, have tended to become more important in recent years, as Nordic producers have continued to integrate their pulp into paper and board. Brazil and Chile will substantially increase their capacity in the next two years, much of which will be available for export to the EC.

Types of pulp

All wood pulps may be divided into two broad categories: mechanical and chemical.

Mechanical pulps are made by mechanically defibrating or grinding wood. Their production consumes less wood per tonne than chemical pulp, but requires large amounts of electrical energy, and hence is highly dependent on the cost of electricity. Recently, mechanical pulps have been further developed by processes involving elevated temperature and pressure, or the addition of chemicals, or both. The modern processes of pressurized groundwood (PGW), thermo-mechanical (TMP) or chemi-thermo mechanical (CTMP) pulp account for most of new mechanical pulp capacity. The pulps produced have improved strength and printing characteristics. Mechanical pulps are normally integrated directly with paper and board production.

Mechanical pulps are used extensively in publication papers. Newsprint, for example, is made almost entirely with mechanical pulp and de-inked waste-paper today in the EC. Uncoated and coated magazine and directory papers use high proportions of mechanical pulps. These pulps are also used in varying levels in the interior layers of folding box-board (used for packaging), where they provide bulk and stiffness, and in certain hygienic and sanitary products.

Chemical pulp is made by treating wood in chemicals to dissolve the lignin bonding the fibres. Half the wood volume is removed in this process. This plus the very capital intensive process systems required make chemical pulps more expensive than mechanical pulps. They have, however, the advantage of superior strength properties and also can be bleached to high brightness levels necessary for many graphic papers. Chemical pulps are produced today primarily by the sulphate or 'kraft' process. Process technology dictates extremely large units to achieve economies of scale and competitive cost. The economic size of a sulphate pulp mill today is 300 000 to 400 000 tonnes/year, with a capital cost of between ECU 350 million and 450 million.

By far the most important grade of pulp consumed in the EC is bleached sulphate pulp (made from coniferous and deciduous wood). It accounted for 9.7 million tonnes in 1988, or 57% of all the pulp consumed in the EC. The share of bleached sulphate pulps has increased during the 1980s, but appears to have stabilized in the past few years. The import penetration rate for this grade has remained at around 74%.

The other major grade of bleached chemical pulp is bleached sulphite, mostly made from coniferous wood. Although EC production has continued to increase slightly, imports and total consumption have decreased. The share of consumption has declined, as has the import penetration rate, which now stands at just over 36%.

Mechanical pulp consumption showed the strongest growth last year, rising by 9% to over 3.9 million tonnes. It's share of total pulp consumption rose slightly to 23.2% in 1988.

Production of mechanical pulps, particularly the newer types TMP and CTMP, is expected to enjoy continued growth at 2 to 3% per year. Thus the share of mechanical pulps in total pulp consumption is expected to increase slightly during the coming years. This development is encouraged by the lower capital investment per unit production required, and the smaller scale of economic installations (60 000 to 80 000 tonnes).

The pulp market is international and highly cyclical, with cycles of three to five years corresponding roughly to the investment cycle (the time required for producers to react, plan and start new capacity). For these reasons, the EC consumers of market pulp are subject to great fluctuations in price and sometimes in supply.

Wastepaper

Wastepaper is the EC's most important domestic raw material for papermaking, and its use continues to increase relative to all other raw materials. The EC is virtually 100% self-sufficient in wastepaper.

Apparent consumption surged 9.3% in 1988 to almost 16.9 million tonnes. This exceptional growth was spurred both by the higher cost of imported pulp and continuing improvements in wastepaper processing technology.

Wastepaper now accounts for almost 43% of all papermaking raw materials (up from 41% in 1987), and virtually 50% of all fibrous raw materials used in papermaking.

EC collections, at 16.8 million tonnes in 1988, represent a recovery rate of 35.5% measured against total EC consumption.

Wastepaper is traded in four main categories:

- Ordinary grades: mixed paper and board, mixed newspapers and magazines, unsold or sold;

- Improved grades: newspapers, once-read or unsold, magazines, books, bleached paperboard, white-top carton trimmings;
- Superior grades: white office waste (from shredders), printers trimming;
- Corrugating waste; corrugated boxes, containing mostly unbleached kraft pulp.

Wastepaper use is concentrated in four sectors of paper and board production: casemaking materials (to 100% wastepaper in total fibre output), grayboard (to 100%), newsprint (between 20 and 100%) and hygienic and sanitary (between 20 and 100%).

Wastepaper usage is obviously saturated in certain grades and is at a technical limit in others. There is potential, however, to extend utilization somewhat with more intensive treatment. The incentive to do this depends to a large extent on the price of pulp. The best prospects for using more wastepaper lie in greater substitution of waste-based casemaking materials for kraftliner and semi-chemical fluting. However, progress in the use of de-inked wastepaper in higher quality printing papers and tissues is likely to continue.

High quality grades of wastepaper are today fully utilized and few unused resources remain. There is potential for recovering substantial quantities of newspapers and magazines (mainly from households, where segregation at source is required) and lower grades from some other sources.

Table 8
Production, consumption and trade by subsector
Paper and wastepaper

(1 000 tonnes)	1985	1986	1987	1988
Wastepaper				
Apparent consumption	13 889	14 840	15 448	16 879
Net exports	-110	-12	81	-113
EC production	13 779	14 828	15 529	13 766
Mechanical pulp				
Apparent consumption	3 489	3 614	3 613	3 941
Net exports	-498	-472	-522	-508
EC production	2 991	3 142	3 091	3 433
Bleached sulphite pulp				
Apparent consumption	1 604	1 631	1 613	1 569
Net exports	-637	-598	-552	-479
EC production	967	1 033	1 061	1 090
Bleached sulphate pulp				
Apparent consumption	8 523	8 767	9 439	9 701
Net exports	-6 137	-6 244	-6 723	-6 895
EC production	2 386	2 523	2 716	2 806

Source: CEPAC, Eurostat (Comext).

Other raw materials

Inorganic fillers and both natural and synthetic binders are used extensively in paper and board production. Together they account for 13 to 16% of total raw material output.

Inorganic fillers or pigments have two main functions: they improve the printing characteristics of the paper surface; and they reduce cost as they are less costly than fibre.

The consumption of all fillers has been increasing at a faster rate than overall paper and board consumption. This is due mainly to the strong demand for coated publication papers. This trend is expected to continue for the next few years. Current consumption of fillers and pigments is estimated at 4.3 million to 4.5 million tonnes. Thus EC self-sufficiency, today estimated at between 80 and 85%, will decline somewhat in the future.

Main grades of paper and board

In this study, nine major grade sectors are identified and reported statistically. They were selected as the most significant sectors in terms both of current volume and future growth. Each sector is comprised of at least several grades (in the case of newsprint and kraftliner) or dozens (coated and uncoated graphic papers).

Variation among individual grades can involve any one of many factors or a combination of several of them. Key factors of differentiation among individual grades are: basic weight or substance, fibre composition (various pulps or wastepaper), surface treatment (coating), physical properties (stiffness, strength), optical properties (brightness, opacity, gloss).

The combined volume of the nine grade sectors selected accounts for roughly 93% of both total EC production and consumption.

The grade sectors not covered here are: semi-chemical fluting (used for corrugated board) and some specialty and industrial papers.

● Newsprint

Newsprint is used mainly for printing newspapers. Made largely from mechanical pulp and/or wastepaper, sometimes with small amounts of inorganic fillers, newsprint may be slightly calendered for improved gloss, white or slightly coloured. It is used for letterpress, offset and flexographic printing.

Newsprint consumption — strongly affected by advertising expenditure — has grown at about 5%/year since 1984. The spread of offset and flexo-printing and the resulting increased use of colour in newspapers has encouraged more advertising and hence higher consumption.

Production volume in the EC has grown even faster, at over 8% per year since 1984, as it jumped 15% last year. Several entirely new mills have been built in the EC during the 1980s, and at least two more are planned in France for completion before 1991. UK production has surged from only 84 000 tonnes in 1982 to 529 000 tonnes in 1988 and could reach 800 000 by 1990.

There are very few producers in this sector and the average mill and machine size is fairly large, on a level with international competition.

Consumption growth was higher than expected last year at 6.8%. More modest growth is foreseen in the coming years. Domestic market share continues to grow steadily, and was up a point to 40.5 last year. It should approach 43 to 45% by 1990.

The export rate doubled last year to 6.8%, due to the surge in domestic production. Exports should continue to increase.

Imports are mainly from Sweden, Norway, Finland and Canada.

● Coated graphic papers

This has been the fastest growing grade sector in the EC. Both production and consumption soared again last year as new machines came on-stream. Production rose 9.1% while apparent consumption jumped over 13%.

Consumption growth is expected to slow considerably this year and next, and the newly expanded EC production capacity, in addition to bringing stiffer competition, will spur a further increase in the export rate. This rose by one-third to 16.5% last year and will likely exceed 20% by 1990.

This sector includes coated mechanical printing papers and coated wood-free papers. The former contain a blend of mechanical and chemical pulps and are used for printing catalogues, magazines and advertising material in gravure or offset. They contain fillers, are pigment-coated on both sides, and may be glossy or matt.

Coated wood-free papers contain little or no mechanical pulps, are generally heavier weight than the

coated mechanicals and are used for high-quality printed products, annual reports, etc.

External trade in coated graphic papers has grown much faster than production. Despite the sharp rise in output, net imports soared 70% last year alone to 674 000 tonnes. They have more than tripled since 1980. Main supplier countries for these grades are Finland, Sweden and Austria.

The import penetration rate rose to 25% last year from 18% in 1987. Although competition is increasingly hard in this market, EC producers should maintain their domestic market share at close to today's level.

Exports, which jumped by almost 50% in 1988 to almost 1 million tonnes, will continue to grow strongly in coming years.

A typical new machine for these grades will have a capacity of around 200 000 tonnes/year. Thus this sector also favours concentration into large, internationally competitive units.

The sharp increase in new capacity, both within the EC and in the main external supplier countries has resulted in the predicted temporary over-capacity in this sector. This may persist for several years, even assuming continued increases in exports.

● Uncoated graphic papers

This grade sector also includes both mechanical and wood-free grades. Also known as groundwood or wood containing paper, this grade includes directory papers and heavily filled supercalendered (SC) magazine papers. It is sold mostly in reels and is printed both rotogravure and offset.

Production was up 10% last year to 6.74 million tonnes, the majority of the growth accounted for by wood-free grades.

Net import growth (again mostly in wood-free grades) was over 16%, however, to almost 2.3 million tonnes, and the import penetration rate surged to over 31%. It was less than 20% in 1980.

For the mechanical grades, production growth has been very modest in the EC and is expected to continue at these levels (under 1%/year). Consumption growth has been supplied largely by imports from Finland and Austria, and even this has been small.

The wood-free sector is by far the larger of the two, however, and has seen growth in the 3 to 4%/year range. These grades are subject to increasing import pressure, mainly from Nordic countries which ben-

efit from integration with chemical pulp, and also from Brazil.

The wood-free sector is characterized by a relatively large number of smaller producers, though a few large producers account for the majority of total output.

- **Kraftliner**

Kraftliner is used for the outer lining of corrugated board, which is made into boxes. It is an internationally traded commodity with relatively low value added.

EC production of kraftliner was up 5.6% in 1988 to 673 000 tonnes, the first significant increase in several years. The growth was entirely accounted for by Spain and Portugal, which together with France produce virtually all the EC's kraftliner.

Consumption was up strongly (+8.8%) to close to 2.4 million tonnes, fuelled by a 10% increase in imports, which come mainly from the USA, Sweden and Finland. The import penetration rate (78.9%) was up almost a full point. It is the highest for any grade.

There is limited potential for expansion of standard kraftliner production within the EC, as both the large size of production units, the necessity for direct integration to kraft pulp and the low value-added argue against this product. Whitetop liner, however, is growing rapidly, replacing substantial amounts of regular kraftliner.

Kraftliner competes with the higher grades of testliner, which is produced in large quantities in the EC.

- **Casemaking materials based on wastepaper**

This sector includes testliner (used for the outer lining of corrugated board) and Wellenstoff or waste-based fluting (used for the interior of the corrugated board). These grades are made in a wide range of qualities, using various grades of wastepaper. Testliner is the main substitute for imported kraftliner.

Production volume, at 7.2 million tonnes in 1988, makes this the largest sector in the EC industry. Output grew by 2.7% last year.

The EC is virtually self-sufficient (93%) in this sector. Apparent consumption growth last year was 5.6%.

All EC Member States produce these grades, with production distributed fairly evenly. There are a large number of small producers in this sector.

- **Packaging papers**

Packaging papers can be made from all grades of pulp or wastepaper or any combination of these. Depending on the end-use, substances range from thin papers (below 30 g/m²) up to 225 g/m², but most of the production is between 25 and 100 g/m².

Packaging papers are produced to a variety of physical and optical specifications, such as strength and stiffness. They may be machine-finished, machine-glazed, calendered, bleached, unbleached, coloured, transparent, opaque and acid-free. They are marketed in rolls or sheets.

End-uses range from household wrappings to all kinds of industrial packaging; from small bags to large sacks. Food wrapping has become of major importance, particularly in the many kinds of flexible packaging (also used in the non-food sector).

Packaging papers are also used as base papers for other purposes — surface treatment, waxing, coating. Many papers in this section are considered as specialty papers.

The possibility of combining different kinds of papers or of combining paper with other materials has created additional properties and widened the range of use — thanks to modern technology also, most of these combined packaging materials are recyclable.

Although partly substituted by plastics (film), there seems to be a slight trend back to paper, for environmental reasons, which could make the public more paper-minded (wastepaper as raw material and recyclability of used packaging papers).

European Community producers have to defend their market shares against strong international competition, mainly from Nordic countries.

The 1988 production figures — compared to 1987 — vary for the different packaging papers from + 11% to - 8%; globally however, both production and consumption of packaging papers increased by 2%.

- **Folding boxboard**

These are paperboards having good folding properties and stiffness, used for making folding cartons for consumer products.

Import penetration has increased fairly rapidly in the sector during the 1980s. Due to the revision in nomenclature the rate is now back to about 31%. Most of the imports are of folding boxboard made with virgin pulp, mainly from Sweden, Finland and

the USA. Among the grades with strong growth, and for which imports have increased strongly, is liquid packaging board used to make carton packs for milk, juices and other drinks. Virtually all the consumption of liquid packaging board is supplied by non-EC producers.

EC production is concentrated in those grades using at least some wastepaper.

EC production growth has been modest during the 1980s. There is potential for increased capacity, integrated to chemical and mechanical pulps, in France, Portugal and Spain.

- Greyboards and other boards

Greyboard, as the name implies, is grey in colour, made generally from lower grades of wastepaper.

This sector, too, has seen only modest production and consumption growth during the 1980s (1.5%/year). Output last year, according to the revised nomenclature, showed a 9.5% increase. Future growth, however, is expected to be considerably slower.

The EC industry's domestic market share is high (87%) and stable.

- Hygienic and sanitary

These papers for sanitary or household uses may be made from virgin fibre, generally bleached, and with varying amounts of secondary fibre ranging up to 100%. Main products are toilet paper, kitchen towelling, handkerchiefs, napkins and industrial wipes.

This has been one of the most dynamic sectors of the EC industry during the 1980s (production growth about 5%/year). Last year's production increase followed the trend (+4.8%), as output reached 2.4 million tonnes.

Apparent consumption growth in 1988 was somewhat higher, at 6.6%, as imports took a larger share, driving the domestic market share below 90%.

Virtually all production is converted at the mills directly into the consumer products.

Further growth is expected, though at slightly lower rates, into the 1990s. Substantial new capacity is being installed in France, Belgium, Italy and Spain. Consumption growth is expected to be stronger in southern EC countries.

The sector is dominated by a handful of very large producers, several of them owned by Nordic or US

companies. The sector has been subject to intensive restructuring for the past two years, as the major producers have consolidated their positions on the EC market.

The EC is largely self-sufficient (88%) in these grades. Because they are bulky, hygienic papers are not easily transported long distances. Imports are mainly from Austria, Sweden and Finland.

Table 9
Production, consumption and trade by subsector
Paper and board

(1 000 tonnes)	1985	1986	1987	1988
Newsprint				
Apparent consumption	5 068	5 360	5 725	6 115
Net exports	-3 119	-3 186	-3 417	-3 458
EC production	1 949	2 174	2 308	2 657
Coated graphic paper				
Apparent consumption	4 807	5 264	5 854	6 630
Net exports	-127	-253	-397	-675
EC production	4 680	5 011	5 457	5 955
Uncoated graphic paper				
Apparent consumption	7 227	7 579	8 025	9 029
Net exports	-1 632	-1 797	-1 884	-2 289
EC production	5 595	5 782	6 141	6 740
Kraftliner				
Apparent consumption	2 378	2 688	2 780	3 026
Net exports	-1 757	-2 052	-2 143	-2 353
EC production	621	636	637	673
Casemaking materials based on wastepaper				
Apparent consumption	6 148	6 361	7 248	7 657
Net exports	-69	-113	-220	-441
EC production	6 079	6 248	7 028	7 216
Folding boxboard				
Apparent consumption	3 615	3 848	3 717	3 542
Net exports	-1 034	-1 215	-1 228	-834
EC production	2 581	2 633	2 489	2 708
Greyboards and other boards				
Apparent consumption	2 728	2 802	2 936	3 214
Net exports	-162	-195	-207	-228
EC production	2 566	2 607	2 729	2 986
Hygienic and sanitary				
Apparent consumption	2 208	2 295	2 427	2 586
Net exports	-142	-115	-132	-180
EC production	2 066	2 180	2 295	2 406

Source: CEPAC, Eurostat (Comext).

Environmental protection

Ecology has been of primary importance to the pulp and paper industry for many years. As the industry is directly connected to, and depends upon, two natural raw material sources, the forest and recycling, the sector is fully committed to further pro-

gress in development of both forest resources and efficiency of recycling in the EC.

Forestry and silviculture

The pulp and paper industry does not contribute to the destruction of the forest, but rather to its healthy survival and good management.

The bulk (a total of 19.5 million steres in 1988 of which 94.8% is domestic) of the coniferous roundwood consumed by the industry consists of small-diameter thinnings generated in the course of forest maintenance. This thinning is necessary to assure production of healthy, high quality, large-diameter trees for the sawmilling and other wood processing sectors. A further source of coniferous raw material for pulp and paper production is, in fact, the waste from sawmills, plywood mills and other wood processing plants.

Hardwood used by the industry consists almost exclusively of wood unsuitable for sawmills or for other purposes. Today, much of this is fast-growing eucalyptus from plantations in Spain and Portugal. In 1988, the EC consumption amounted to 20.1 million steres of which 95% is domestic.

By using what was once mainly burned as waste, the industry has not only added value to the forest, but has helped to reduce greatly the environmental burden associated with this former burning of waste.

Further, the industry has been actively involved in forest management and silvicultural research for many years. Many of the advances in tree genetics, disease and pest protection and treatment, as well as related areas such as watershed management have been made either partially or largely with the support of the pulp and paper industry.

The Council of Ministers agreed upon a strategic mutual action plan in the field of forestry.

Major progress was made in 1989 and reached almost unanimous agreement on afforestation of farmland: a scheme to develop and promote more rational use of woodlands in rural areas, processing and marketing of timber products, setting up a Standing Forestry Committee and a European Forestry Information and Communication System (Efics).

The programme is now applicable for an initial period of four years.

The Community has taken a series of measures to stimulate forestry activity at a time when many new pulp and paper production facilities are being built within the EC. It is desirable that the EC reduce its dependence on external sources by better use of its

existing resource base, which is currently underexploited. And further, the EC should develop the potential of these resources in the medium term.

Current Community resources are about equally divided between coniferous and hardwood species (respectively 58.6% and 41.4% in 1988).

The Community adopted at the beginning of this year a coherent group of measures built around the following points: protection and development of Community forests within the framework of development of rural zones and underdeveloped regions; converting and commercialization of forestry products; support of afforestation of agricultural land.

These actions, accompanied by the establishment of the necessary management tools and the coordination of national policies, among them the forestry information system and the Permanent Forestry Committee, constitute the key elements of Community strategy for the forest.

The measures adopted reinforce the existing system for improving the structural efficiency of agriculture by:

- the introduction of an annual subsidy on average of ECU 150 per hectare, for 20 years, to compensate for the loss of revenue to farmers who afforest their land;
- the extension of aid for afforestation for all owners of agricultural land;
- an improvement of aid accorded in favour of forests in overall agriculture.

The paper industry, which absorbs almost 50% of EC wood production as a consumer mainly of thinnings and sawmill waste, should benefit quickly from the entry into force of the forestry action programme, for which the Community plans to devote ECU 750 million for the period 1989-93.

Recycling

Half of the entire fibre raw material requirements of the EC paper industry are provided via the recycling of paper and board products consumed within the Community. This recycling rate is effectively the highest in the world.

Further, the rate of recovery is very high: over 35% in 1988, up from around 32% at the start of the 1980s. This means that of all the paper and board products consumed in the EC today, well over one-third are recovered and recycled back into the paper industry. Considering the fact that a sizeable share of total paper and board consumption is non-recoverable (books, archived documents, hygienic and sanitary papers) the effective rate of recovery is

actually far higher; it may be estimated at well over 40%.

The process developments, notably in the technology of de-inking (or removal of ink from printed papers) have allowed far wider use of recycled fibre in higher quality paper and paperboard products. EC equipment manufacturers and paper companies have been the leaders in developing de-inking technology for the past 20 years. Numerous de-inking installations operate throughout the Community. Most of them are directly integrated with production of newsprint, other printing papers, or hygienic and sanitary papers.

Much of the EC's casemaking materials and, by definition, most of its grey board are made almost entirely from recycled fibre.

Consumption of wastepaper in the EC paper industry is expected to continue to increase during the next few years. It is very likely that the share of wastepaper will exceed that of pulp in the industry's total raw material structure within several years.

There are two main areas of ecological or environmental impact associated with recycling in the paper industry.

First, recycling of paper and board products removes a major component from society's solid municipal waste stream. Without recycling by the paper industry, some 17 million extra tonnes of municipal waste would have to be collected and disposed of safely. Recycling eliminates a significant part of the cost of collection, removal and disposal of a tonne of waste to a municipality and does it safely.

Secondly, recycling effectively extends the EC's forest resources allowing more paper and board to be produced with the same, limited forest resources.

The paper industry remains fully committed to further strengthening of all aspects of recycling. This includes active research projects in the field.

The impact of '1992'

On a structural level, the prospect of '1992' is believed to have been a strong driving force for the rapid and broad restructuring of the industry which has taken place during the past few years within the EC. The pace of mergers and acquisitions within the paper industry has accelerated. Some of this activity has involved only EC companies, but the majority involve combinations of EC companies with groups from outside the EC, mainly from the Nordic countries and North America.

This can advance the consolidation of the industry within the EC into larger corporate units, capable of competing better internationally, and increase capital investment in new production facilities.

The surge of new investment plans throughout EC industry during the past 2 to 3 years has been fuelled by several key factors. The now larger European or multinational groups have a more European strategy regarding marketing and hence the siting of production facilities and the financial strength to realize these ambitions. As they compete, in many cases, on a worldwide basis, there is a strong tendency for these groups to develop their production sites to an internationally competitive size. The effects of this can be seen in the sharp increase in average mill size in the EC, and this will continue.

A significant result of this concentration of investment in large, efficient facilities is a surge in exports to non-EC countries. The over-capacity in certain sectors (notably in printing papers), due to the rise in capital investments, has spurred exports to offshore markets such as North America and Asia. However, these exports will continue even after the temporary over-capacity is past, for the product quality and cost-effectiveness of the larger mills will drive them to participate actively in world trade on a long-term basis.

Outlook

The high level of investments in new papermaking facilities was maintained throughout the Community, though the pace of new project announcements may begin to slow next year. Projects scheduled for completion in 1990-91 (most of them integrated to pulp production) should continue to raise the industry's productivity, while at the same time reducing its overall environmental burden. Graphic papers together with hygienic and sanitary papers account for the major part of the new investment.

The thrust of development, both in terms of capital investment as well as restructuring, appears to be moving south within the Community, as France, Spain, Italy and to a lesser degree Portugal have become focal points of activity.

It is estimated that the respective levels were higher than in 1987, and that this positive trend will continue in 1989 and 1990.

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THE PAPER AND BOARD CONVERTING INDUSTRY

(NACE 472)

Summary

The production value of the paper and board converting industry reached ECU 32.9 billion in 1987. This level grew to about ECU 35.8 billion in 1988. Because the economic situation within the European Community shows an upward trend from which the paper and board converting industry is benefiting its turnover is projected to reach around ECU 35.0 billion in 1989. The sector has a large number of small and medium-sized companies. The majority of its products are sold on Community markets. Major growth areas are packaging materials for fluids and foodstuffs and sanitary paper, followed by office products for computers.

The sector relies heavily on the paper and board manufacturing industry as a supplier obtaining an estimated 45% of its most important raw materials from within the Community, thereby consuming a large proportion of the EC's paper and board production.

Description of the sector

The paper and board converting industry within the Community employs about 365 000 persons in about 5 000 companies, and in recent years has reached a production of more than ECU 35 billion.

The medium-sized operations of the paper and board processing industry account for about half of the total number of employees and are responsible for about half of the industry's turnover.

The paper and board converting industry mainly consists of small and medium-sized companies, as shown in Table 2.

The spectrum of the paper and board processing industry's products is wide and heterogeneous. The most important of these are: paper products for use in interior decoration, household and sanitary good toilet requisites and paper underwear, board or pulp, writing materials and paper articles or paperboard commonly used in offices, schools etc., packaging products, bitumenized paper and paperboard for the building industry, impregnated, waxed, composite, adhesive and similar paper, coated paper and other articles in paper and board.

The largest proportion, both in quantity and in value, is represented by packaging materials of different kinds. The wide range of products offered, as well as sophisticated consumer demands as to quality, safety and economic efficiency, require well-developed packaging.

With a market share of more than 40%, paper, pulp and board packaging materials occupy a prominent place amongst all packaging goods. They meet consumer requirements effectively and at low cost and are biodegradable. Board and corrugated board packaging products in particular have experienced a boom whilst the remaining groups of paper and board packaging products have developed to a less significant degree.

Table 1
Main indicators, 1980-89
Paper and board conversion

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption (1)	19 298	20 427	22 429	24 053	26 941	29 443	31 628	33 400	36 215	N/A
Net exports (1)	220	211	352	505	598	733	583	468	420	N/A
Production (2)	20 884	21 833	23 675	25 081	28 244	30 829	31 045	32 932	35 795	39 705
Employment (1 000) (2)	439.9	414.6	396.3	388.9	386.3	381.3	374.0	374.3	363.9	366.8
Number of enterprises	4 301	4 124	4 095	4 087	3 975	3 922	3 856	3 837	N/A	N/A

(1) 1980 EC 9; 1981-85 EC 10; 1986-89 EC 12.

(2) Data cover enterprises with 20 or more employees; Spain and Portugal: All enterprises.

Sources: Citpa, Eurostat (Inde, Bise).

Production and consumption

Corrugated board packaging materials are successfully used as sturdy receptacles for transport and mailing purposes and have in many cases replaced the wooden boxes previously used for heavy goods. They have to a large extent benefited from growing trade in goods. Printed corrugated board boxes are also gaining in popularity as shop and sales packaging.

Table 2
Distribution of turnover by size of company, 1984

(%)	20-99 employees	100-499 employees	500+ employees
Belgium (1)	29.86	52.54	17.60
Denmark	18.15	43.39	38.46
FR of Germany	17.33	41.93	40.74
Greece (1)	21.35	36.98	41.67
France	21.97	53.11	24.92
Italy	38.14	36.33	25.54
United Kingdom	17.51	46.64	35.85

(1) 1980.

Sources: Eurostat (Inde).

Folding carton is mainly used for sales packaging owing to its excellence as a printing medium. Furthermore, carton packaging material is especially suited for automatic packaging of goods in high-speed packaging machines.

Carton packaging for fluids has secured an important market in recent years. Sealing the carton with plastic or metal foil ensures that fluids and gaseous or greasy substances are contained. In this fashion, the carton is converted into a packaging product which is inexpensive, lightweight and easy to handle. This type of packaging is increasingly used for milk, fruit juices, wine, and more recently for other food-stuffs as well.

Cardboard boxes made of solid-fibre board are produced in the most diverse shapes, including the luxuriously designed gift box. Boxes made of heavy solid-fibre board have lost some of their market share but continue to be used for certain purposes. Their suitability for high-speed packaging systems is becoming increasingly important. There are new markets for solid-fibre board packaging created by the demand for crates for yoghurt and other milk products, as well as for fruits and vegetables.

Fine cardboard, which is often embossed and covered with other materials, is used for gift boxes. This product is highly effective in showing to

advantage luxury items such as chocolates, cosmetics, alcoholic drinks, etc.

Paper cornets, bags and carrier-bags as well as impregnated coated and gummed paper have lost market share owing to the introduction of synthetic products. Competition, especially with reference to carrier-bags is fierce. Manufacturers of both groups of items have adapted, or will have to adapt, to this shift in demand by including synthetic packaging in their product range. Overall, however, paper cornets, bags, carrier-bags and other flexible paper packagings continue to play an important part in the packaging of consumer goods, where paper and cardboard appear to be particularly suitable base materials for compound packaging materials, in which synthetics and metal foils are incorporated.

Flat materials like paper and/or board, foils of all kinds, textiles, as well as threads and fibres can be wrapped around cores, which are suitable for this purpose. These are also used as packaging material in transport or mailing. Cans (composite cans) made of paper and/or board, as well in combination with other materials, are increasingly used as a substitute for glass, metal or plastic packaging. The market for composite cans is gaining in importance both in the food and in the non-food sector in the packaging of fluids, pastry and dry goods.

Household and sanitary paper goods made from cellulose cotton, tissue and crepe paper represent the second largest sector amongst paper and board goods. This product group has shown exceptionally high growth rates over the past 25 years and has increased its share both in quantity and value.

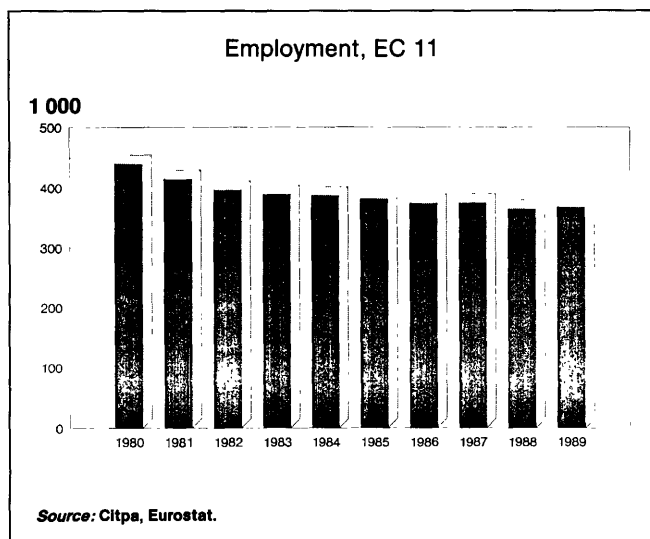
Cellulose wadding or webs are used in nursing and baby care and in feminine hygiene. The development of tissue paper, a smooth, soft and absorbent material that is used for handkerchiefs, facial tissue, travelling and kitchen towels and for napkins and lavatory paper has led to major growth and these items have replaced corresponding products made of other materials. The production of crepe paper has also increased sharply. This product is mainly used for hand, kitchen, car and travelling towels.

The per capita consumption of sanitary paper goods in the EC is still considerably lower than, for instance, in the USA.

Stationery and office supplies are the third largest product group amongst paper and board products. In both quantity and value, production has increased at a below-average rate in the past 15 years.

Account books, duplicating books and system bookkeeping products are being replaced by electronic data processing systems. The production of envelopes has suffered from the increased use of telephone, telex and electronic data communication. The increase in direct mailing, i.e. the mailing of bulk printed matter in envelopes as part of marketing strategy has, however, provided some compensation.

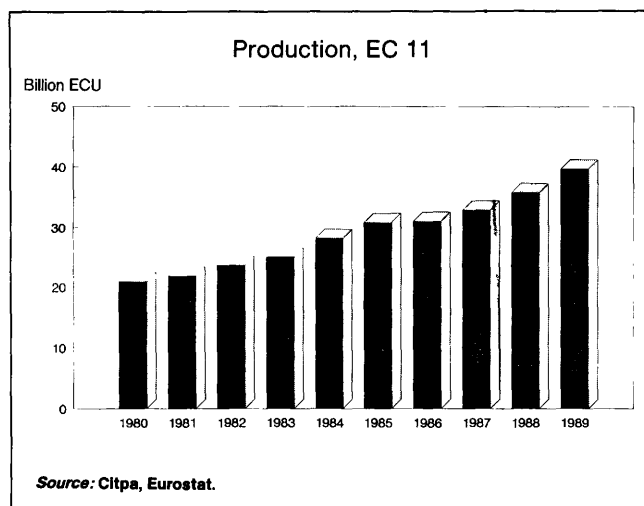
Figure 1



The production of teaching aids has decreased owing to falling birth rates. The expansion of pre-school and adult education and the general increase in the standard of living have offset this decline to some extent.

The turnover in business diaries and advertising items such as calendars has recorded growth, whereas the turnover in fancy paper and letter pads has fallen in recent years.

Figure 2



Since 1970, the proportion of wallpaper in the production of paper goods has fallen both in quantity and in value, mainly due to the introduction of wood-chip wallpaper, which is categorized under paper manufacture. The latter can be painted over several times. In keeping with the do-it-yourself trend, user-oriented novelties such as wipe-clean plastic wallpaper, easily removable vinyl wallpaper and self-adhesive wallpapers have breathed new life into the wallpaper business. Although to many prospective customers, grass fibre, cork wall coverings and wood panelling provide an alternative to wallpaper, their high price prevents them from seriously jeopardizing wallpaper's position.

Employment

Total employment is given in Table 4. The sector has a large number of small and medium-sized com-

Table 3
Production by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
EC (1)	20 884	21 833	23 675	25 081	28 244	30 829	31 045	32 932	35 795	39 705
Belgium	666	660	697	754	824	889	891	888	973	1 079
Denmark	286	335	425	483	532	604	651	662	693	770
FR Germany	5 500	5 825	6 149	6 704	7 330	7 901	8 220	8 710	9 314	10 263
Greece	199	314	211	199	235	256	278	329	325	360
Spain	1 513	1 497	1 452	1 446	1 717	1 903	1 907	1 920	2 110	2 344
France	4 024	4 287	4 607	4 622	5 113	5 687	6 013	6 269	6 727	7 062
Ireland	200	216	202	201	231	260	260	279	305	340
Italy	1 857	1 793	2 289	2 834	3 734	3 960	3 868	4 133	4 597	4 730
Netherlands	1 011	1 153	1 240	1 308	1 430	1 601	1 744	1 827	1 957	2 150
Portugal	93	120	146	146	185	215	227	228	255	282
United Kingdom	5 535	5 633	6 257	6 383	6 914	7 556	6 986	7 687	8 539	10 327

(1) Excluding Luxembourg.

Sources: Citpa, Eurostat (Inde).

Table 4
Employment by country

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
EC (1)	439 916	414 614	396 306	388 862	386 345	381 343	374 033	374 337	363 907	366 782
Belgium	10 536	9 808	9 454	9 456	9 447	9 238	9 113	8 881	8 762	8 747
Denmark	5 187	5 147	5 987	6 053	6 374	6 996	7 367	7 404	7 262	7 249
FR of Germany	113 012	111 363	103 842	103 199	99 502	100 342	99 061	99 858	101 157	101 952
Greece	4 420	4 927	3 369	3 275	3 249	3 212	3 266	3 379	3 379	3 373
Spain	32 066	29 110	25 177	25 511	24 377	22 432	22 715	21 719	21 719	21 681
France	73 478	69 999	69 635	67 011	66 853	67 158	65 972	66 943	63 431	62 621
Ireland	4 827	4 381	3 750	3 354	3 257	3 186	3 204	3 150	3 047	3 042
Italy	30 212	29 030	33 802	34 250	36 418	36 109	33 311	32 021	31 055	30 345
Netherlands	15 141	14 634	13 990	13 430	15 031	15 527	15 785	16 170	16 567	16 538
Portugal	5 633	5 758	5 883	5 920	5 942	5 817	5 496	5 286	5 479	5 469
United Kingdom	145 404	130 457	121 417	117 403	115 895	111 326	108 743	109 526	102 049	105 765

(1) Excluding Luxembourg.

Sources: Citpa, Eurostat (Inde).

panies witness the fact that between 20% and 44% of the personnel work in companies employing less than 100 persons. This percentage is the highest in Belgium, Greece and Italy. Between 1980 and 1988, total employment fell in all EC countries but Denmark, Italy and the Netherlands. Ireland, Spain, the United Kingdom and Greece were the most severely hurt. This is probably partly due to the increase in labour costs over the period. In comparison with the capital-intensive paper and board producing industry, competitiveness in the paper and board converting industry is more strongly influenced by labour productivity. The evolution of labour costs per employee differs considerably from one country to another.

Industry structure

The EC paper and board converting industry is made up of small and medium-sized companies. This indicates that product-oriented and regional

differences in the market for paper and board products are very pronounced. The flexibility of the smaller and medium-sized businesses enables them to adapt quickly to changes in the market. Proximity to the market, i.e. to the customer, is essential since it is uneconomical to transport paper and board products over long distances. Factories are mainly found close to the food-processing industry, the capital goods industry (e.g. mechanical engineering), the chemical industry, the electrical engineering and the electronics industry, as well as the services sector.

Investment and structural changes

In many sectors, traditional production processes are used, which are necessarily inexpensive and relatively unautomated. However, certain sectors are more capital-intensive and more highly automated (e.g. the corrugated board and the sanitary paper goods sectors).

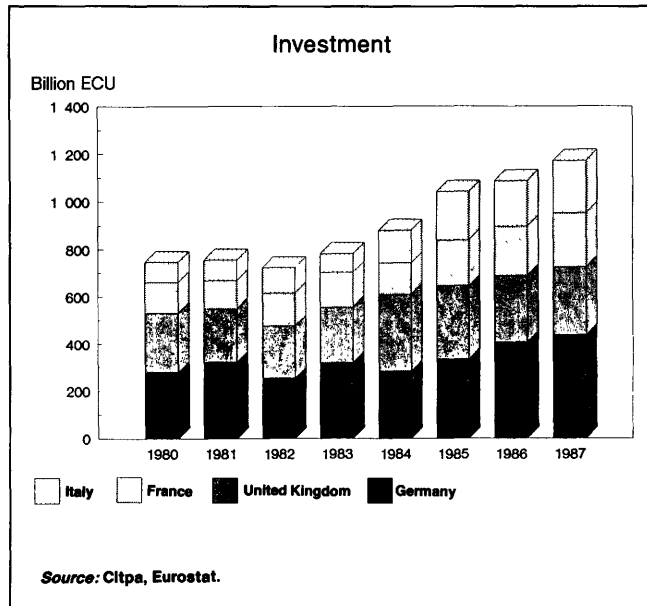
Table 5
Total labour costs per employee

(ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Belgium	16 657	17 700	17 421	18 549	19 689	21 769	21 760	21 698
Denmark	15 558	16 825	18 640	20 172	21 258	21 727	23 673	24 892
FR of Germany	14 060	15 188	16 873	18 409	19 441	20 105	21 894	23 438
Greece	6 312	7 936	8 638	8 366	N/A	N/A	N/A	N/A
Spain	8 969	9 986	10 835	10 454	11 564	12 527	12 494	13 196
France	14 626	16 059	17 342	18 064	19 087	20 867	22 123	21 231
Ireland	10 296	12 349	14 133	14 729	15 812	17 640	18 102	16 476
Italy	10 926	11 746	13 940	16 347	17 727	19 023	20 315	22 460
Netherlands	16 538	18 389	21 387	23 738	21 582	21 923	22 901	23 741
Portugal	3 142	3 717	4 148	4 071	4 090	4 642	N/A	N/A
United Kingdom	10 477	12 147	14 197	14 566	15 499	16 909	16 099	13 358

Sources: Citpa, Eurostat (Inde).

Compared with other processing industries, the paper and board converting industry has seen above-average investment since 1980.

Figure 3



Investment has not taken place at the same time in all Member States. Investments were made with caution in the period 1977-80, after which they increased sharply. In 1987 Germany was by far the biggest investor, having poured into the industry ECU 436.1 million or 4.25% of its production. Between 1980 and 1987, the most rapid growth of investment occurred in Germany and Italy and except for Denmark and Ireland (as well as for Greece and the Netherlands, for which the figures are not available), investment increased in all the countries in the past two years. The Single European Act of 1985 had a singular influence on investments, witness the fact that the industry immediately started with its preparations for the internal market.

The paper and board converting industry requires relatively few measures for the protection of the environment since it emits hardly any polluting substances. Investments are mainly directed towards purifying air emissions in coating and varnishing installations and reducing machine noise.

In future, most investments will be directed towards rationalization and the maintenance of competitiveness. The replacement of existing plants will automatically lead to an expansion in capacity. Excess capacity and imports may adversely affect production and investment activities in certain subsectors. Other factors influencing future investments are the reduction of working hours and rising wages in some Member States. To offset these reductions, rationalization is taking place or has been implemented the aim of which is to produce goods more economically as well as to improve their quality.

Today, the structure of the paper and board converting industry of the EC is marked by small- and medium-sized companies. The number of companies decreased from 4 301 in 1980 to 3 837 in 1987.

Research and development

Except for a few subsectors, R&D expenditure in the paper and board converting industry is relatively low and amounts to around 3% of turnover. Major efforts are being made in design and engineering, job planning, rationalization, and in addition, it is being attempted to find rapid, cheap and hygienic methods of packaging goods. Some R&D projects are carried out jointly by the manufacturers of paper and board converting machinery and the packaging industry.

Harmonization of standards for processed products, machinery or types of paper and board is gaining in importance since the customer increasingly refers to uniform, comprehensive testing procedures relative

Table 6
Total investment by country

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Belgium	28.0	20.0	27.4	34.2	45.2	42.2	44.8	47.4
Denmark	13.0	14.1	20.9	18.8	35.4	38.9	48.4	47.7
FR of Germany	281.6	322.2	254.3	320.7	284.3	334.8	406.4	436.1
Greece	6.5	N/A	14.1	16.5	N/A	N/A	N/A	N/A
Spain	41.0	44.3	52.7	59.1	57.4	52.6	55.0	57.6
France	129.7	119.9	139.9	147.1	132.2	193.1	209.3	226.9
Ireland	6.8	6.0	3.6	4.7	4.7	6.7	5.0	4.0
Italy	85.4	86.9	106.7	80.6	136.8	203.6	191.3	221.9
Netherlands	51.7	50.1	61.0	61.6	N/A	N/A	N/A	N/A
Portugal	6.9	11.3	15.8	9.9	6.6	8.1	8.9	9.8
United Kingdom	250.6	226.7	221.6	234.2	325.4	310.7	279.8	288.2

Sources: Citpa, Eurostat (Inde).

to the quality of paper and board products. However, small and medium-sized companies will be at a definite disadvantage as far as observing standardization norms or participating in standardization panels is concerned.

The paper and board converting industry expects new ideas for standardization from the recently formed CEN working group on paper, board and pulp, which will develop specifications for office organizations, writing and printing paper, formats and computer paper.

Trade

Until the early 1970s, paper and board products were not considered easily tradable goods. Due to their unfavourable weight/volume ratio, it is virtually impossible to transport packaging materials over long distances economically. For corrugated board, a distance of between 250 and 500km is considered the upper limit. Government and other protectionist influences play an important part, especially in the packaging sector, as do trade and customs regulations.

Small- and medium-sized companies are often unable thoroughly to familiarize themselves with the various regulations of a potential third-country customer. Intra-EC trade has, therefore, gained in importance in the past decade because of the absence of major trade barriers. Between 64 and 70% of the industry's foreign trade movements are intra-EC, and around 20% are with EFTA countries. World-wide foreign trade volume, of which the EC now accounts for around 40%, has increased almost sixfold over the past decade.

The extra-EC exports of converted products reached ECU 2 516 million in 1988 while imports extra-EC amounted to ECU 2 096. Both followed a rather similar evolution between 1980 and 1989 and the EC external balance has remained positive (ECU 420 million in 1988). Intra-EC trade, which increased by 180% over the same period, amounted to ECU 6 308 million in 1988.

Outlook

The industry's growth rate is expected to increase in the future. An impetus for the paper and board converting industry is the creation of the internal market

Table 7
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC (1)	20 884	21 833	23 675	25 081	28 244	30 829	31 045	32 932	35 795	39 705
Index	67.7	70.8	76.8	81.4	91.6	100.0	100.7	106.8	116.1	128.8
USA (2)	33 157	45 137	52 208	61 260	75 634	79 532	64 465	59 183	62 869	70 747
Index	41.7	56.8	65.6	77.0	95.1	100.0	81.1	74.4	79.0	89.0
Japan (2)	11 879	16 080	16 407	19 430	22 864	22 186	24 060	24 745	29 603	N/A
Index	53.5	72.5	74.0	87.6	103.1	100.0	108.4	111.5	133.4	N/A
Production in constant prices										
EC	28 756	27 221	27 538	28 947	30 131	30 829	31 718	33 336	34 956	36 470
Index	93.3	88.3	89.3	93.9	97.7	100.0	102.9	108.1	113.4	118.3
Trade (3)										
Exports extra-EC	1 121	1 253	1 429	1 677	2 023	2 284	2 146	2 229	2 516	N/A
Index (4)	48.1	54.9	62.5	73.4	88.6	100.0	95.3	99.0	111.7	N/A
Imports extra-EC	902	1 042	1 076	1 173	1 425	1 552	1 564	1 761	2 096	N/A
Index (4)	57.9	67.2	69.3	75.6	91.8	100.0	104.9	118.1	140.6	N/A
X/M	1.2	1.2	1.3	1.4	1.4	1.5	1.4	1.3	1.2	N/A
Intra-EC trade	2 245	2 620	2 957	3 424	4 045	4 694	5 229	5 767	6 308	N/A
Index (4)	47.9	55.8	63.0	72.9	86.2	100.0	106.1	117.0	128.0	N/A

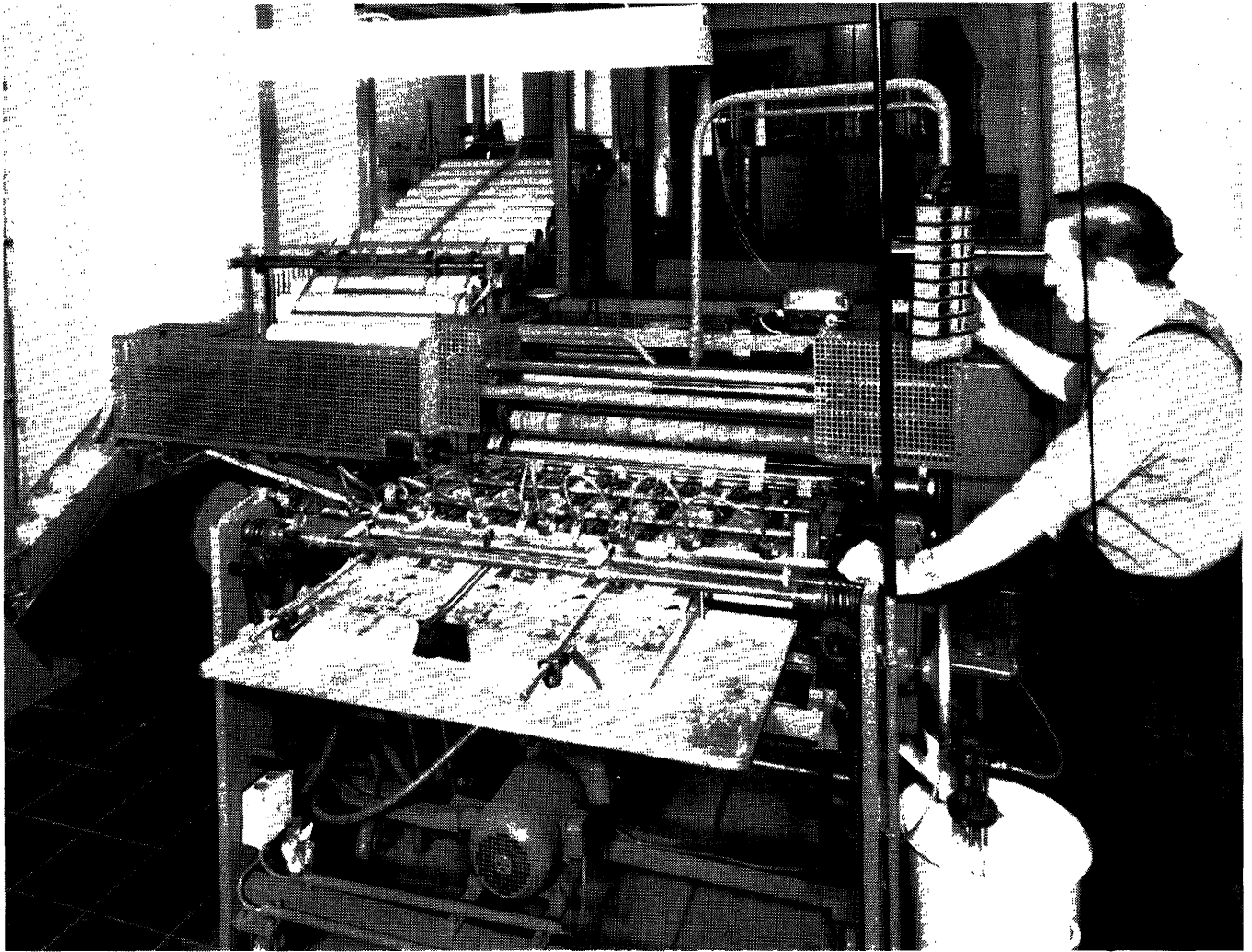
(1) EC 10: Enterprises with 20 or more employees. Spain and Portugal: all enterprises.

(2) Census of Manufactures and Eurostat estimates.

(3) 1980 EC 9; 1981-85 EC 10.

(4) Adjusted index giving true year-on-year changes.

Sources: Citpa, Eurostat (Inde, Bise).



by 1992. However, the industry is already offering a wide range of attractive products for which there is a constant demand both domestically and abroad. Mass products not requiring very sophisticated production techniques, whose only selling point is price, are increasingly being supplied by non-EC competitors. On the other hand, resourcefulness in product development and diversification, coupled with leadership in quality and production techniques, will guarantee further growth.

The rise of labour costs per employee in the past few years and the certainty that this trend will result in increased prices for paper, transport and energy, worries the paper and board converting industry. The converters are hoping upon hope that the con-

ditions of competition with third countries and especially the EFTA countries will remain the same as they are.

The European Community Business Survey, which has been progressively developed, shows an upward trend for the paper and board converting industry as from 1987.

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PRINTING

(NACE 473)

Summary

The printing industry is a major industrial sector in the Community with a massive production capacity. Comprising more than 60 000 establishments of all sizes, some 670 000 employees — most of them highly skilled — and handling a turnover in excess of ECU 50 billion, the Community's printing industry manufactures a variety of printed products for business and household consumption. It is a modern, high-technology industry in the vanguard of technical progress and intensely competitive not only within national markets, but also across Community borders and outside the EC.

Current situation

The printing industry has withstood the economic crisis better than industry overall, in terms of percentage decline in the numbers of firms (Federal Republic of Germany shows an increase) and employees, as well as trends in volume and turnover. On the whole, its growth has exceeded that of the Community's economy by about one percentage point per year. Rapidly rising production volumes, recently paralleled by a slow decrease of employment levels, indicate rapid progress in productivity; past performance shows the vitality and capacity for renewal of this traditional but innovative industry.

In 1988, exports outside the EC reached ECU 1.3 billion. Paper and cardboard consumption by the industry itself was close to 20 million tonnes, half of

it accounted for by newspapers, magazines and periodicals.

With publishing, the printing industry is essentially a provider of products which incorporate information, knowledge and entertainment. Its central, strategic and political weight thus stems not so much from its economic size, but more from its cultural, educational and intellectual role in communicating information and ideas in democratic societies. The present developments in several Eastern bloc countries may offer new and large markets for the printing industry.

Consumption

Demand for printed products depends on a number of demographic and economic factors. Among the demographic elements are population growth, composition of households, school, university and training course enrolment, and levels of education. Despite static or low growth of the population, the number of households continues to grow as well as the proportion of income available for information. The educational levels of the population and the number of managerial jobs are also going up, requiring more information. All this will continue to stimulate the demand for newspapers, magazines, periodicals and probably also for books.

The main demand for print however, comes from the activity of industries and services, including government authorities, with only a small part of the market directly dependent on personal consumption. Thus the main economic factors influencing the demand for printed products relate to levels of dis-

Table 1
Main indicators, 1980-89
Printing

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Net exports (1)	215	254	213	258	303	495	340	447	643	N/A
Production (2)	30 696	32 373	35 045	36 429	40 404	44 102	44 923	47 921	51 439	57 336
Employment (2)	793	752	726	716	708	699	680	682	667	671

(1) 1980: EC 9; 1981-83: EC 10; 1984-88: EC 12; CN 49.01, 49.02 are not included as they also cover the publishing industry; Nimex 49.11.30 figures are not available before 1985.

(2) Excluding Ireland; EC10: enterprises with 20 or more employees; Spain and Portugal: all enterprises; United Kingdom: printing and publishing combined.

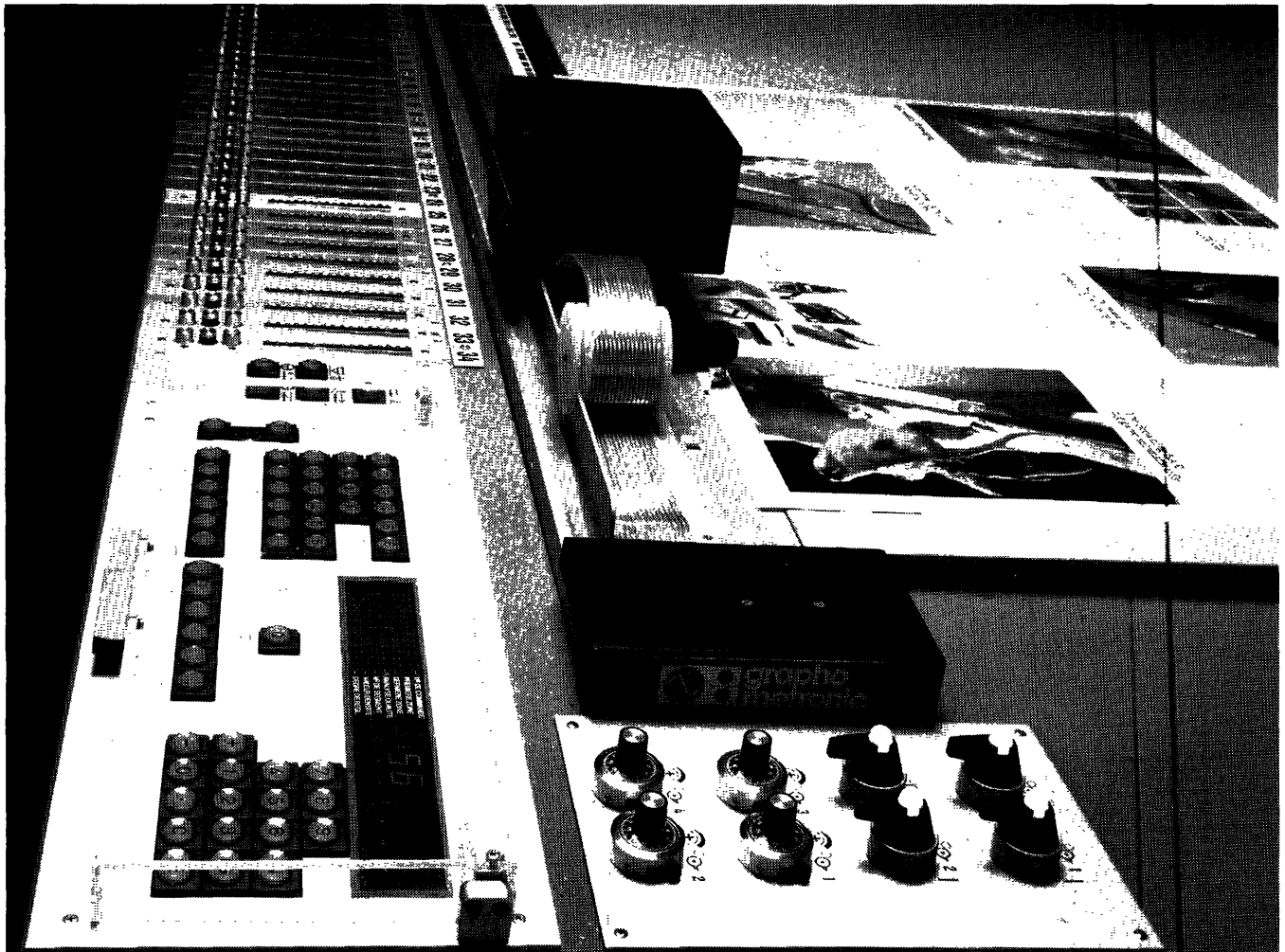
Sources: Intergraf, Eurostat (Inde, Comext).

posable income, growth in business activity, increases in the number of establishments and particularly the growth in advertising. Rapidly rising levels of advertising expenditure are a crucial element for the industry. In the Federal Republic of Germany for example, close to two thirds of print production is directly or indirectly related to advertising, and printed advertising material shows a higher level of growth in several Community countries than printing as a whole. This growth may be affected by the expansion of commercial TV.

Although more books are being published than ever before, they only represent a small segment of the European printers' market. The commercial sector of printing is experiencing a boom in demand. Catalogues, brochures, tourist information, annual reports, and business forms are being printed in ever-increasing volumes. Also, new technologies have opened up new and growing markets for printed matter, e.g. computer manuals and a variety of teaching material.

This upward trend in overall demand has been stimulated by product development and more active consumer-oriented marketing, i.e. catering for special interests. Quality standards are rising visibly, particularly in creativity and design by electronic means, and improved equipment for colour printing. Multicoloured pictorial information is moving ahead for advertisements, magazines and company reports, but the majority of newspapers also make use of colour inserts and pre-prints by web offset.

Specialization to cater for interest segmentation has been facilitated by a reduction of the cost penalty for shorter runs. The number of magazine titles and pages is moving up. In the UK for example, there are now close to 3 000 consumer magazines, over 50% more than a decade ago. In France, where newspaper circulation is extremely low, periodicals of all kinds put out over 1 300 copies for every 1 000 citizens. In Italy, the circulation of newspaper magazines is booming and printed advertising is growing by 6 to 8% annually. However, in the business forms sector, professional printing has experienced some





difficulty in keeping its place, since these items are increasingly produced on in-house computers and laser printers of firms and public agencies.

Production

Information needs are being satisfied by a widening variety of electronic media and communication devices. Nevertheless, printing characterized by permanence and high information content, has retained its position as a convenient, widely accessible and effective medium of communication. In general, the substitution of printing by electronic or 'soft' media and indeed the introduction of all the newer technologies, although rapid, has been much slower than expected a decade ago. None the less, the necessity to process and exchange information efficiently in our societies will continue to increase.

Current developments in the industry indicate a close link between the printing sector and the global development in communication and information technology. Cross-fertilization and mutual dependence are apparent in technology and media usage. Research has shown that in the past competition bet-

ween different market categories was mainly directed towards increasing capacities. The resulting structural change remained manageable because at the same time the total market expanded greatly. Such an expansion is likely to continue into the future, but the relationship between various communication areas will become more differentiated. The media researchers describe these sometimes overlapping effects as partial substitution and complementation. The effects have to be seen in the context of specific groups. However, it is important to realize that, in this respect, electronic communication should not be seen as something which does not concern the printing industry or which is *per se* directed against it. Apart from pure printing products and pure non-printing products, in certain parts of the information market there will be an increasing amount of 'mixed information' i.e. purpose- and user-oriented mixed solutions consisting both of printed and electronic communication. This explains the efforts of the printing industry to open up new markets in both areas by early participation in new information technologies and active diversification of business activities.

The printing industry has become a high technology operation, with new equipment having a pervasive impact not only on type of work and volume but also on marketing, work flexibility and generally on management. Many aspects of the print production process are now automatic processes, calculated, measured and controlled by computers and microprocessors. In the last few years, there has been a substantial increase in investment in new printing machinery in several Community countries. The new machinery takes the following main forms:

- computerized typesetting, laser and photo-setting, with photocomposition the predominant technology ;
- computerized automated equipment to control the machines, with microprocessors increasingly used in ancillary control functions such as ink regulation ;
- linking of printing and telecommunications in new information retrieval systems ;
- use of new chemical and physical methods in the chain of activities from input to shipment.

There has been particularly fast change in the pre-press sector where, at least in the more economically advanced parts of the Community, even small printing and reproduction houses now resort to totally electronic pre-press systems with word and image processors, electronic setting of colour

images, etc. Desk-top publishing by customers as well as printing houses makes it possible to take a floppy disk straight from the word processor and feed it directly into computerized typesetting systems. Such systems not only set text, but combined with scanners they handle layouts, including images and diagrams. But customers' own keying work leads to ever greater demand for photosetting and professional printing which the in-house desk-top equipment is not capable of producing effectively and economically.

In a parallel development, some major customers of the print sector, such as mail order catalogue houses, have begun to typeset their own pages; this allows for last-minute changes and greater data security. In response, some printers have installed complete electronic pre-press systems capable of handling various types of input from customers, whether or not finished, to convert them into high quality print. By moving typesetting in-house, only printing, binding, addressing and mailing are needed to reach the readership. In other areas, computers allow for new and cheaper creative print design and advertising. Elements in advertising can be changed quickly to see how they look on a page.

Further down the printing process, modern technology offers electronic whole-page transmission in colour, ink-jet, computer-controlled servomechanisms, electronic automatic binding — notably for paperbacks — and polywrapping of magazines ready for dispatch. Highly automated, versatile machines allow shorter print runs to be handled economically through lower changeover and make-ready times; customers now often prefer to print a short first run and then obtain further reprints. All this also helps specialization of content, notably in advertising, which requires message personalization in market media. The speed and automation of binding and finishing machines has also been continuously improving to unprecedented levels. In 1987, the first lines for largely automated book manufacturing from German equipment producers went into full production at book printers in different parts of the Community.

With pace and intensity varying from one country to another, all this equipment which reduces the fixed cost per unit of printing, has been gradually introduced in all Member States since the early 1970s. Non-labour unit costs as a proportion of overall costs may have risen, due to a relatively reduced use of labour. On the whole, the new technologies were not as rapidly adopted as originally foreseen and have thus not created the huge disruption which many expected. The reasons for this include the time

it took to develop fully and improve the new equipment, and to reduce costs by incorporating cheaper electronic devices, better software and computer memories. Capital limitations, and occasionally the requirement for labour retraining, have also played a role, as well as the fact that the new equipment often entails a jump in capacity with no immediate corresponding demand.

As there are only a few producers and worldwide suppliers of major equipment, modern technology is available everywhere. In 1985, the Federal Republic of Germany completed the largest industrial project of the 1980s, then with the start of a manufacturing complex producing the world's most advanced automated printing machines. Particularly for sheet-fed offset equipment as well as for other machinery, Germany continues to dominate the market for installations of all size ranges. However, in recent years, Japanese manufacturers have gained some 60% of new installations in the world in the medium format range; for web offset presses, some Japanese companies have made inroads into the Community market. The relative position of other major equipment-producing countries has declined with France, Italy and the United Kingdom among them, even though all these Member States still have some large and successful producers. In Italy, for example, the production of big rotogravure and flexographic presses has been growing rapidly. The major international printing machinery exhibitions take place in France (TPG), the United Kingdom (IPEX), Italy (GEC), Japan (IGAS) and the USA (Print-Chicago), but Drupa in Düsseldorf outstrips them all and has been joined by Imprinta (also Düsseldorf) which concentrates exclusively on the pre-press sector.

The European printing industry buys significant numbers of American and Japanese presses, and an Israeli company is a strong competitor to British, German and Japanese producers of electronic image-processing equipment. Overall, international competition in the printing sector is fierce and in this respect, measures which encourage the harmonious development of the printing industry in the EC are vital.

Industry structure

The structure of the printing industry in the Community today is one of a very few giant businesses (1 000 or more employees), a modest number of medium-sized plants (a few hundred employees) and a very large number (thousands in every large industrialized country) of small businesses mostly family-owned. Printing firms still number around 6 000 to

10 000 in Member States such as France, the FR of Germany and the United Kingdom, and in the region of 3 000 in the Netherlands and Belgium.

There is great diversity in print markets and products. Also the customers of the printing industry range from small local businesses to large multinational concerns buying a wide range of products. Private consumption represents only an insignificant proportion of print orders, whereas advertising and general commercial printing constitute a very considerable part of the turnover. Demand for print is often for a very precise delivery date. The printer must be able to satisfy a variety of requirements within a very short time, whilst still offering irreplaceable quality and personalized service. Publishers purchase less than half of the production of printers (newspapers, magazines, books). All other products such as printed packaging, advertising, forms, catalogues, etc. are extremely important for printing firms. Less than 10% of printing firms have special links with publishers: printing and publishing tend to take place in the same business.

In the newspaper magazine and book publishing sector, ownership used to be in the hands of families. However, in the last decade, economies of scale implying huge capital expenditure and opportunities for full exploitation of related information markets,

have led to many mergers and takeovers. These have taken place not only between publishing firms (especially in newspaper publishing) but also between them and other media activities, with some becoming publicly owned global information businesses, trading information in a variety of electronic and printed forms. Most newspaper and some magazine publishers have their own printing equipment. In the Community, as well as in other developed regions, there is now increased competition among top printer/publishers in the major product markets. The printing industry proper, on the whole, has not gone through a similar merger wave.

Modern technology has favoured large-scale operations catering for national and transnational markets with ever wider and faster presses and other expensive equipment which only financially powerful investors can afford. But there has also been a surprising vitality in the medium to smaller firms, partly stimulated by the reduction in cost of more versatile equipment which has helped many such firms to improve quality at moderate prices and exploit niche markets for differentiated products and services. Usually, these smaller firms have initially computerized only their existing production processes. Most are catering to smaller and more local customers, or have become specialized subcontractors.

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC (1)	30 696	32 373	35 045	36 429	40 404	44 102	44 923	47 921	51 439	57 336
Index	69.6	73.4	79.5	82.6	91.6	100.0	101.9	108.7	116.6	130.0
USA (2)	22 037	30 618	39 296	46 184	59 295	65 430	53 918	49 199	51 210	61 924
Index	33.7	46.8	60.1	70.6	90.6	100.0	82.4	75.2	78.3	98.8
Japan (2)	17 099	24 048	25 672	31 425	37 024	42 475	46 747	43 850	54 450	N/A
Index	40.3	56.6	60.4	74.0	87.2	100.0	110.1	103.2	128.2	N/A
Production in constant prices										
EC (1)	46 449	42 446	41 526	41 429	43 270	44 102	44 529	46 293	46 860	48 759
Index	105.3	96.2	94.2	93.9	98.1	100.0	101.0	105.0	106.3	110.6
Trade (3)										
Exports extra-EC	358	421	404	463	543	933	857	924	1 275	N/A
Index	N/A	N/A	N/A	N/A	N/A	100.0	91.9	99.1	136.7	N/A
Imports extra-EC	143	167	191	205	240	438	518	477	648	N/A
Index	N/A	N/A	N/A	N/A	N/A	100.0	118.2	108.8	147.9	N/A
X/M	2.5	2.5	2.1	2.3	2.3	2.1	1.7	1.9	2.0	N/A
Imports intra-EC	506	556	647	716	828	1 674	1 777	1 927	2 511	N/A
Index	N/A	N/A	N/A	N/A	N/A	100.0	106.2	115.1	150.0	N/A

(1) Excluding Ireland; EC 10: enterprises with 20 or more employees; Spain and Portugal: all enterprises; United Kingdom: printing and publishing combined.

(2) Census of Manufactures and Eurostat estimates.

(3) 1980: EC 9; 1981-83: EC 10; 1984-88: EC 12; CN 49.01, 49.02 are not included as they also cover the publishing industry; Nimex 49.11.30 figures are not available before 1985.

Sources: Intergraf, Eurostat (Inde, Comext).

The investment boom seems to have peaked in most Member States around 1982 (1984 in the Netherlands), when printers, repro-houses and finishers invested heavily in the new equipment on offer. There is now some over-capacity in Europe, notably in the web offset sector. This is having an impact on price levels and profitability, making the printing market even more competitive.

Employment

In the Community, employment in the printing industry numbers some 671 000 jobs in 1989 and represents as much as 2% of the total labour force in some Member States. Some three-fifths of the employees are highly trained specialists, a much higher percentage than in other industries.

The EC printing industry experienced substantial overall job reduction in the second half of the 1970s. This trend was partly due to a constant outflow of trained workers from the printing industry to publishers and in-house printing activities of public bodies and firms; in addition, the new technologies affected in particular the more manual jobs. However, since 1982 employment in the Belgian graphic industry has been stable and in the Netherlands, employment rose until 1981, followed by a fall until 1984. It was in the pre-press sector, and mainly in the setting area involving changeover from hot metal to phototypesetting, that typesetters, letterpress printers and platemakers had to find alternative occupations, mostly in lithography. Expansion of the market combined with overall dynamism of the printing industry, a network of social regulations and agreements, as well as extensive retraining within the industry, helped to facilitate the adjustment, which is now well advanced.

Unemployment of skilled workers in the printing industry is now lower, in percentage terms, than in the economy as a whole. This in itself is a remarkable achievement in view of the technical revolution which has swept up the industry and boosted its productivity. In general, the number of less skilled production workers, as a percentage of total employment, may well continue to decline. Indeed the major concern of the printing industry now and for the coming years is to be able to recruit sufficient well-educated entrants to the industry. In all the major countries of the Community the industry has been assessing future needs and making special efforts to attract the right calibre of recruit. This is a worldwide problem, and industrialized nations outside Europe are making efforts to attract skilled immigrants, which may further exacerbate the

problem for some European Community countries. But future employment can be expected to confirm an ongoing trend of slowly increasing numbers of well-paid, highly trained workers, with more participation by women. As in most other industrial sectors, job creation will be linked to overall economic growth, availability of the required type of skills and the necessary flexibility in labour and social legislation.

The printing industry is characterized by the high labour content of its cost structure. In the Federal Republic of Germany, where labour costs are probably amongst the highest, they represent 36% of total costs as compared with 24% for industry overall. The ever greater need for skilled workers and sharp rises in social charges have contributed to this situation. Overtime and shift work, notwithstanding their cost, are unavoidable in an industry characterized by time constraints, particularly at a time when working hours are going down. According to Unice, harmonization of social conditions at European level would involve the risk of increases in wage costs on a scale which would cause very serious problems.

Investment and related training needs

During the last two decades, the printing industry has been confronted with the necessity to alter dramatically, expand and diversify its technical skills in the production process in order to respond to changes in the printing processes described above. The ever-widening range of input sources and techniques has affected the whole chain of production: suppliers of paper, chemicals, films and plates, printing inks, computer-based front-end typesetting and reproduction systems, cameras and scanners for reproduction, and printing and finishing equipment. The production management function has become immensely complicated and now requires mastery of technology and complex financial and marketing matters. It is therefore no surprise that experienced, multilingual and creative people are, more than ever, the key element for cost-effectiveness, speed and quality.

With the present levels of technology, it is more difficult for the industry to rely on printing schools and colleges to provide training to the levels required by these new technologies. The manufacturers themselves have been taking over a greater educational role in bridging the gap between skills learned at school or in-house and the requirements of industry, and have tried to collaborate with the schools to integrate training in their basic curricula.

Traditionally, within the industry the moves of workers and other employees were chiefly horizontal, between different kinds of hardware, involving minimum retraining. Nowadays, job changes often consist of transition from secondary to tertiary jobs such as software-related qualitative changes in occupations with new skill requirements, language knowledge and work organization, including new patterns of working hours and mobility across the printing sector. It should therefore not be surprising that retraining in the new microelectronic technologies has all but been accomplished.

Apprentice and trainee numbers are now increasing again, reflecting renewed confidence in the industry's future. In the FR of Germany and the Netherlands for example, the annual requirement for skilled workers represents some 4 to 6% of the present workforce, with somewhat greater intake for the pre-press and finishing sectors and a reduction for less-skilled workers. For young people, entry into the industry remains as before, i.e. in-house training of apprentices in printing companies or vocational courses in colleges or schools (usually lasting around 3 years). The curricula show that specialization is tending to decrease, and to be replaced by broader based training in the new technologies. The schools have experienced increasing difficulties in acquiring advanced equipment; there is a need for cooperation between government authorities, trainers and private entrepreneurs in order to respond better to training requirements. Printing employers' federations in several countries, sometimes in close cooperation with the trade unions, have taken action to give the industry a proper, dynamic image to attract young people, and the training itself has been adapted to meet contemporary needs. However, as in many other high-tech industries, there remains at present a serious shortage of qualified specialist labour.

Trade

The Community market has no protection against imports from EFTA, and very little against imports from other third countries. Nevertheless, with the exception of book printing, relatively little printing work is placed outside Western Europe. Imports tend to consist mainly of material, particularly advertising literature, printed outside on behalf of foreign principals (not domestic print) and imported by them to support their activities in the Community. However, book printers do place a substantial amount of printing work in the Far East, Eastern Europe, and some in North America when exchange

rates are favourable. There is also a sizeable import of periodicals.

While the domestic Community markets remain the focus of most printers, Community trade is an important facet of demand for a number of Member States. Total exports amounted in 1988 to ECU 1.275 million. The main destinations of these exports were: Switzerland (with ECU 237.8 million or 18.6% of total extra-EC exports), the USA (14.5%), Austria (11.8%), Sweden (10.6%) and Norway (4.9%). Lesser clients were Canada, Australia and Japan, in order of decreasing importance.

In 1988, imports originated mainly from Switzerland (27.6%), the USA (18.9%), Austria (11.4%), Sweden (11.3) and Japan (7.8%). Other less important suppliers were Andorra, Hong Kong and Finland. Total imports totalled ECU 648.2 million.

At present, the main competition for the EC printing industry is between Member States.

Table 3
Imports and exports by country, 1988

(million ECU)	Exports				Imports			
	Intra-EC	(%)	Extra-EC	(%)	Intra-EC	(%)	Extra-EC	(%)
EC	2 492	100	1 275	100	2 511	100	648	100
B-L	312	13	48	4	295	12	30	5
Denmark	46	2	70	5	87	3	57	9
FR of Germany	872	35	495	39	281	11	193	30
Greece	15	1	2	0	28	1	4	1
Spain	49	2	41	3	71	3	20	3
France	301	12	211	17	684	27	106	16
Ireland	52	2	11	1	77	3	8	1
Italy	279	11	133	10	122	5	34	5
Netherlands	341	14	91	7	352	14	44	7
Portugal	20	1	2	0	21	1	4	1
United Kingdom	205	8	172	13	493	20	149	23

Sources: Intergraf, Eurostat (Comext).

Graphic products

Production of graphic products in EC Member States is determined mainly by internal demand. The export quota, i.e. the proportion of export turnover of printing firms in relation to total turnover, is in general below 10%. Taking only the four largest EC countries, Italy and the Federal Republic of Germany have the highest quotas at around 8 to 9%, whereas Great Britain and France have the lowest quotas at around 4%. These comparatively low export quotas are explained by several factors: need for close contacts with the customer, great need for

communication, linguistic barriers and high transport costs.

The greater part of trade of printing companies is with customers in Western Europe, especially in the Member States of the EC and in the EFTA countries, in so far as they are geographically close and there are no major linguistic problems. Western European print buyers place relatively few orders in Eastern Europe or outside Europe.

Export business is limited mainly to long run or specialized orders, particularly catalogues and other advertising printing produced in the gravure process, and to books and periodicals. Most exports are therefore produced by the very small number of large gravure and offset printing houses.

It is not possible to give precise figures on the trade and structure of trade in graphic products, by product and country, since trade figures for graphic products do not distinguish between trade by printers and trade by publishers and booksellers. This must be underlined, because the added value generated by publishers is several times as high as the added value generated by printers. The figures given by Eurostat as printing trade figures therefore greatly exaggerate the position so far as printing is concerned, and the structure figures give an image of foreign trade in press products and literature, rather than in printed products. Only a thorough revision of foreign trade statistics, as demanded for a very long time by the printing industry, can provide a better understanding of the extent of foreign trade in printing.

Research and development

The great advances in print technology must be ascribed in very large part to the research carried out by the major suppliers to the printing industry — press and equipment manufacturers, paper and ink makers, and manufacturers of films, plates and other materials used in the printing process. Some of the larger printing and binding companies have developed equipment to meet their own production needs, but this is the exception rather than the rule.

Finance to maintain printing research institutes independent of any single commercial enterprise has tended to be a diminishing resource. The German printing research institute, Fogra in Munich, maintains particularly good and close cooperation with the German printing industries' federation, jointly publishing a steady flow of research covering a wide area of practical printing problems. Another major

institute is PIRA in the UK, which covers paper and packaging as well as printing; it still does practical, technical research, but has more recently broadened its activity into technical-economic research, financed usually as multi-client studies. IGT in the Netherlands was also in the top rank of the printing research institutes in the Community, but was recently closed due to lack of funds. Like the other two, IGT developed test and measuring apparatus which was successfully marketed in the printing industry for better control of the printing process. These three institutes have made a major contribution to the understanding and standardization of printing processes.

Printing research on a smaller scale is also done at the Graphic College of Denmark, but while paper research institutes have continued to exist for example in France and Italy, common printing research has lacked finance in most other Community countries. The British and German institutes excepted, printing research has probably enjoyed relatively greater resources and support in non-Community countries like Finland and Switzerland, where excellent institutes continue to serve the industry.

The cost of research and its increasing importance would seem to argue in favour of the development of specialized centres for high quality research, spread among the Member States, but working for the European Community as a whole.

Environmental protection

For years, it has actively participated in reducing pollution. Technical progress has enabled the industry to use methods and materials which do not harm the environment, and considerable progress has been made in recycling of waste products. This was done before the tightening-up of environmental legislation.

In some Community countries, there is detailed discussion between industry and government before the introduction of new anti-pollution measures. In others it would appear that the legislator introduces measures to be applied to many industries and/or many types of equipment, for instance printing presses, without making any distinction between widely varying levels of pollution, or even whether all types of such equipment cause any pollution at all. The printing industry is ready to cooperate, but insists that it should be consulted in advance.

Harmonization of environmental protection standards within the European Community will be welcomed; uniform application is as essential as harmonization of the legislation. Stricter rules and/or their stricter application in one Member State compared with other States can seriously distort the conditions of competition, since compliance with anti-pollution measures frequently occasions heavy financial and other burdens for those concerned.

The Impact of '1992'

Whilst the measures to achieve a single European market have had little effect on the printing industry so far, and may continue to have little effect after 1993, there is evidence that many of the large firms and some of the smaller ones have been adapting their structure in order to be able to compete in a wider market. This has involved mergers with and acquisitions of companies in other Community countries, and also looser forms of cross-border partnership. Some companies have shown a greater interest in selling print to other Community countries, but this activity is still regarded as exporting, rather than as an expansion of the domestic market.

Outlook

The outlook for the industry is relatively healthy assuming steady increases in disposable incomes, buoyant business activity and a continuation of the growth in advertising expenditure. Estimates to 1990 are available for some Member States and these indicate moderate to strong growth in turnover, with the FR of Germany anticipating real growth of 2 to 3%, France around 7% and the Netherlands 8 to 9%. Employment trends are likely to be mixed; some countries expect at least marginal growth in employment, others anticipate a decline reflecting continuing restructuring and productivity improvements.

Overall, the industry is well placed to take advantage of growth opportunities, given recent investment in technology and training. However, competitive pressures from countries outside the EC will continue to present challenges for the industry.

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DAILY NEWSPAPERS

(NACE 474.4)

Summary

Since the emergence of other forms of mass communication, daily newspapers have undergone a decrease in popularity and hence in revenue. Television advertising in particular has encroached upon the daily newspaper's financial basis, which, to a large extent, is bound up with advertising. In many countries, the weaker newspapers have been granted public subsidies to stay in business. It is recognized that new developments in printing and related techniques have made a high degree of computerization and automation inevitable. This has led to job losses in the manual-labour sector of this traditionally highly unionized industry. However, the number of journalists is currently increasing.

Current situation

The daily press in the EC claims 1 934 titles, with a daily print-run of 74 million copies.

With some exceptions, companies in the sector have evolved from the traditional family-owned or single proprietorship enterprise towards medium-sized or large enterprises. This is due to the extensive investment required for modernization and automation (e.g. a printing machine costs approximately ECU 16 million) and the fact that a certain circulation level needs to be reached for economies of scale to be realized.

Table 1
Main indicators
Daily newspapers

(1 000)	1982 (1) (2)	1986
Apparent consumption (tonnes)	4 250	4 937
Production	72 263	74 262
Employment (3)	234	227

(1) Apparent consumption — EC 10.

(2) Production — EC 9.

(3) CAEJ estimates.

Source: CAEJ.

The sector's income depends on two key factors: the number of copies sold and the take-up of advertising space. Newspaper circulation levels vary widely between Member States.

The reading rate for daily papers, which can be defined as the ratio of print-runs to population, appears to be linked to reading levels in general. A rough distinction can be made between northern Member States such as the United Kingdom, the Federal Republic of Germany and the Netherlands, where the reading rate is between 300 and 400 copies per 1 000 inhabitants, and southern Member States such as Italy, Spain, Portugal and Greece, where approximately 100 dailies are read per 1000 inhabitants.

Given the role of the daily newspaper in democratic societies, i.e. the dissemination of different views — a right guaranteed under the Convention of Human Rights — newspapers need to be sold at a price that makes them accessible to large portions of the population.

Table 2
Daily production

(1 000)	Number of newspapers		Daily print-run	
	1982	1986	1982	1986
EC	1 633	1 934	72 263	74 262
Belgium	38	36	2 259	2 180
Denmark	46	46	1 821	1 837
FR of Germany	1 202	1 273	25 538	20 918
Greece	N/A	129	N/A	1 321
Spain	N/A	102	N/A	3 005
France	101	88	10 899	9 886
Ireland	5	5	650	555
Italy	88	78	7 490	8 378
Luxembourg	4	4	110	115
Netherlands	48	48	4 562	4 527
Portugal	N/A	25	N/A	420
United Kingdom	101	100	18 934	21 120

Source: CAEJ.

Production and consumption

The daily press has made considerable efforts to modernize its production techniques; composition rooms, editorial offices, dispatching departments and rotary press rooms have all undergone far-reaching changes in the basic methods of production.

Investments made in recent years should allow the daily press to offer its readers and advertisers an excellent printed product of high editorial quality.

Table 3 gives consumption figures in tonnes, rather than value. These data provide a more reliable picture, since the price of paper is different in each



Member State (e.g. in Belgium it is relatively cheaper than in the UK).

Table 3
Consumption of paper

(1 000 tonnes)	1982	1986
EC	4 250	4 937
Belgium	196	194
Denmark	165	189
FR of Germany	1 287	1 448
Greece	54	85
Spain	N/A	267
France	569	499
Ireland	35	30
Italy	315	366
Luxembourg	8	8
Netherlands	381	463
Portugal	N/A	38
United Kingdom	1 240	1 350

Source: CAEJ.

In the advertising market, newspapers compete directly with other media. The appearance of a new advertising medium inevitably results in a revised division of advertising expenditure among the traditional media. Television advertising is one of the main competitors of the written press.

Table 4
Percentage of advertising expenditure in the daily press

(%)	1982	1986
Belgium	32.4	28.3
Denmark	89.2	89.2
FR of Germany	41.8	37.9
Greece	25.9	15.3
Spain	30.1	33.8
France	27.1	20.3
Ireland	52.6	30.6
Italy	25.4	19.5
Netherlands	42.0	39.7
Portugal	28.6	28.4
United Kingdom	34.3	31.4

Source: CAEJ.

The daily press in most EC countries has seen its market share of total advertising expenditure diminish. This is largely due to increased television advertising and the introduction of commercial television channels. Between 1980 and 1985, the proportion of total advertising expenditure accounted for by advertising in newspapers has marginally declined in Belgium, the FR of Germany, the Netherlands, Portugal and the UK. In these countries it represents around 30 to 40% of the total. Member States that have experienced a much

Table 5
Employment in 1982 and 1986

	1982 (1)				1986			
	Journalists	Manual labour	Admin. person.	Total (2)	Journalists	Manual labour	Admin. person.	Total
Belgium	968	2 762	2 068	5 798	1 045	2 499	2 025	5 569
Denmark	1 650	5 100	4 400	11 150	1 970	5 700	4 600	12 270
FR of Germany	10 397	26 353	36 495	73 245	11 173	25 560	35 901	72 634
Greece	1 058	1 005	469	2 532	1 711	2 005	N/A	3 716
Spain	N/A	N/A	N/A	N/A	2 560	5 089	2 222	9 871
France	6 000	15 500	14 000	35 500	4 870	9 570	6 090	20 530
Ireland	555	864	1 084	2 503	503	738	1 012	2 253
Italy	4 024	14 076	N/A	18 100	4 077	12 576	N/A	16 653
Luxembourg	58	420	N/A	478	60	500	N/A	560
Netherlands	3 146	4 072	6 672	13 890	3 061	4 222	6 421	13 704
Portugal	N/A	N/A	N/A	N/A	400	3 200	N/A	3 600
United Kingdom	8 800	41 200	21 100	71 100	12 000	35 600	18 200	65 800
Total	36 656			234 296	43 430			227 160

(1) EC 10.

(2) France — regional daily press only.

Source: CAEJ.

sharper decline in the portion of advertising expenditure accounted for by newspapers include Ireland, Italy, France and Greece. For these countries the relative proportion of advertising in newspapers is much lower. The only country to have experienced an increase in this area is Spain. However, the rise was only marginal.

In some Member States, radio and television stations protected by a State monopoly have been authorized to increase their volume of advertising.

Between 1982 and 1986, the number of newspapers in the EC has been relatively stable, although this masks a slight drop in Belgium and the UK, and a more marked decline in France and Italy. Conversely, in the FR of Germany there has been an upward trend in the number of newspaper titles.

As far as readership patterns are concerned, it appears that adolescents read less in general and fewer daily newspapers in particular.

Employment

Although figures for 1982 and 1986 are not entirely comparable (EC 10 compared with EC 12), employment in general is decreasing slightly. In EC 10, employment in the sector fell from 234 000 to 227 000. This tendency is more marked in the manual-labour sector and is a result of computerization of printing techniques and the introduction of other new technologies. On the other hand, the proportion of journalists to total employees has increased from 15.6 to 19.1%.

Outlook

Daily newspapers are aware that continuous efforts are needed in several key areas. Chief among these is editorial content. The increase in the number of journalists demonstrates that newspapers have invested in this area. Many newspapers have also undertaken readership surveys in order to understand the rapid changes in lifestyle and taste among their readers. Another important area is the quality of newsprint; the possibilities here have been enhanced by increased use of colour, as well as more variety in the visual presentation of material.

Many newspapers also recognize the value of diversification. The primary goal of newspaper publishers is to disseminate information and opinions. Experience gathered by newspaper publishers and editorial teams has prompted newspapers to expand into various fields of information.

The future of the written press also depends on external factors such as the price of raw materials, especially newsprint, which is a significant element in production costs.

With reference to 1992 and beyond, it is extremely difficult to provide a reliable forecast on the development of the newspaper sector, although some increase in concentration of ownership is anticipated. With regard to advertising in newspapers, no significant changes are anticipated in the national markets.

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PERIODICALS

(NACE 474.4)

Summary

There are more than 20 000 periodical publications in the European Community.

The publishers are groups of international dimension (Bertelsmann, Hachette, etc.) and family-owned SMEs where the capital is held by a few founders.

In most Member States, there is a noted trend towards concentrated shareholding. This phenomenon is due to the much too low capitalization of press SMEs as regards the investments required for computerization or promotion, and to the nature of the advertising market.

Description of the sector

Present in great force in the daily life of Europeans, be it at home with mass circulation periodicals or at work with specialized publications, periodicals are nonetheless still not well known from the economic perspective.

These publications actually cover both the business and the working world, sciences and technologies, leisure, life styles, culture and politics, or in general, all fields of expression of knowledge and opinion. In this regard, they have an identical role to that played by the dailies in the life of the constituent democracies of the European Community.

To this diversity of contents is added that of periodicity — weekly, bi- or tri-weekly, semi-monthly, monthly, quarterly, or biannual — and that of the physical characteristics of the products — quality of paper used for the print, such as magazines or newspapers, information circulars, etc.

Given its pluralism and dynamism, this multifaceted situation makes it difficult to undertake a statistical approach of newspapers and periodicals at the European level. Each Member State defines in its own way the outlines of this sector, combining several criteria which vary depending on the content, periodicity or advertising volume. Some combine the so-called 'publishing' press with that of associative press in their census, while others consider only the 'publishing' press. As result, there is no Community definition of the periodical press to date.

Current situation

Except in Italy and Portugal, where the advertising turnover represents less than a third of the overall turnover of periodicals, advertising represents more than 40% of the revenues in France, exceeds 50% in Federal Republic of Germany and Belgium, and is more than 70% in the United Kingdom.

In certain countries, the competition of television on the advertising market is particularly keen. This phenomenon is felt all the more in places where audiovisual deregulation is advanced, as is the case in Italy. The same trend is evident in Portugal, but for opposite reasons, given that in this country TV advertising costs are the lowest in Europe.

It is also worth noting that mass circulation magazines appear to be particularly vulnerable to the competition from the audiovisual sector, whereas technical and trade publications are enjoying the full benefits of the growth in advertising expenditures in most countries.

For a number of mass circulation periodicals, a new source of competition has recently surfaced: that of dailies, through their topical or specialized supplements. To stop the erosion of their sales and the increasing preponderance of periodicals, numerous dailies henceforth develop magazine products that they distribute with the paper, thereby succeeding in meeting the expectations of the readers and at the same time satisfying the quality requirements of advertisers.

This specialization trend, which seems to be the most suitable means for protecting the written press from the competition of audiovisual media, is for that matter general: for the most part, new titles are now created around a segment of readerships and specialized contents, most often conditioned by the existence of a sufficient number of potential advertisers.

This greater specialization makes an essential contribution to the strong growth registered on the average for periodicals.

Finally, there is one last trend discernible in the magazine sector: the internationalization of titles. But this internationalization is made only rarely by export. The most important groups develop inter-



Table 1
Periodicals
Summary table, 1986

	Number of titles	Turnover	
		Total (million ECU)	Advertising (%)
Belgium (1)	395	391	50
FR of Germany	6 908	5 312	55
France	2 378	3 837	41
Italy	3 312	1 992	32
Netherlands (2)	450	N/A	N/A
Portugal (3)	1 100	42	N/A
United Kingdom	5 600	2 222	75

(1) Figures are for 1987; Restricted coverage — Fédération nationale des hebdomadaires d'information and Union des éditeurs de la presse périodique.

(2) Restricted coverage — NOTU (business press only).

(3) Number of titles covers the entire Portuguese press.

Source: FAEP.

national publications on the basis of their national products, and then usually adapt them to each targeted country.

Given that most large press groups have activities in other communication fields (newspapers, TV, etc.), it has unfortunately not been possible to identify the main publishers of periodicals *per se*.

FNPS: Fédération nationale de la presse d'information spécialisée (National Trade Press Federation)

Address: 6bis rue Gabriel Laumain, F-75484 Paris Cedex 10
Tel: (33 1) 48 24 98 30

FAEP: Fédération des associations d'éditeurs de périodiques de la CE

Address: Rue Charles Martel 54, B-1040 Brussels
Tel: (32 2) 230 09 99

PROCESSING OF RUBBER AND PLASTICS

(NACE 48)

The economic importance of the industry

The processing of rubber and plastics is a particularly dynamic sector of the European economy and has been so for many years. It benefits from an ever-increasing demand, thanks to the regular appearance of new products which frequently open up new fields of application for plastics, often thanks to acute cooperation between manufacturers and users.

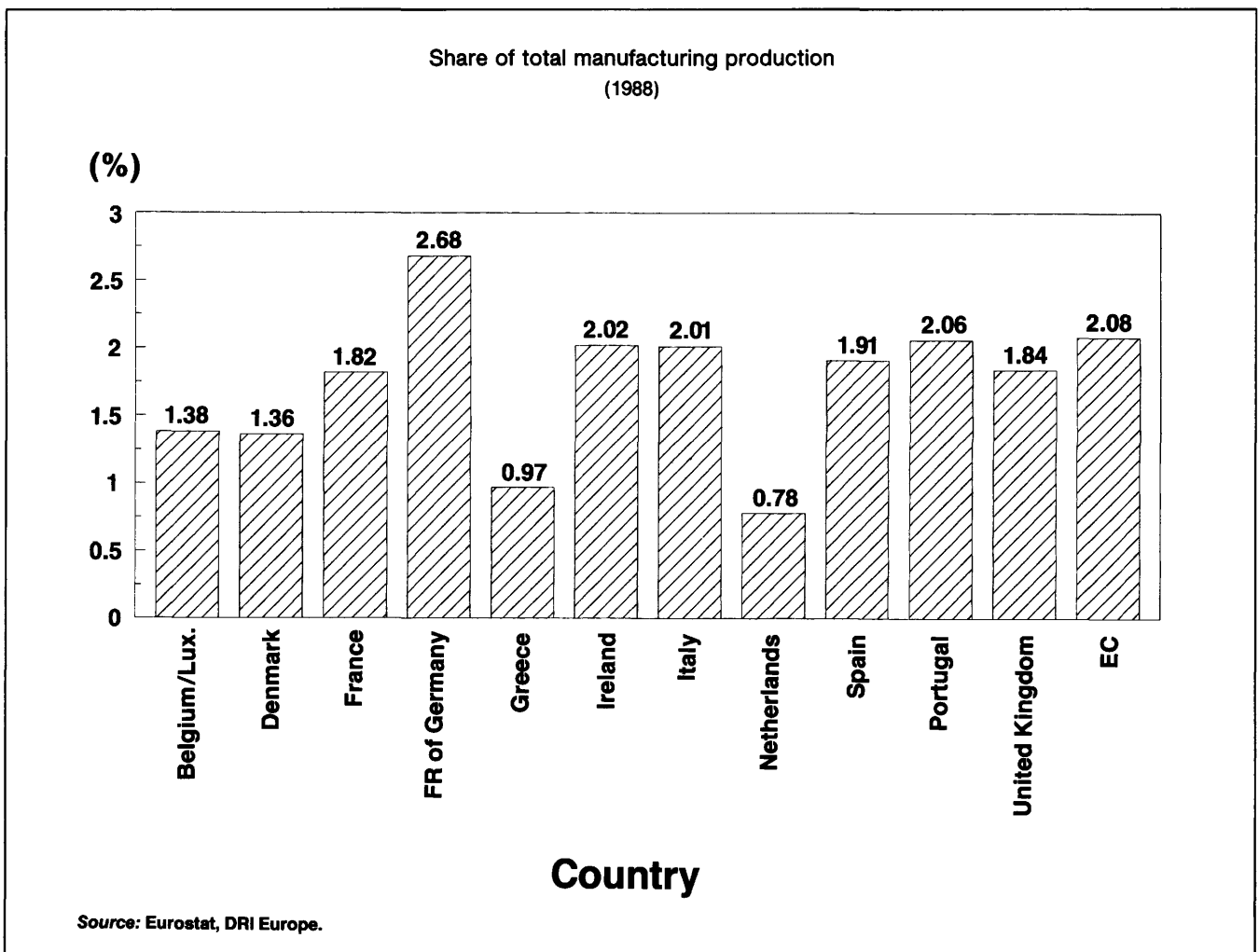
Plastics are used more and more in all areas. Their advantages over more traditional materials such as wood, glass, paper or metal include their price, phys-

ical or chemical properties, the fact that they are easy to use, etc.

Rubber has been in use even longer than plastics, and is a more stable sector than plastics.

The turnover of these two branches taken together hovered around ECU 80 billion in 1988, which represents an average annual growth rate of 7.6% since 1980. Measured in volume, this corresponds to a growth rate of 3.2% a year, i.e. 1% greater than the growth rate of the EC GDP. The sector employs about 1 000 000 persons. Employment had been on

Figure 1



the decline until 1983. Then, the strong growth of plastics caused a sharp rise in employment in this sector, even though employment in the rubber industry continued to decline until its stabilization starting in 1987.

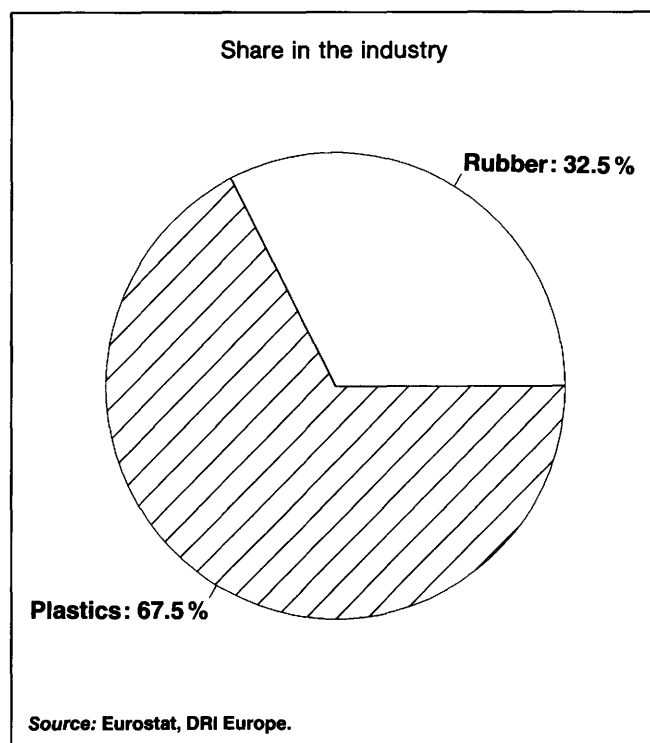
The Federal Republic of Germany is the Community's main producer, as about one third of the total production takes place in the Federal Republic. The Grand Duchy of Luxembourg is also a major producer: considering the small size of its economy, the presence of a single major company explains the relative specialization in this branch.

On the other hand, Denmark, Greece and Portugal are not very specialized in this sector. The lower labour costs in the latter two countries could, however, lead to fast development in this sector in the years to come, as many products require a large manual labour input.

Description of the industry

In terms of turnover, the plastics industry is twice as large as that of rubber.

Figure 2



Plastic or rubber parts are used in virtually all sectors of the economy. Important users include the construction sector, the automobile industry, and electrical and electronic equipment. However, the most important user of rubber and plastic products

is the packaging industry, which accounts for 30% of the demand for plastics.

The automobile industry, and in general that of transport equipment, is another important market. Tyres represent half the activity of the rubber sector. Furthermore, an increasing number of rubber or plastic parts are used in the manufacture of vehicles. Consequently, the automobile industry is a high growth market for this sector.

Structure of the industry

Aside from tyre companies, where concentration is very high, this sector is made up essentially of small and medium-sized companies. The manual labour input may vary widely depending on the products manufactured. Those which require much manual labour are increasingly being imported, especially from Comecon and South-East Asian countries.

The manufacturers of plastics and synthetic rubber (a third of the rubber used is of natural origin), chiefly the major chemical corporations, tend to integrate the companies of this sector in their own structure. This provides an outlet for their products and diversifies their activities in products with greater added value than basic plastics.

Risks and opportunities

Technology

New applications for plastics are constantly being discovered. Development prospects are therefore good in the medium term. Nevertheless, we should point out that whereas the field of applications of plastics continues to widen unrelentlessly, no new plastic substance has been brought out on the market for many years now. In the long term, this could mean a slowing down in the growth of the sector.

Environment

Up until now, plastic products have made headway because of their qualities (low costs, easy to use etc.). Manufacturers will now have to prove that these products are not harmful to the environment, an issue about which consumers are increasingly more sensitive. Industry will therefore have to create recycling possibilities for certain products or use biodegradable plastics. This subject will constitute one of the bases of research in the sector in the years to come.

The single market

Tyre manufacturers have already developed their strategy at world level. The single market will therefore have few consequences in this segment of the market.

In the rest of the sector, we may expect an increase in concentration, especially for the purpose of meeting the financial needs for research and development of new products. The integration of companies that produce rubber and plastics in major groups, for example chemical conglomerates which produce plastics, is another possibility.

Competition from third countries

Trade with non-EC countries is not very developed. In 1988, the supply of plastics was insufficient, so that European manufacturers were not able to satisfy the increasing demand for plastic products. Imports increased their share of the market, even though

companies had cut down on their exports in order to concentrate on the domestic market. As a result, the balance of trade has deteriorated. With the creation of new production capacities, this trend should once again be reversed in the years to come.

Outlook

Prospects remain favourable for this sector, especially in the medium term, when problems of capacity shortages and bottlenecks in the plastics sector will have been solved. Given the constant appearance of new applications for plastics, the growth rate remains greater than the average. An annual volume growth of more than 4% is anticipated in the next few years for the subsector of plastic products. The rubber industry will probably grow at a more moderate pace, around 2.5% per year in volume.

DRI Europe

RUBBER

(NACE 481)

Summary

Rubber processing is a relatively old industry. This industry consists of two distinct segments of comparable importance, which will be studied separately: the tyre industry and the rubber industry, which covers a great variety of products. About half the production of industrial rubber goes to the transport sector, while the entire tyre segment goes to the same sector. Consequently, the rubber industry depends chiefly on the situation in the transport equipment sector.

In 1986, the rubber industry produced around 4 million tonnes in the EC, for a value of ECU 22 billion. In 1989 production exceeded ECU 27 billion.

The EC industry therefore is number one in this sector, with American and Japanese productions in the neighbourhood of ECU 20 billion.

The rubber processing industry employs a sizeable work force, as manual labour is still necessary for a good number of products. In 1987, this industry employed 330 000 people in the European Community. The steep drop registered since 1980, when the number of jobs in the Europe of the seven (Belgium, the Federal Republic of Germany, the United Kingdom, France, Italy, Luxembourg and the Netherlands) amounted to 390 000, appears to be checked now. Employment has been stabilized since 1988.

Table 1
Main indicators, 1980-87 (1)
Rubber

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Apparent consumption								
New tyres	1 856	1 652	1 634	1 618	1 672	1 738	2 012	N/A
Other rubber articles	1 453	1 322	1 380	1 361	1 347	1 402	1 632	1 868
Net exports								
New tyres	241	260	160	184	209	173	252	N/A
Other rubber articles	120	157	134	125	138	146	111	124
Production								
New tyres	2 097	1 912	1 794	1 802	1 881	1 911	2 264	N/A
Other rubber articles	1 573	1 479	1 514	1 486	1 485	1 548	1 743	1 992
Employment (1 000)	394.7	368.0	350.3	332.4	322.3	315.6	351.9	330.0

(1) 1980 EC 9; 1981-85 EC 10.

Source: International Rubber Study Group (*Rubber Statistical Bulletin*).

Table 2
International comparisons

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987 (2)	1988 (2)	1989	1990
Production in current prices											
EC (1)	17 942	17 536	18 390	19 604	21 386	21 591	22 368	23 433	25 164	27 336	N/A
Index	83	81	85	91	99	100	104	109	117	127	N/A
USA (3)	12 333	17 481	19 173	22 909	20 058	28 841	21 939	19 099	19 632	22 273	23 382
Index	43	61	67	79	70	100	76	66	68	77	81
Japan (3)	7 028	9 342	9 391	11 544	13 715	15 207	15 607	15 502	18 792	N/A	N/A
Index	46	61	62	76	90	100	103	102	124	N/A	N/A

(1) Excluding Luxembourg.

(2) Estimated.

(3) Census of Manufactures and Eurostat estimates.

Source: Eurostat (Inde).



Tyres

Consumption

The manufacturing sector has two types of customers. These are automobile producers, for what is called the first installation, and the motorists themselves who constitute the replacement market.

The first installation market is very competitive. The technical and economic criteria (essentially the price) take priority. Automakers and tyre manufac-

turers cooperate constantly on the short and long term by defining their products in relation to each other. This market is important because it often conditions the brand chosen for the replacement.

On the replacement markets, manufacturers are faced with a multitude of customers, from the simple private car owner to the owner of a fleet of vehicles (transport, rent-a-car operators, etc.). Manufacturers do not just offer a product through their subsidiaries and sales networks: they must necessarily accompany this product with a service and technical assis-

Table 3
External trade
Tyres

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Exports extra-EC (1)	501	492	423	465	588	595	577	681	643
Index (2)	95	93	80	88	99	100	97	114	108
Imports extra-EC (1)	209	172	188	214	238	270	310	371	437
Index (2)	81	64	71	81	88	100	115	137	165
X/M	2.4	2.9	2.3	2.2	2.5	2.2	1.9	1.8	1.5
Imports intra-EC	799	782	823	819	839	910	1 026	1 072	1 180
Index	91	88	92	92	92	100	113	118	131

(1) 1980 EC 9; 1981-84 EC 10.

(2) Taking into account changes in EC membership.

Source: Eurostat (Comext).

tance, supplied either by the physical presence of their representatives on the spot, or by written information (leaflets, etc.).

Production

The main tyre producers are located in Europe, the USA and Japan, i.e. the three areas with the densest concentration of automobiles. According to medium-term forecasts, the number of cars will remain stable in the USA, advance slightly in Europe (except for Comecon) and rise sharply in South-East Asia.

The top 10 tyre manufacturers accounted for 84% of world production, before Uniroyal was acquired by Michelin.

Europe represents 34% of the world market, and the United States and Japan 23% and 27% respectively).

Table 4
Estimated turnover of the largest manufacturers, 1988

(billion ECU)	Turnover	%
Goodyear	677	18
Michelin	677	18
Bridgestone	550	14
Continental	321	8
Pirelli	288	8
Sumitomo	254	7
Uniroyal	169	4
Yokohama	144	4
Toyo	63	2
Cooper	55	1
Others	609	16

Source: SEDICA.

Concentration is very strong in this sector and has been become even stronger these last few years through mergers and acquisitions. For example, the

Table 5
National production of passenger car tyres

(1 000)	1984	1985	1986	1987	1988 (1)	1992
EC 12	146 372	149 785	159 001	174 527	182 079	N/A
Benelux	7 580	7 659	6 950	5 794	6 144	N/A
FR of Germany	35 402	36 507	38 838	42 892	42 793	N/A
Greece	315	305	540	769	800	930
Spain	16 500	15 700	16 641	19 523	21 075	20 000
France	42 360	42 255	45 627	49 980	53 332	N/A
Ireland	1 802	1 702	1 840	2 033	2 200	2 772
Italy	19 021	21 947	23 478	26 408	26 099	27 330
Portugal	1 699	1 784	1 773	2 049	2 100	2 600
United Kingdom	21 693	21 926	23 314	25 079	27 536	N/A
USA	172 934	162 584	159 350	167 522	174 341	N/A
Japan	78 976	83 886	88 067	90 373	95 351	N/A

(1) Greece, Ireland and Portugal estimated.

Source: International Rubber Study Group (*Rubber Statistical Bulletin*).

Table 6
National production of commercial vehicle tyres

(1 000)	1984	1985	1986	1987	1988 (1)	1992
EC 12	18 935	18 346	19 415	20 513	22 191	N/A
Benelux	1 077	1 169	1 254	1 339	1 541	N/A
FR of Germany	3 805	3 970	4 023	4 192	4 968	N/A
Greece	469	467	458	504	525	566
Spain	2 400	2 900	2 463	2 709	3 127	3 000
France	5 460	4 249	5 499	5 590	5 701	N/A
Italy	2 847	2 795	2 805	2 974	2 911	3 122
Portugal	455	502	584	666	750	1 329
United Kingdom	2 422	2 294	2 329	2 539	2 668	N/A
USA	36 441	34 339	30 939	35 455	37 010	N/A
Japan	48 287	48 259	44 009	45 518	49 887	N/A

(1) Greece and Portugal estimated.

Source: International Rubber Study Group (*Rubber Statistical Bulletin*).

Japanese firm Bridgestone acquired the American firm Firestone, and Michelin acquired Uniroyal.

Each of the three major manufacturers has a sizeable share of its domestic market: Bridgestone controls 36% of the Asian market, Goodyear 33% of the North American market, and Michelin 36% of the European market.

The recent efforts to set up in Asia are easily explained by the fact that the share of the other groups (i.e. not the three major ones) is clearly greater there than on the other two markets, and that expected growth is decisively greater in this region.

Moreover, given the globalization of the car market, the strategy of tyre makers cannot but be worldwide in scope.

Current situation

1988 was an excellent year for the automobile industry. World production reached a record level, more than 45 million units, up 9% in comparison with the previous year. This progression was registered in all manufacturing countries, whereas in 1987, the USA had not participated in this growth.

As in 1987, the tyre industry benefited from the overall favourable economic activity in 1988. Numerous capacity expansion and modernization programmes were announced for the next few years, especially on the American continent.

International trade

Although still widely positive, the balance of trade of the EC has been in decline since 1980. There must certainly be a decline in the position of certain manufacturers on their home markets. The EC has improved its exports to the USA where production has stagnated, but its position has weakened with regard to Japan. The export/import ratio *vis-à-vis* Japan dropped from 0.54 to 0.38 between 1980 and 1987.

Tyres for bicycles and air tubes are two products which have contributed to this decline in our balance of trade with Japan.

As regards bicycle tyres, very keen competition from South-East Asian countries these last few years has forced numerous factories in Europe to close. Anti-dumping measures taken by the EC proved insufficient, because the situation continues to deteriorate. Only France and Italy continue to produce bicycle tyres.

The progressive disappearance of air tubes in Europe is not due primarily to the growth of the 'tubeless' tyre, but to keen competition between manufacturing countries, among which those of South-East Asia. This phenomenon is all the more remarkable because the raw material is not natural rubber, which is produced in some of these countries, but synthetic rubber.

Employment

With a total of 330 000 persons in 1987, employment has remained relatively stable these last two years. The drop in employment is linked to a drop in production (up to 1983) and to a rationalization of production.

Investments

Strong competition and the struggle of the bigger groups to survive have compelled tyre makers to invest to the limit of their financial possibilities in research and development, rationalizations and capacity expansions. The increasing globalization of the market implies that companies attempt to establish a foothold in all the major markets. For the rubber processing industry as a whole, investment in 1987 was up by 20% in comparison with 1986, for a total of ECU 1 350 million.

Structural changes

Numerous structural changes have taken place these past few years. They were all geared towards increasing the size of the big international groups, often through the absorption of smaller groups. These structural changes were not dictated by constraints from the size of the European continent alone, but rather by the world market as a whole.

It should be noted that the legal notion of 'dominant position' both at a national and an EC level loses its meaning when put next to the world dimension of the market.

The impact of '1992'

The completion of the single European market is not expected to cause important changes in the tyre industry. Concentration is already dense, and the European scale has already been largely integrated in the strategy of companies.

Table 7
External trade
Industrial rubber

(1 000 tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Exports extra-EC (1)	298	316	312	339	346	363	338	347	267
Index (2)	86	91	90	93	95	100	93	96	74
Imports extra-EC (1)	158	149	159	154	164	171	193	221	214
Index (2)	95	89	95	91	96	100	113	129	126
X/M	1.9	2.1	2.0	2.2	2.1	2.1	1.8	1.6	1.3
Imports intra-EC	463	443	469	460	508	547	593	617	433
Index	89	84	89	87	93	100	108	113	80

(1) 1980 EC 9; 1981-84 EC 10.

(2) Taking into account changes in EC membership.

Source: Eurostat (Comext).

Outlook

Europe holds a leading, though vulnerable position, as entire sections of this industry have already been hit hard (bicycle tyres, air tubes).

It cannot be left helpless in the face of production from countries which enjoy considerable advantages in raw material and labour costs.

Particular efforts must be made in such areas as increased productivity, research and development, modernization of equipment and greater penetration of all the major markets in the world.

Industrial rubber

Description of the sector

This industry produces a great variety of goods, such as glue, tubes, belts, shoes, articles of hygiene and surgery, etc. The sector of transport equipment accounts for half of its outlets, the rest being sold to numerous activities in the economy as a whole.

Production processes vary widely; some require heavy investments while others remain at handicraft level and require light equipment. This sector thus comprises good sized companies (more than 1 000 persons) but also small units with a staff below 20 persons.

Production

Table 8 shows the national production of the top six EC countries in 1987.

The overall stable trend does not reflect individual situations where certain very specialized sectors are very high-growth, while others are in decline.

Foreign trade

Due to the structure of the different markets and the nature of the products, this subgroup is less concerned with foreign trade than is the tyre sector.

Table 8
National production
Industrial rubber

(million tonnes)	Production	%
EC (1)	1 992	100
Benelux	195	10
FR of Germany	623	31
Spain	187	10
France	280	14
Italy	359	18
United Kingdom	348	17

(1) Excluding Denmark, Greece, Ireland and Portugal.

Source: National Rubber Associations (Sedica).

The export/import ratio fluctuates widely, with a downward trend. Comecon and South-East Asian countries continue to increase their share of the European market, especially for products which are labour-intensive.

Employment

With slightly fewer than 20 000 persons in 1987, this sector remains very dependent on manual labour. Thanks to the economic recovery, it has managed to stabilize its employment situation these last two years.

Nevertheless, the massive influx of certain down-market, labour-intensive products on the European market is forcing more and more companies to out-

source production in order to take advantage of lower labour costs.

Structure

Numerous medium-sized companies (200 to 500 persons) are integrated in major industrial groups.

None the less, industrial rubber continues to be a very divided sector with a few big companies on one side, and a multitude of small companies of local or regional scope on the other.

No major changes in this distribution in the size of companies are expected in the medium term.

Since the industrial rubber industry continues to supply a large number of other sectors, the rubber production of certain countries has specialized in parallel with the local dominant client industries.

Thus, the Italian industry specialises particularly in soles for shoes, the German industry in conveyor belts (for the mining industry), etc.

The impact of '1992'

The completion of the single market is bound to bring about more intra-Community trade. Spain, and to a lesser extent Greece and Portugal, want to acquire additional market shares in the EC by taking advantage of the temporary opportunity of lower salaries.

National specialization could well be enhanced, thus leading to more trade and subcontracting.

Sedica: Société d'étude et de développement des industries du caoutchouc

Address: 60, rue Auber, F-94408 Vitry-sur-Seine

Tel: (33 1) 46 71 91 22; Telex: 202 903 F; Telefax: (33 1) 45 21 03 50;

THE PLASTIC FILM AND SHEET INDUSTRY

Summary

In 1988, consumption of plastic film and sheet grew by 6% and a similar performance is expected in 1989. The high prices of polyethylenes and PVC, accompanied by a shortfall in production capacity for some plastics, have, on the other hand, meant a lower-than-expected growth in consumption.

Technology

Plastic film and sheet are manufactured by extrusion, calendering or coating. In the extrusion process, the material to be moulded is heated, plasticized, i.e. softened, and then homogenized in an extruder. The plastic material is then sent through a linear or circular mould or die to be given the desired shape. The extruded material is then stretched into a sheet or film of the appropriate thickness. The stretching process orientates the macromolecules and can lead to improved clarity and strength. Coextrusion is used in the making of multi-layer sheet or film. In this process, several extruders are linked to a single moulding device. In this way,

the properties of several plastics are combined in one film or sheet and produce new properties. In the calendering process, the heated and softened material is sent through a series of rollers until it forms a continuous sheet. When desired, the sheet can be embossed or laminated to fabric, felt, cardboard, paper, metal or another sheet of plastic by means of extrusion, calendering or scraping.

Consumption

Plastic sheet has a wide range of uses, the most important of which are described below.

Packaging

Packaging is far and away the sector that makes most use of plastic sheet and film. In addition to being strong and light, plastic packaging is particularly advantageous as its manufacture and transformation require small amounts of energy and few raw materials. The replacement of traditional packaging materials by plastics helps to reduce by half both the volume of packaging waste and the consumption of

Table 1
1988 World consumption of film and sheeting, 1988

(1 000 tonnes)	Total consumption	Film and sheeting	% of total consumption	1987/88 growth rate (%)
Western Europe				
LDPE (1)	4 958	4 085	82	5
HDPE	2 556	340	13	10
Rigid PVC	3 125	549	18	8
Plasticized PVC	1 707	836	49	7
Polypropylene	2 947	460	16	13
Polyester thermoplastic (2)	320	114	36	6
USA				
LDPE (1)	4 054	2 797	69	2
HDPE	3 433	375	11	19
Rigid PVC (2)	2 382	458	8	8
Plasticized PVC (2)	1 190	674	51	10
Polypropylene	2 777	288	10	8
Polyester thermoplastic	737	268	36	8
Japan				
LDPE (1)	1 263	640	51	12
HDPE	795	300	38	4
Rigid PVC	920	N/A	N/A	N/A
Plasticized PVC	780	N/A	N/A	N/A
Polypropylene	1 507	360	24	7
Polyester thermoplastic	N/A	N/A	N/A	N/A

(1) LDPE includes LLDPE.

(2) Estimated.

Source: Modern Plastics International, January 1989.

energy. New horizons are opening on the packaging market thanks to technological innovations and materials with new properties. Promoting awareness on the part of the public and the authorities concerning undesirable effects of plastic on the environment is being viewed as a new challenge by the plastics industry. The correct treatment of plastic packaging waste calls for new structures and technologies. Recycling and the recovery of energy through incineration will surely be a top concern for the plastics sector in the future.

In Europe, there are some 500 companies active in the flexible packaging sector. They transform raw materials into bags, sacks and rolls that are ready for use by automatic packaging machines.

In addition to paper and aluminium foil, films made of polyethylene, polypropylene, polyamides and polyester have carved themselves a sizeable market share. Their protective properties are obtained through a coating process using polyamides, PVDC and EVOH. Vacuum metallizing of plastic film has also made significant advances in recent years. The processes of coextrusion, extrusion laminating and complex extrusion using different raw materials enable manufacturers to combine different properties in order to meet the specific needs of the food industry.

The building sector

Sheets of rigid, plasticized PVC are widely used in the building sector. Impervious membranes, flooring and wall covering are examples of the many applications in this field that in 1988 followed the general trend in the building sector and grew by 7%.

Transport

The transport sector offers numerous applications of plastics. Coated textiles, impervious water containers for lorries and the manufacture of calendered PVC sheets used to cover imitation leather for car interiors are just a few examples.

Agriculture

Low-density polyethylene (LDPE) and PVC film and sheet are used in the ensilage of fodder, ground cover for spring harvests, countersinking for tunnels and the construction of greenhouses.

Other market sectors

Adhesives, film for use in graphics, video and sound recording tape, credit cards, office material, patent

leather and medicine also offer a number of applications for plastics.

Table 2
The polyethylene film and bag sector by country, 1988

(1 000 tonnes)	Prod.	Consumption	Import penetration (%)
Belgium	247	174	22
Denmark	136	86	58
FR of Germany	805	725	15
Spain	250	N/A	N/A
France	490	600	24
Italy	580	N/A	N/A
Netherlands	184	160	N/A
United Kingdom	670	740	14

Source: Plasteurofilm.

Production

Polyethylene

Three-quarters of total LDPE consumption is attributed to film and sheet and 7% to extruded and coated products. Their chief uses are in packaging (80%), sheets for use in farming (10%) and rubbish bags (10%). HDPE, or high-density polyethylene, is an alternative to LDPE for certain packaging uses. Household packaging is one of the most common uses of HDPE.

Table 3
Consumption of PVC film calendered in the EC, 1987

(million tonnes)	Consumption	%
Construction		
- flooring	84	22
- others	34	9
Transport	33	9
Packaging	39	10
Medical applications	15	4
Credit cards	11	3
Toys	11	3
Furniture	67	18
Other	84	22
Total	378	100

Source: AEC.

Polyvinyl chloride (PVC)

Rigid PVCs are a basic material for impervious membranes in the building sector, protective covering, labelling, adhesives and sheets for blister packaging. Plasticized PVCs are used in coated fabrics (182 000 tonnes), floor covering (259 000 tonnes)

and in other film and sheet (395 000 tonnes), including transparent stretch wrapping for the fresh food industry.

Imitation leather for furniture and fashion articles are made by the coated fabric process. Coated textiles are also used in impervious containers for lorries, protective clothing and impervious membranes for floor coverings. Western Europe's coated textile market for technical uses is estimated at 130 million m², 20 million of which are used for protective clothing.

Table 4
PVC production by product for certain countries, 1987

(million m ²)	Coated fabric (PVC & PUR)	Flooring
FR of Germany	91	57
France	68	38
United Kingdom	20	43

Source: AEC.

Europe's soft floor covering (PVC and linoleum) industry comprises together 30 companies and 42 production plants. The sector's total production amounts to 290 million m² and its turnover is ECU 1.3 million. Some 15 000 workers are employed in the sector.

Polypropylene (PP)

EC consumption of polypropylene film reached 640 000 tonnes in 1988, three-quarters of which was accounted for by biaxially stretched film. Biaxially-stretched polypropylene film has been expanding steadily and offers significant advantages over paper, cellophane and other plastics.

EC production of biaxially-stretched polypropylene film in 1989 is estimated at 360 000 tonnes and annual growth has been forecast at 8%.

Table 5
Breakdown of the West European market, 1988

(%)	Share
Belgium-Luxembourg	1
Denmark	3
FR of Germany	25
Greece	1
Spain	3
France	11
Ireland	1
Italy	9
Netherlands	5
Portugal	1
United Kingdom	24
EC	90
Western Europe	100

Source: Epetma.

Table 6
Main applications, 1988

(%)	Share
Magnetic tapes	25
Film for graphics	20
Packaging	20
Metalization/foil stamping	13
Electrical insulation	10
Other technical applications	12

Source: Epetma.

Polyethylene terephthalate (PET)

EC's production of polyethylene terephthalate (PET) in 1988 was some 114 000 tonnes; 80% of this figure was manufactured by four firms: Hoechst AG/GB Folien (Germany), ICI Films (United Kingdom, Netherlands), Rhône-Poulenc Films (France) and The Du Pont Company (Luxembourg).

Annual growth is estimated at 6%.

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PLASTICS PROCESSING

(NACE 483)

Summary

The EC plastics processing industry's output reached ECU 41 billion in 1988. This sector employs around 573 000 persons. Since plastics continue to replace metal, glass, paper, wood and other traditional materials thanks to very competitive prices, the annual growth of production and consumption has remained above 5% over the past few years. This sector has constantly shown a modest trade surplus, half of which is accounted for by the German industry. In the future, growth should be sustained by rising demand for new or improved products. At the same time, important technological investments have recently meant a slower increase in employment than the increase in production, but a rise in the skill levels of the workforce.

Description of the sector

Plastics processing includes a range of different technologies of processing, like injection moulding, blow moulding, film blowing, thermo-forming and rotational moulding as well as conversion into finished

products, printing, decorating, welding, etc. The plastics processing industry is composed of companies who buy plastic resins and compounds and convert them into products.

Plastics manufacturers may produce finished articles which are used by other industries, like food packaging or building articles, or distributed to consumers. They may also be custom processors who produce components used by other manufacturers or they may be in-house operations integrated into the manufacturing process.

The major markets for plastics are building, packaging, electrical and electronics, automotive, furniture, and agriculture. In short, virtually every type of product manufacturer uses, or can use, plastic components. Products made by plastics processors range from such mass-produced items as low-density polyethylene packaging films to such specialized ones as implanted heart valves.

Table 1
Main Indicators, 1980-90 (1)
Plastics processing

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Apparent consumption (2)	24 406	24 719	27 065	29 734	32 773	34 786	36 515	38 872	41 173	43 800	46 000
Net exports (2)	1 723	1 894	1 913	2 101	2 372	2 746	2 501	2 600	2 800	2 950	3 100
Production	28 433	29 052	31 384	34 476	37 860	40 269	40 956	43 013	47 150	49 800	52 000
Employment (1 000)	566.3	538.5	522.9	517.9	526.2	536.4	552.2	561.4	573.1	583.0	595.0

(1) 1987/88 estimated.

(2) EC 10.

Source: APPE.

Table 2
Structure of industry

	1980	1981	1982	1983	1984	1985	1986	1987	1988
Number of companies (1)	11 867	12 544	12 334	13 715	15 575	15 501	16 821	17 222	17 380
Average number of employees per company (1)	48	43	42	38	34	35	33	32	33
Sales per employee (ECU) (1)	49 565	53 444	59 914	66 490	75 553	77 092	74 169	76 617	82 272
Average hourly labour cost (2)	6.6	7.2	7.7	8.3	8.8	9.4	9.9	10.4	10.7

(1) Excluding Greece.

(2) Excluding Spain and Portugal; estimated.

Source: APPE.

Current situation

The industry accounts for a major part of the total consumption of plastic materials processed in the EC. The plastics processing industry consists of 17 000 enterprises. These are largely independent plastics processors with an average of about 35 employees. 573 000 of the estimated one million employees working in the conversion of plastics are employed in this industry. Wage levels are typically lower than for comparable industries and the share of unskilled workers is high.

From the initial production and use of materials, there have been notable differences between plastics materials production and plastics processing.

Firstly, there is always a substantial difference in scale between the two industries, with plastics processing being undertaken on a smaller scale, being less capital and more labour-intensive. Secondly, there is a much greater variety in the size of operations and in the significance of plastics to the total business. Thus, plastics processing may be the sole activity of a company with only ECU 1 million annual turnover, or else, a very small part of a large company's business.

In most countries, the plastics processing industry has developed through several common factors. There has been substantial technical service, applications development and financial assistance by the suppliers of plastics materials. A plentiful supply of materials at reasonable prices together with a low capital threshold has encouraged a number of technical entrepreneurs to enter the industry. Furthermore, a number of companies manufacturing products from competing materials have moved into plastics. Lastly, a number of companies in industries which use plastics have undertaken some backward integration into plastics processing. All these factors, taken with the points in the previous paragraph, have contributed to the fact that the plastics processing industry now has a diffuse and difficult-to-define structure.

In the last couple of years, as demand was booming, plastics materials became in short supply in Western Europe. Producers were unable to increase the supply significantly or to meet all the potential demand.

As a result, plastics materials prices increased substantially. The EC customs barrier of 13% on plastics raw materials has reinforced the unfortunate trend. The effect of this is explored later but it is sufficient to say that EC plastics processors have as a result

become increasingly less competitive. Furthermore, this has a negative effect on EC industries which incorporate plastic components, like communication, automotive, electronics, household appliances, etc.

Production

Consumption and production of plastics has been rising steadily in the EC since 1980. While most of the tonnage has been in the commodity plastics (high and low-density polyethylene, polystyrene, polypropylene and PVC), the more profitable growth area has been in engineering plastics, where improved grades of such materials as ABS, polyamide (nylon), polycarbonate and thermo-plastic polyesters offer attractive margins on relatively low tonnage.

A comparison of the applications of a typical commodity material (PVC) with those of a typical engineering material (polyamide) indicates the trend.

For example, PVC tubing production fluctuated sharply, starting at 153 000 tonnes in 1984, rising to 160 000 tonnes in 1985, dropping to 150 000 in 1986 and hitting 165 000 tonnes in 1987. Overall, between 1984 and 1987 growth was a scant 8%.

On the other hand, considerations of weight reduction and design freedom have led to a widespread replacement of metal by engineering materials for automotive components. In 1984, the automotive industry in the EC used some 52 000 tonnes of components made with polyamides (nylons). Volume rose to 57 000 tonnes the following year, to 67 000 tonnes in 1986, and to 71 000 tonnes in 1987; in three years the growth was nearly 30%.

The latest statistics from the Federal Republic of Germany, the leading EC producer of plastics products and a barometer for the EC, indicate that the domestic market for the plastics processing industry grew by 23.3% in value during 1988.

Total production for 1988 in the Federal Republic of Germany is estimated at ECU 20.8 billion of which 76% was for domestic consumption, compared to 63% the previous year. Given the excess demand situation, most processors chose to focus on the domestic market, thus giving up the export market. The export share is, however, expected to increase again in 1989. The weight of the plastics manufacturing and processing industries in the Federal Republic of Germany will continue to increase, as the growth in plastics production in the Federal Republic of Germany greatly exceeds that of Spain

(18.2%), France (11%) and the United Kingdom (7.2%).

Consumption

The demand for articles of plastic will continue to grow over the next years. There are wide variations in the per capita consumption of the individual EC countries and the growth potential will vary accordingly in the long term.

The evolution in the life cycle for the consumption of plastic articles can be described in three phases. The first is 'market entry' which covers market and business investigation as well as research and technical development. The rate of growth in this stage in the EC often exceeded 25% a year.

The second phase of the cycle is market development, where the rate of growth, whilst still high, begins to slow down compared with the previous stage. Although plastics have yet to achieve widespread acceptance, growth comes mainly from innovation based on extensive applications development and to a lesser extent from growth of markets.

The third and final phase of the cycle is that of a market situation where plastics have become widely accepted. As a result, there is much less scope for innovation and growth comes almost completely from growth of the existing markets.

In each of the three stages, growth is due to a combination of two separate but inter-related factors, namely national economic growth and innovation. As a guide to how much of the growth in plastics consumption is due to the national economic factor, it could be suggested that each 1% annual growth in GDP in various EC countries produced an annual growth of 1.5 to 2% in plastics consumption, with the higher figure being approached for the newer plastics industries, such as those in Spain and Portugal.

The identification of these various stages of growth in plastics consumption is not just an academic exercise, but is important because companies will have to adopt new strategies or modify existing ones to take account of new situations.

The structure of the end markets of plastics producers is the following: packaging 29%, building 18%, consumer goods 13%, electric and electronic 9%, and automotive 8%.

The major outlet in packaging is for LDPE (low-density polyethylene) films, but bottles made of LDPE, HDPE (high-density polyethylene), PP

(polypropylene) and lately PET (polyester terephthalate) also play an important role. Thermo-formed sheet and injection-moulded articles as well as expanded sheet are important. Multi-layer films play an increasing role in food packaging and are produced either as laminates, which may also include combinations with non-plastic substrates, or are blown directly.

The food, drink and chemical and allied industries account for 75% of plastic packaging. This market has a good growth potential over the next five years. Most important are the rapid developments in retailing, wholesaling and distribution, which have partly arisen from increasing labour costs and the growing domination of food processing industries and supermarkets, and the development of integrated packaging and distribution systems.

Plastics will play an increasing role as the concern for the environment and the aim to reduce generation of waste increases. The advantage in weight reduction and reduced consumption of resources in comparison with alternative packaging materials, and the fact that plastics are produced from oil and can be burned to recover the energy, are important features for the future.

The building and civil engineering industries have learnt about the materials they use and gained confidence in them over long time. Because a long life is required for most building products, much of the growth in consumption of plastics has been in decorative and ancillary applications where a shorter life is expected. Pipework and window frames have been notable exceptions because of outstanding advantages over traditional materials, rapidly capturing large market shares.

In building applications, pipework and fittings are the major markets. Door and window frames, flooring and roofing are other important outlets together with thermal insulation. The process of acceptance is liable to take longer and cost more than in most other markets.

Trade

Given that plastics are supplied to industrial customers as products and components and not as materials, the main influences on their price occur during their processing.

It would appear that up to 20% of projected plastics usage may come within the price sensitive area, experiencing stronger competition from other materials and requiring greater efforts from the

industry to develop the markets. This does not mean that future markets will be lost, but that price competition with other materials will be particularly close and that strenuous efforts will be needed to enter a market or maintain a share.

Most EC plastics processing industries are principally concerned with supplying domestic demand so that only a small part of their output is directly exported. As processing units are rather small, it is generally easier to set up a plant at the source of demand rather than exporting plastic goods a long way. Plastic components are incorporated into finished products, such as appliances, or motor cars, thus constituting a category of indirect exports. The share of direct and indirect exports in total output is thus generally less than 25%.

It is characteristic that the trade between Member States is accounting for the bulk of the export trade and that EC direct export is of little significance.

Small and open economies generally have a larger export intensity than larger ones. The export ratio for Belgium was 64% and for Denmark 49% in 1988, while the Federal Republic of Germany, the main exporter in monetary terms in the EC, exported 23.6% of production, worth ECU 4.9 billion. France and Portugal both had an export ratio of 16% while the United Kingdom exported 7.2% and Spain 5.6% of their production respectively.

Employment

While the workforce has remained virtually stagnant throughout the 1980s, and projected increases over the next decade are not likely to be more than an annual rate of 3%, the industry faces a potential problem in finding skilled workers to replace the 60 000 or so who retire or move into other fields, and to fill the 30 000 to 35 000 new jobs created each year. Nearly 573 000 persons, about 80% of them production or maintenance workers, are currently employed in the plastics processing industry. As a policy, training should be standardized so that graduates can work in any EC Member State.

Investment and related issues

At present, many companies are finding that they are having to revise their financial policies. The increasing rates of inflation highlight the difference between the replacement costs of new machinery and the depreciated purchase price of existing plant. Companies have to take account of the inflationary trends in their accounting systems, and it is likely that an increased share of the product's price will have to be allocated to capital charges.

Recent technological developments in both commodity and engineering plastics processing are changing the structure of the industry. These changes are mainly due to increased automation and improved control systems. These require considerable capital investments on the part of the processor,

Table 3
Production and external trade (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Production									
Current value	28 433	29 052	31 384	34 476	37 860	40 269	40 956	43 013	47 150
Index	71	72	78	86	94	100	102	107	117
Quantities (1 000 tonnes)	18 240	18 111	18 320	20 198	21 335	21 945	22 959	24 064	25 126
Index	83	83	83	92	97	100	105	110	114
EC trade in current prices									
Exports extra-EC (2)	3 005	3 349	3 611	4 028	4 804	5 436	5 147	5 014	4 900
Index	55	62	66	74	88	100	95	92	90
Imports extra-EC (2)	1 282	1 455	1 698	1 927	2 432	2 690	2 646	2 840	3 100
Index	48	54	63	72	90	100	98	106	116
X/M	2.3	2.3	2.1	2.1	2.0	2.0	1.9	1.8	1.6

(1) 1987/88 estimated.

(2) EC 10.

Source: APPE.

resulting in increased productivity without a corresponding increase in workforce.

The present pattern of interest rates, with an average industrial rate of 12%, has meant that companies have to improve their levels of profitability so as to ensure a flow of funds for investment. It has been suggested that around one third of companies did not achieve a 15 to 18% return on capital. This suggests that some further increases in price in some sectors will be needed, which in turn must have some effect on demand for plastics.

There is a serious danger that rising inflationary pressures and shortages of working capital, both of which are being experienced by plastics companies and by user industries at present, will have a negative effect on investment, in particular technology investment. Improving the sector's technical competitiveness indeed requires not only working capital but also investment in fixed assets.

The four largest EC plastics producers — the Federal Republic of Germany, France, Italy and the United Kingdom — have shown marked increases in both domestic production and exports.

Production in the Federal Republic of Germany rose by 58% from 1980 to 1986, from ECU 9.6 billion to ECU 15.2 billion. During this considerable expansion, the number of people employed in plastics rose only slightly, from 193 000 to 204 000. Investment in new plant and equipment actually declined from ECU 559 to 517 million from 1980 to 1982, then rose sharply to ECU 753 and 878 million in the following years.

France, with the second largest plastics processing industry in the EC, showed growth of 37% in the 1980-86 period. Investment in plant and equipment has risen every year (except 1981) during the six-year period, increasing by more than 60% to nearly ECU 400 million in 1988.

The increase in plastics processing in the United Kingdom during the period was the lowest in the

EC, with a production value of ECU 4.8 billion in 1980 and ECU 5.7 billion in 1988.

Employment in the UK processing industry has remained remarkably stable during the six-year period. In 1988 the industry employed 112 000 people, some 12 500 less than six years earlier. But investment has risen sharply, from ECU 289 million in 1980 to ECU 624 million in 1988.

Structural changes

Earlier we mentioned the dependence of the industry on imported materials as well as the imbalance between demand and supply. It seems unlikely that there will be a sufficient increase in feedstock supplies and materials production capacity in the near future to produce a better pattern of supply and demand in the EC. Quite apart from the lost business in the meantime, the shortage of materials will have several effects, notably the delay of some new applications. This will be as much due to customers' doubts about future materials availability as to the present shortage. The delaying effect will be pronounced for some applications where the opportunity for using new materials occurs at particular intervals, such as the launching of a major new product.

The direct effect of this supply constraint is that consumption of plastics may only grow by some 4 to 5% a year in tonnage. Whilst total consumption will accelerate sharply after that, the shortage may postpone the introduction of some new products.

Consumption, based either on total tonnage or on the value of processed products, rose sharply in 1987 and 1988, and will continue to rise until 1992 with sales of plastic products rising by an annual rate of nearly 8%.

Consumption rose by 8% in the Federal Republic of Germany, with per capita consumption reaching 131 kg, by far the highest level in the EC. With new applications opening up in the automotive and elec-

Table 4
Turnover and investment

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Turnover (1)	26 795	27 439	29 865	32 730	37 901	39 447	41 645	43 969	48 050
Net investment (2)	1 423	1 307	1 432	1 781	2 001	2 362	2 525	2 761	2 957

(1) Excluding Greece; 1987/88 estimated.

(2) Excluding Greece, Spain, Netherlands and Portugal; 1987/88 estimated.

Source: APPE.

trical/electronics industries, and with improved packaging film and blow-moulding materials for bottles, the rate of consumption should rise by at least 6% in 1989, with subsequent increases from 3 to 4% in 1990 and 1991.

In France, consumption should increase more dramatically, mainly as a result of increased packaging applications. The 9% annual increase recorded in 1987 should be maintained over the next three years. Annual consumption increases of more than 10% are expected for Spain (12.2% for 1987) on the basis of a continuing industrial boom. It appears unlikely that the United Kingdom will maintain the 10% increase registered in 1987, as high-volume packaging applications are already well-developed.

An annual rate of increase of sales of about 8% is likely for plastics processors in the EC, with increases in sales per employee, as a measure of productivity, up by a more modest 5% to 6%. Growth rates will vary widely among EC members. For example, the Federal Republic of Germany's 5.2% increase in sales and its 1.45% increase in sales per employee should not increase by much in 1989, as both market saturation and operating efficiency are at high levels. At the other end of the scale, Spain's 15.4% sales increase and 15.7% sales-per-employee increase could be maintained at about 10% for 1989 and 1990.

Geographic features

Apart from the differences in the consumption pattern and in the export rates throughout the EC, discrepancies will also appear in productivity and technology.

Italy, with a turnover that is about a third of the German one, has twice as many processing plants, 4 850 compared with 2 014. But the German plants employ 228 000 people, compared with only 101 000 for Italian plants.

Sales per production worker rise with the increasing use of sophisticated control systems, automation and downstream finishing operations. Of the major EC plastics processing countries, sales per employee in the French industry were ECU 73 000 in 1987, compared with ECU 84 000 in the Federal Republic of Germany and Italy.

The figures for the French processing industry indicate the complexity of national comparisons. With 3 408 processing plants employing 89 376 people, the French industry has a turnover of ECU 7.8 billion and sales per employee of ECU 73 000.

The Italian processing industry is composed of a large number of small custom moulders. For example, nearly 98% of the plants employ less than 50 people, compared with 65% in France and only 13% in the Federal Republic of Germany.

At the other end of the scale, the processing industry in the Federal Republic of Germany is becoming increasingly concentrated in large custom processing and in-house operations, particularly for the automotive, electrical/electronics and appliances sector. Thus, nearly 48% of the German plants employ 100 to 499 people, compared with 15% for France and less than 1% for Italy. Some 22% of German plants employ more than 500 people, including some with more than 1 000 employees. The French figure is 3%, and the Italian figure negligible.

Environmental protection

The increase in the consumption of plastics in the past has largely been based on the substitution of other materials because of the cost and commercial advantages. Now that there is growing public and political concern for the environment and the conservation of resources, it becomes increasingly important that plastics are marketed with such arguments as being less energy and resource-consuming, and environmentally friendly in comparison with the materials it substitutes. Plastic materials possess these virtues. However, this has largely been ignored by the public. The recyclability property could be a major feature of plastics and a business opportunity for an industry in its own right, if carefully conducted. A 'plastics recycling industry' must be developed if and when recycling becomes an issue, to conserve resources and control waste.

The impact of '1992'

For the EC plastics market the lifting of any kind of trading restrictions after 1992 will only result in limited changes. The strong position of the Federal Republic of Germany in the world plastics trade is based on exports to other EC countries. This also applies, to some extent, to France, Italy and the United Kingdom as shown earlier. There is no particular reason to expect that overall capacities will be increased as a result of the single market, nor that the competitive environment will change much since there are already a number of transnational companies that are operating in this sector. On the other hand, a shift of production with regard to cost and

environmental protection may be easier to manage within domestic markets.

Recently, a number of enterprises have merged and this trend is expected to continue in preparation for the single European market after 1992. This will result in larger units with greater specialization in product range and production technology. Contrary to the situation in the USA, it is the smaller companies in this sector that are more diversified within the EC. This would lead to a 50% reduction in the number of companies, while production and employment would be maintained.

Technological development

Two important developments dominate the plastics processing scene.

Firstly, as equipment becomes more sophisticated, with increased emphasis on robotics and downstream operations, the new technologies will involve large capital investments, and will require a small highly-trained workforce. These investments will be paid off in three to five years. Thus in the medium-term, five to ten years, prospects for profitability are excellent.

Secondly, improved materials and processing technology for multi-layer packaging film and for blow-moulded bottles are opening up new high-volume applications with higher profit margins than those normally associated with commodity plastics. As these materials begin to replace traditional packaging materials, the percentage growth in commodity plastics could keep pace with that of engineering materials.

Outlook

The increase in the value of the production of this industry in 1987-90 has been greatly influenced by the increase in the prices of raw materials, and to a lesser extent an increase in tonnage. In the same period the profit margins decreased. There is a risk that when raw material prices come down, and demand is balanced with supply, this will lead to a further shrinkage of profit margins, as has generally been the case during previous fluctuation periods. In view of the restructuring of the industry, which requires large capital investment to prepare for the single European market and maintain or even enhance international competitiveness, the plastics processing industry could well appear less attractive to investors as a direct result of fluctuations in raw material prices.

A higher price stability could be secured if and when the EC market becomes more open to plastics raw materials, i.e. when imports of new materials from the rest of the world will not be subject to customs barriers. This would further stabilize the supply-demand balance.

The overall outlook for the plastics industry in the next five years is healthy: further expansion into markets previously dominated by such conventional materials as glass, metal, wood and ceramics is expected; substantial investment in new equipment could translate into higher productivity and larger profit margins; workforce productivity should rise with better-paid and more highly skilled employees.

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FIBRE-REINFORCED PLASTICS

(NACE 483)

Summary

The EC fibre-reinforced plastics industry produced 1 million tonnes of plastic composites in 1988, a 7% increase over 1987. This corresponds to a turnover of ECU 14.6 billion, 12% higher than the previous year. This sector comprises approximately 4 000 small enterprises, employing approximately 80 000 persons at a variety of skill levels. Industry concentration is low and the number of jobs it provides has increased by more than 50% in six years. Sales per employee more than doubled over the last eight years, rising from ECU 82 000 in 1980 to ECU 202 500 in 1988. This represents an increase of 10% a year on average. European production and consumption should increase by 7 to 9% annually over the next five to six years and the long-term outlook points to even faster growth as the compression technique for making medium-range car parts becomes widespread.

Description of the sector

Plastic composites are a comprehensive range of engineering materials where the physical, mechanical and economic properties are uniquely determined by the reinforcement, the matrix or the processing technique employed.

This sector is defined as the manufacture of articles consisting of a plastic matrix reinforced with long fibres. It includes thermoplastics with mineral fibre reinforcements.

Current situation

For historical reasons and given the nature of the fabrication techniques employed, the EC composites

industry remains dominated by small and medium-sized enterprises which employ an average of 25 people. 'Small' in this sector sometimes means a very profitable entrepreneurial operation, supplying high-quality products to a very specialized market sector using only a small labour-force and a highly capital-intensive plant.

The EC fibre-reinforced plastics industry is already producing 29% of the estimated world total of 3.1 million tonnes. It is very nearly the same size as the American industry which produces 31%. Japan's share remains much lower, at about 9%. EC trade in this industry is negligible.

The EC market for glass-reinforced plastics (thermoset and thermoplastic composites) rose by 7% in 1988, to 997 000 tonnes. This compares with an increase in tonnage of 8.1% and 5.2% in the two previous years. The consumption pattern has shown a steady rise since 1981, when it stood at 490 000 tonnes. Since then, there has been an increase every year, at an average annual rate of 11%.

By contrast, the average annual increase in the USA during the period was 4.5% to reach consumption of 1 149 000 tonnes in 1987, and 1 207 000 tonnes in 1988. In Japan, the reinforced plastics market developed from 232 000 tonnes in 1980 to 533 000 tonnes in 1988.

Industry concentration is low in the fibre-reinforced plastics industry. Annual turnover per company rarely exceeds ECU 2 million and the annual sales figure per employee averages ECU 180 000. The approximately 40 000 establishments in the industry depend on a relatively small number of very large chemical companies for their supplies of raw materials (for example, BASF, Bayer, British Petroleum, DSM, Du Pont, Imperial Chemical Industries,

Table 1
Main indicators, 1980-91
Fibre-reinforced plastics

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Apparent consumption (1)	4 572	4 651	6 141	7 406	8 608	10 322	11 590	13 808	16 524	18 500	20 800	21 700
Production	4 572	4 651	6 141	7 406	8 608	10 322	11 590	13 808	16 524	18 500	20 800	21 700
Employment (1 000)	55.8	48.2	51.9	61.2	65.1	67.6	71.1	77.2	81.6	83.6	89.1	95.5

(1) There is no significant trade outside the EC.

Source: APPE.

Saint-Gobain, Owens Corning and Turner & Newell).

There is an increasing tendency for these large chemical companies to either acquire a composite company (and largely retain its 'small' character), or set up an in-house operation. However, although the European industry continues to grow and develop, there is little change in either the number of people employed, approximately 100 000, or in the number of companies involved. The distribution of the establishments and number has stayed fairly constant over the years with the United Kingdom at approximately 1 100, France at 700, and the Federal Republic of Germany and Italy at around 650 each.

Production trends

While reinforced plastic components include carbon fibre/epoxy used in such exotic applications as the aerospace industry, the greater bulk of the tonnage and turnover in the EC involves the use of unsaturated polyester, reinforced with long glass fibres or glass mats to make large parts such as hulls for boats, industrial storage tanks and panelling for the construction and transport industries. An increasing number of manufacturers in the EC are replacing such conventional materials as metal and wood with reinforced plastics to achieve greater design freedom, weight-saving, and improved mechanical strength/weight ratios.

Table 2 shows an outline of the 12 EC member nations' output, country-by-country contributions for 1987-88:

Table 2
Production by country, 1988

	1 000 tonnes
Benelux	105
Denmark	37
FR of Germany	268
Greece	15
Spain	73
France	176
Ireland	5
Italy	177
Portugal	13
United Kingdom	129
EC	997

Source: APPE.

Consumption trends

1988 production of reinforced plastics was 268 000 tonnes in the Federal Republic of Germany, 177 800

tonnes in Italy, 176 000 tonnes in France and 129 000 tonnes in the United Kingdom.

In the Federal Republic of Germany, reinforced plastics tonnage rose substantially in 1988. The growth markets are the transport and electrical appliances sectors. In transport, the share of the reinforced plastics market rose from 30 to 41% in two years, while the electrical components industry accounted for 24% of purchases of reinforced plastic. The market growth in these two sectors has been accompanied by the growth of compression and thermoplastic injection moulding, which accounted for 51% of the total reinforced plastics tonnage two years ago and now accounts for 60%.

The evolution of the industry for each Member State is very different. In 1978, SMC/BMC (compression and injection moulding) volume was 37 000 tonnes in the Federal Republic of Germany, rising to 78 000 tonnes in 1988. The annual growth rate from 1982 to 1988 was 9%. During the same period, the volume for hand lay-up dropped.

Italy, the other major producer of reinforced plastics in the EC, saw its production rise from 110 500 tonnes in 1983 to 131 200 tonnes the following year, then drop to 112 700 tonnes in 1985 and rise to 176 000 tonnes in 1988.

Growth in the French market has been dramatic — from 139 000 tonnes in 1984 to 176 000 in 1988. The 1988 breakdown by industry shows that transport, mainly automobile and truck components, accounted for 31% of the tonnage, with electrical parts accounting for 22%. This compares with EC market shares of 22% and 23% respectively. Sports and leisure applications, largely in the marine sector, accounted for 10% of the French reinforced plastics market, nearly 50% over the 7% EC market share. Other key factors in the growth of leisure and sport applications include the strong position of the French ski industry in the international market, and the growth of the wind-surfing board market.

Reinforced plastics production in the United Kingdom has been virtually unchanged since 1983 and remains at a level of about 130 000 tonnes.

Employment trends

In the past few years, employment has increased in the Community, to around 100 000 employees, and sales per employee have increased greatly, sufficient to meet rising demand.

Table 3
Consumption by type of application, 1988

(%)	FR of Germany	France	Italy	EC average	1 000 tonnes
Construction and building	9.0	11.0	19.0	17.0	169.5
Consumer products (1)	5.0	6.0	8.0	6.0	59.8
Electrical and electronic	24.0	22.0	22.0	23.0	229.3
General engineering (2)	17.0	15.0	26.0	17.0	169.5
Miscellaneous (3)	2.0	5.0	1.0	8.0	79.8
Sports and leisure (4)	2.0	10.0	9.0	7.0	69.8
Transport	41.0	31.0	15.0	22.0	219.3
Total	100.0	100.0	100.0	100.0	997.0

(1) Including appliances and business equipment.

(2) Including agriculture, corrosion resistant/water control equipment.

(3) Including aircraft, aerospace and defence.

(4) Including marine.

Source: APPE.

The statistics for the EC indicate that the reinforced plastics industry is rapidly changing from labour-intensive to more highly automated production. For example, compression and injection moulding accounted for only 18% of the tonnage in 1970, rising to 36% in 1980, and to 59% in 1988. Industry estimates are that it will top 65% by the end of 1990. The reasons for the increase in this mass production moulding process are not hard to find. Automotive manufacturers are using the process for making grilles, opening panels and truck hoods, while appliance and electrical manufacturers find it an effective low-cost method for producing housings.

Table 4
Annual sales per employee

	1 000 ECU
1980	81.9
1981	96.5
1982	118.3
1983	121.0
1984	132.2
1985	152.7
1986	170.4
1987	178.8
1988	202.5
1989	221.3
1990	227.1
1991	233.4

Source: APPE.

In contrast, hand lay-up and spray-up market share has dropped sharply, from 43% in 1970 to 30% in 1980 to 20% in 1988. Some reasons for this drop can be discerned by examining the market share of sports and leisure in the reinforced plastics market,

now only 17%. Meanwhile, the market share of transportation, mainly automotive, has risen to 22%. In addition, with faster cycling compression and injection moulding equipment, processors of reinforced plastics are more inclined to invest in expensive dies and processing equipment for increased production efficiency.

Structural changes

The reinforced plastics industry is composed of small companies with relatively low turnover. This is mainly due to the nature of the industry. The construction of six-metre boat hulls by spray-up, for example, calls for a great deal of painstaking manual labour, long curing times and a level of craftsmanship not encountered in most manufacturing; in this case, curing times are measured in hours, whereas they are measured in minutes in other activities such as assembly lines for the production of automotive parts.

According to a survey of North American and Western European processors, typical North American reinforced plastics processing companies have about 80 employees, while in the EC companies employ an average of 25 persons.

Figures for the EC show that 91% of the companies have five or less executives, 64% have five or less technicians, and 76% have five or less administrators. Some 50% of the companies have 15 or less skilled workers, and 30% have 40 or less. Only 10% of companies have more than 40 skilled workers. Some 69% of all companies employ up to 15 unskilled workers, 21% employ from 16 to 40 unskilled workers, and only 10% employ more than 41.

To date, two factors have inhibited the growth of reinforced plastics in the automotive parts sector: the difficulty in obtaining the quality demanded by the user, and the low output rates compared with injection moulding of thermoplastics or traditional metal stamping. Both these difficulties are being overcome.

The advantages of compression moulding over other processes make it an ideal system for medium-scale production. The cost of dies capable of producing such parts as automobile fenders is relatively modest. The cost of investment in equipment is considerably less than would be required for an injection moulding machine. Since SMC involves the use of long reinforcement fibres, the parts are also stronger.

Table 5
Production trends

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Value	4 572	4 651	6 141	7 406	8 608	10 322	11 590	13 808	16 524	18 500	20 800	21 700
Index	44	45	59	72	83	100	112	134	160	179	202	210
Quantity (1 000 tonnes)	558	490	580	649	705	747	787	883	997	1 070	1 150	1 235
Index	75	66	78	87	94	100	105	118	134	143	154	165

Source: APPE.

Today, SMC is widely used in truck components, although use in passenger car components is still in its infancy. But all of the major automobile manufacturers within the EC are developing SMC components, first for specialized vehicles, then for small and medium-scale production. Eventually, probably within a decade, these components will be used in mass production.

While compression and injection moulding as well as other automated and semi-automated processes will account for an increasing share of the reinforced plastics market, the small craftsman who relies on hand lay-up and spray-up will stay in business. But little is expected in the way of technical developments, and production rates will remain unchanged.

The shift to compression moulding, however, involves much more than merely upgrading equipment. It requires large capital investment to enter the field. Few of the traditional hand lay-up shops are likely to take this step. They will rather stay in specialized niche markets, while this need for big investment will trigger a concentration of the rest of the market.

Geographical diversity

While no figures are available for the EC as a whole, average annual sales per company in 1985 for France, the Federal Republic of Germany and the United Kingdom provide an idea of the typical company size. Germany has the highest EC average, with ECU 3.5 million, followed by France with ECU

3 million. This compares with an average company turnover of ECU 4.3 million in the USA.

The growth of the plastic composites industry has remained positive throughout the EC for the major part of this decade. Given that the European composites industry now accounts for nearly 30% of the world total, if present trends continue, this EC sector will soon challenge the current supremacy of the USA as the principal supplier.

Forecast and outlook

The EC composites industry is currently growing fast, a definite change from the early 1980s. Growth is expected to continue rapidly, supported by a general improvement in GNP, the availability of increased and improved reinforcements and matrix materials which in turn promote low investment cost fabrication techniques, such as resin-injection which offers enhanced productivity, lower scrap rates, and better economics. Profitability is slowly improving. At the same time the cost of many of the less energy-consuming competitive materials is rising faster, as a result of a rapidly diminishing supply. All these factors suggest that the reinforced plastics industry is in a strong position to meet the increasing competition and to take advantage of growth opportunities.

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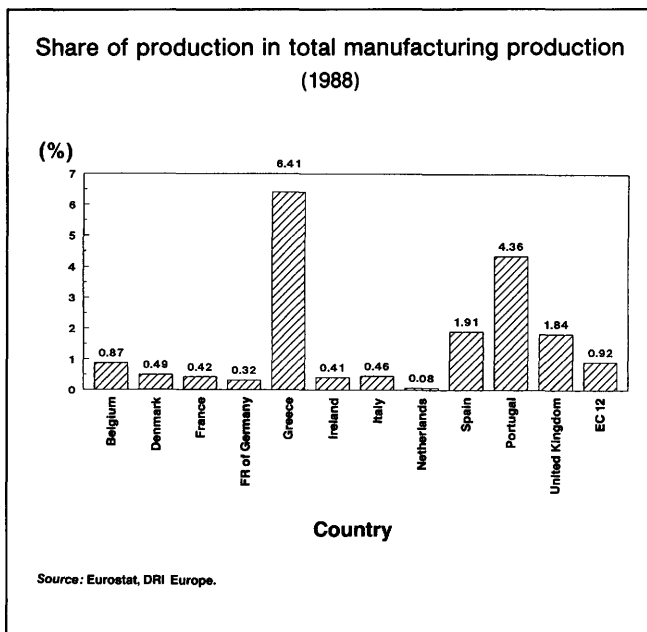
OTHER MANUFACTURING INDUSTRIES

(NACE 49)

The economic importance of the industry in the EC economy

The total production of the 'other manufacturing industries' amounted to ECU 36.9 billion in 1988. The share of production of 'other manufacturing products' in total manufacturing production in individual EC Member States is shown in Figure 1: it is the highest in Greece with 6.41% and Portugal with 4.36%, followed by the United Kingdom with 1.98% and Spain with 1.91%. In the other EC countries, it is lower than 1%. This sector employed more than 390 000 people in 1988.

Figure 1



Description of the sector

'Other manufacturing industries' are covered by NACE code 49. This includes the manufacture of articles of jewellery and goldsmith's and silver-smith's wares (including the cutting or other working of precious and semi-precious stones (NACE 491), the manufacture of musical instruments (NACE 492), the photographic and cinematographic laboratories (NACE 493), the manufacture of toys and

sport goods (NACE 494) and miscellaneous manufacturing industries (NACE 495).

Only the manufacture of jewellery, costume jewellery, musical instruments and toys will be analysed in more detail below.

As this chapter is composed of very heterogeneous and independent industries (except for jewellery and costume jewellery), it is very difficult to draw general characteristics for all the industries considered. This overview will thus highlight the main features of each of them.

Industry structure

Jewellery

After having suffered severe disturbances as a result of the substantial rise in the prices of gold and silver in the early 1980s, the EC jewellery industry has now recovered steady sales growth rates. Within the EC, Italy is the largest producer, followed by the Federal Republic of Germany, France and Belgium. Italy and Belgium are the most specialized in jewellery production.

The number of employees of the sector has been falling sharply in the early 1980s, and the rise in production that took place after did not result in similar increases in the labour force, as more capital-intensive methods are now used. This industry is still dominated by many small units (less than 20 employees) and many self-employed craftsmen and outworkers, as most items must still be hand-made.

As specialization is essential in this sector, the manufacturing centres are concentrated in certain regions of the EC, either producing high-quality products or specialized in larger-quantity produced silver articles.

The costume jewellery sector has a cyclical and more diversified activity. It faces strong competition from an increasing number of low-wage Far East producers, and copying problems, which damage the

image of European products. Producers are mainly located close to large towns, especially London, and tend to sell more and more directly to retailers.

Musical instruments

The musical instrument industry is mainly composed of small-sized individualistic and independent companies. The share of small enterprises (less than 20 employees) represents 29.3% of total turnover of the industry. The EC has a strong advantage in the manufacture of traditional high-quality instruments and the restoration of old instruments. However, its Asian and American competitors are dominant on the growing market of electronic instruments as they often have reached a higher profitability level, which allows them to make larger investments and to be more flexible. Specifically, national specialization and good technical and human potential are dominant features of the EC industry. Geographically, even if some local regions have gained a worldwide reputation, the European companies are concentrated in four countries: the Federal Republic of Germany, Italy, France and the United Kingdom.

Toys

In the toy industry, EC companies are in general also specialized in traditional products. South-East Asian producers have built strong positions on the EC market. Factors such as small investment capacity linked to their small size and financial resources, the absence of specialized design firms with an international scale (as is the case for example in the USA), insufficient production runs, high wage costs and low production flexibility have caused difficulties in the EC toy industry throughout the 1980s and have led to some reduction of the workforce. There are however some dynamic and creative firms, and European products are famous for their high quality.

Compared to its American and Japanese counterparts, EC industry suffers from the absence of truly multinational companies. The EC industry is still

dominated by very small companies (less than 20 persons) and the slowdown experienced by the sector between 1980 and 1984 led to many closures. Geographically, production is mainly concentrated in the Federal Republic of Germany, Italy, France and Spain.

Outlook

For the jewellery industry, the outlook is rather bright although it should be remembered that many factors such as fiscal measures, rates of exchange and gold and silver prices play an important role in the industry's profitability, even though the industry has no control over them.

As far as harmonization is concerned, the jewellery industry will have to solve many radical differences in the means of certification of precious metals and their permitted contents. The fact that EC Member States often have divergent positions on these issues and are reluctant to accept standard regulation will necessitate compromises and discussions in the coming years.

Prospects are favourable too for the EC musical instrument industry, even if it will certainly continue to face strong competition from Asian and American producers in electronic instruments. To fully exploit its advantages and consolidate its market position, the EC industry should therefore set up an organization strategy in order to enhance musical research, improve its distribution networks and promote the design of traditional instruments.

The outlook for the toy industry is less buoyant. The declining demand in the EC and stiff competition will force European companies to diversify into less seasonal leisure products, and choose between specializing in traditional toys in the high and middle segment of the market, or building of a stable foothold at the bottom end of the market.

DRI Europe

JEWELLERY

(NACE 491)

Summary

The sector has, at last, recovered from the shock and disturbance caused by the very high price of gold and silver in 1980, which had a serious adverse effect on sales. In 1988 total EC gold production grew by 17%, to more than 390 tonnes, whereas the world-wide volume was 1 484 tonnes. In the same year, the value of EC production was estimated at ECU 4.7 billion — (Italy accounted for 35% of this production) which represented employment for nearly 50 000 people, which does not include a large but unknown number of workers. Production growth is driven by strong domestic demand but is also a result of rapidly rising export demand, especially from Japan.

Description of the sector

NACE category 491 embraces six subgroups:

- 491.1 manufacture of articles of jewellery containing precious metal or precious plated ware
- 491.2 manufacture of goldsmiths' and silversmiths' wares
- 491.3 manufacture of fancy jewellery

- 491.4 diamond cutting
- 491.5 working of precious and semi-precious stones
- 491.6 striking of coins and medals.

The line between jewellery and costume (fancy) jewellery is hard to draw. Usually, an article made of base metal and coated with precious metal, perhaps set with imitation stones, would be regarded as costume jewellery, but high-quality plated metals may be set with natural stones, and so there is a grey area. In this monograph we have separated as far as possible figures and comments on jewellery and costume jewellery. The industry includes many articles made of precious metals — particularly articles of silver — that are not worn on the person.

At the retail level, it is customary for the industry to entertain close ties with the horological industry (clocks and watches) as well as with antique articles not necessarily made of precious metals.

Current situation

The sector has at last recovered from the shock and disturbance caused by the very high prices of gold

Table 1
Production in the jewellery industry, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
EC (1)	3 136	3 170	3 762	3 769	3 908	4 882	4 411	4 603	5 019	5 417
Belgium (2)	635	614	768	580	484	684	686	683	749	781
Denmark (3)	21	20	17	17	20	13	11	13	13	14
FR of Germany (4)	665	656	943	893	666	697	781	786	832	890
Greece (5)	4	9	8	8	9	9	10	10	11	12
Spain (4)	195	203	173	184	183	194	212	222	241	261
France (4)	604	669	693	725	674	720	780	813	873	881
Ireland (4)	36	42	42	35	40	33	30	35	38	40
Italy (4)	524	603	737	1 007	1 397	2 086	1 474	1 575	1 752	2 011
Netherlands (6)	15	17	17	18	19	29	26	26	21	22
United Kingdom (4)	438	339	365	302	415	416	400	440	488	506
USA (7)	3 946	5 023	5 518	6 228	7 093	7 428	5 911	5 423	5 572	N/A
Japan (7)	661	996	1 058	1 344	1 631	1 794	N/A	N/A	N/A	N/A

(1) Excluding Luxembourg and Portugal.

(2) 1985-89 estimated.

(3) 1988-89 estimated.

(4) 1987-89 estimated.

(5) 1983-89 estimated.

(6) 1980-83 and 1986-89 estimated.

(7) Census of Manufactures and Eurostat estimates.

Source: Eurostat (Inde).

and silver in 1980. The consequent high prices of industry products had a serious adverse effect on sales, and it took a number of years for articles made at these prices to work through the system, the rate of stock turnover being very low at the retail end. However, the industry is now optimistic, and the producers of gold are confident that the industry will absorb an increasing proportion of world production at a faster rate than production is increasing. Diamond jewellery sales have increased steadily in the EC in recent years.

Production and consumption

Table 1 presents production figures for the EC countries. By 1988 Italy had become by far the largest producer in the EC with a turnover of ECU 1.6 billion, followed at a distance by the Federal Republic of Germany, France and Belgium. Clearly, Italy and Belgium are much more specialized in jewellery production than the other EC countries. During the 1980s Italy considerably strengthened its dominance in the EC; in 1980 it was in fourth place only. Production increased at a slower pace in Belgium.

In 1988 nearly 80% of all gold consumption in the EC was accounted for by the jewellery sector. About 7% went to the electronics sector for special applications, 6% was used for official coins, 3% was used for dentistry and another 4% by various industrial sectors. Jewellery is also the fastest-growing component of gold demand; in 1980 it accounted for 54% of total demand.

The weight of gold used in the making of jewellery in the EC between 1987 and 1988 increased by 17% to 391 tonnes, including scrap. This compares with a world-wide increase of nearly 29%. This gold-fabrication trend changed dramatically between 1987 and 1988. These increases in the use of gold for jewellery raised the proportion of gold used in jewellery relative to the total gold fabrication from nearly 72% to 79% in 1988. This compares with a figure of around 54% in 1980.

The demand for platinum jewellery increased (in weight) by 19% in 1988 and accounted for 37% of world production compared with 32% in the previous year. Of all the platinum used in jewellery, 90% is consumed in Japan, a remarkable figure, accounting for over half the jewellery market in the country. Table 2 shows the very high tonnage of gold

Table 2
Gold fabrication in carat jewellery (including scrap), 1980-88

(tonnes)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	2.9	2.2	2.1	2.0	1.9	1.9	1.7	1.6	1.8
Denmark	.3	.3	.7	.7	.8	.8	.9	.9	.9
FR of Germany	32.0	30.5	32.5	33.0	33.0	34.1	35.0	39.2	45.1
Greece	4.5	5.6	6.7	7.9	9.1	10.5	9.0	8.2	8.3
Spain	18.0	17.1	15.8	13.4	12.6	15.7	15.6	17.0	23.0
France	13.0	14.9	18.8	17.4	16.7	17.6	19.9	20.4	22.3
Ireland and UK	9.3	11.7	12.6	11.4	12.8	14.8	15.8	17.5	21.1
Italy	107.0	171.0	228.0	172.0	220.0	253.0	238.0	222.0	262.0
Netherlands	.6	.5	.8	.8	.8	.8	.9	1.0	1.0
Portugal	2.1	2.5	3.0	3.2	2.4	2.3	2.5	4.7	5.1
EC 12 (1)	189.7	256.3	321.0	261.8	310.1	351.5	339.3	332.5	390.6
(excluding scrap)	156.8	238.2	295.7	236.9	286.5	328.5	322.2	315.8	376.3
Rest of Europe	25.0	24.9	28.6	28.5	30.9	34.4	35.1	34.1	41.4
North America	69.3	73.7	81.8	90.2	94.5	99.8	103.2	104.1	110.7
(of which: USA)	59.1	64.5	71.6	79.8	83.9	89.0	92.9	94.4	100.6
Latin America	25.7	28.9	30.6	21.4	18.5	22.2	33.2	23.3	26.7
Middle East	65.6	178.4	168.5	155.8	208.7	213.9	206.2	195.8	213.4
Indian subcontinent	50.0	73.9	126.5	121.3	170.5	199.9	175.9	190.2	222.5
Far East	64.6	116.0	138.0	122.8	215.7	201.3	198.0	245.2	441.5
(of which: Japan)	28.6	39.0	42.9	43.4	50.2	60.7	80.7	84.0	95.0
Africa	19.6	23.1	18.7	17.8	18.3	17.8	21.0	22.4	32.7
Australasia	3.3	3.9	5.3	4.7	2.6	3.2	4.4	4.2	4.0
Total (2)	512.8	779.1	919.0	824.3	1 069.8	1 144.0	1 116.3	1 151.8	1 483.5
(excluding scrap)	284.8	610.0	753.3	638.2	866.6	904.6	838.7	882.0	1 232.8

(1) Excluding Luxembourg.

(2) Excluding USSR and associated countries.

Source: Gold 1989 — Consolidated Gold Fields.

produced in Italy, e.g. around two-thirds of the total EC figure in 1987 and 1988, and more than this proportion in the three preceding years.

It can also be seen from Table 2 that the total EC production greatly exceeds that of the USA and Japan together. However fabrication in Japan has grown faster in the last eight years than it has in the EC. The combined total production of the EC, USA and Japan is substantially less than that in the rest of the world. Table 2 shows the very high tonnage fabricated in the Middle East, in the Indian subcontinent and the Far East and the extraordinary increase in the figure for the Far East in 1988, from 245 tonnes in the previous year to 441 tonnes.

It is interesting to compare the retail value of diamond jewellery sales, in Table 3, with the gold production figures in Table 2. While not comparable, in that the gold figures are in tonnes fabricated whereas the diamond figures are in retail sales values, the proportions in the EC, the USA and Japan show sharp differences. The EC is well behind in the consumption of diamond jewellery relative to the production of gold. Table 3 also shows that the growth in diamond sales in Japan is greater than in the EC or USA, although on average for the period 1980-87 it is greatest in the USA.

It is as well apparent from Table 2 that the proportion of scrap that is recycled in the industry because it is so valuable, is substantial indeed although relatively less scrap is used within the EC than world-wide.

Consumption in gold jewellery

Probably the most comprehensive description of industry trends is that contained in the Consolidated Gold Fields report 'Gold 1989', from which the following comments have been extracted:

'The opening months of 1988 were relatively quiet for jewellery manufacturers in Italy, with order levels broadly in line with those established during 1987... Fabrication totalled 262 tonnes, the highest ever recorded. Demand was good in both the export and domestic markets.

'One very encouraging sign was the resurgence in exports to the USA, essentially for the first time since the peak year of 1985. Italian exports to other countries in Europe, primarily Switzerland, the United Kingdom and France, enjoyed an overall 16% increase. In addition, Far Eastern demand continued to grow, and there were few indications of an incipient revival of interest in some countries in the Middle East.

Table 3
Retail sales
Diamond jewellery, value and pieces

		1980	1981	1982	1983	1984	1985	1986	1987
EC (1):	million ECU	2 475	2 709	2 910	3 045	3 375	3 541	3 972	4 428
	1 000 pieces	5 772	6 052	6 639	7 164	7 226	7 617	8 194	9 051
Belgium:	million ECU	N/A	N/A	N/A	118	118	118	130	134
	1 000 pieces	N/A	N/A	N/A	250	250	250	260	268
Denmark:	million ECU	9	15	20	27	30	22	35	37
	1 000 pieces	44	58	77	93	86	79	72	73
FR of Germany:	million ECU	603	614	654	759	749	735	790	1 029
	1 000 pieces	1 707	1 723	1 707	1 756	1 656	1 714	2 039	2 640
Spain:	million ECU	271	296	307	334	389	435	547	607
	1 000 pieces	576	642	696	795	827	857	919	950
France:	million ECU	469	593	572	543	473	473	525	484
	1 000 pieces	819	937	967	928	848	848	806	714
Italy:	million ECU	768	806	973	834	1 065	1 139	1 347	1 489
	1 000 pieces	1 329	1 396	1 850	1 898	1 974	2 239	2 390	2 377
Netherlands:	million ECU	49	51	56	63	68	73	81	84
	1 000 pieces	170	179	189	191	194	196	202	204
United Kingdom:	million ECU	306	334	328	367	483	532	517	564
	1 000 pieces	1 127	1 117	1 153	1 253	1 391	1 434	1 506	1 825
USA:	million ECU	3 707	5 485	5 855	7 344	9 773	11 565	9 877	9 824
	1 000 pieces	12 525	15 223	14 722	14 486	15 679	17 498	17 970	19 817
Japan:	million ECU	3 700	4 462	4 144	4 863	5 773	5 861	7 168	7 810
	1 000 pieces	4 128	3 943	4 449	4 630	5 257	5 591	5 952	6 795

(1) Excluding Greece, Ireland, Luxembourg and Portugal in 1980-87; and Belgium in 1980-83.

Source: De Beers.

'The Italian domestic market accounted for an increase of 12%, with most of the growth coming in the final quarter of the year. The outlook for the Italian industry remains bright, with orders at the Vicenza and Basle fairs in early 1989 at record levels.

'Sharply higher fabrication was also recorded in Germany. Total fabrication exceeded 40 tonnes for the first time in this decade. Domestic demand for carat jewellery was particularly healthy, with many consumers switching to gold in preference to silver-plated costume jewellery. There were some indications of a trend towards higher caratages, with good sales not just of mass-produced 9-carat products but also of high carat chain with individually designed gemset inlays. Men's jewellery, especially heavy chains made up of large links, seemed to be gaining in popularity, whereas the fashion for jewellery in three-colour gold appeared to have run its course.

'Apart from buoyant local demand, the German manufacturers enjoyed strong exports, especially to other European countries. Exports to the USA remained subdued, but this was more than compensated for by the strength of other export markets.

'The fabrication of gold into carat jewellery in Spain jumped by over a third to 23 tonnes in 1988, the best level since 1979. The main factors behind this steep advance were the reduction in value-added tax from 33% to 12%, coupled with the booming tourist industry. The strong economic growth in the country, even though this led to higher inflation, also played a role in the increase in jewellery manufacture. Virtually all growth came in the domestic and

tourist markets, with exports, which account for about one-fifth of total fabrication, remaining stable.

'An official hallmarking system was introduced in Spain early this year. While it may be some time before this becomes fully operational, it should help the industry by allaying public fears about under-carating.

'The market in France experienced its fourth consecutive year of growth in 1988, absorbing 22 tonnes of gold in the fabrication of jewellery. Consumption in the domestic market was nearly 9% higher, but the major growth was in the export sector, which increased by 18%. Local demand easily absorbed higher import of jewellery, especially chains fabricated in Italy.

'Jewellery fabrication in the UK and Ireland jumped by more than 20% in 1988 to over 21 tonnes, the highest total since 1979. The industry remained predominantly 9 carat, with 78% of the items hallmarked in the UK in this category. The sector that is demonstrating the fastest rate of growth remains items of 22 carat and above, most of which are destined for the Asian population. This category accounted for 14% of the total in 1988.

'Since 1987, the UK authorities have not required items under 1 gram in weight to be hallmarked. The continued popularity of small charms and earrings of very light weight has resulted in an estimated 2 tonnes of gold jewellery by-passing the hallmarking office.'

Table 4
Employment in the jewellery industry

(1 000)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
EC (1)	70.2	63.1	59.5	63.7	57.3	56.5	56.6	55.7	54.8	55.5
Belgium (2)	7.3	6.7	6.4	6.0	5.5	5.9	5.8	5.7	5.6	5.7
Denmark (3)	.6	.5	.5	.4	.4	.2	.2	.2	.2	.2
FR of Germany (4)	15.2	14.6	13.8	17.7	12.4	12.5	12.9	12.9	12.8	13.3
Greece (5)	.2	.3	.2	.3	.3	.3	.3	.3	.3	.3
Spain (4)	9.5	7.8	6.4	7.3	7.3	6.6	6.4	6.4	6.4	6.4
France (4)	13.5	13.1	13.0	12.5	12.5	12.3	12.2	11.9	11.7	11.4
Ireland (6)	1.2	1.2	1.1	1.1	1.2	.9	.9	.9	.9	.9
Italy (4)	12.5	10.9	10.7	12.3	11.7	11.4	11.1	10.7	10.4	10.6
Netherlands (7)	.5	.5	.4	.4	.4	.5	.5	.5	.6	.6
United Kingdom (4)	9.7	7.5	7.0	5.7	5.6	5.9	6.3	6.2	5.9	6.1

(1) Excluding Luxembourg and Portugal.

(2) 1985-89 estimated.

(3) 1988-89 estimated.

(4) 1987-89 estimated.

(5) 1983-89 estimated.

(6) 1986-89 estimated.

(7) 1980-83 and 1986-89 estimated.

Source: Eurostat (Inde).

Consumption in diamond jewellery

Preliminary results for 1988 suggest an increase in Europe of 16% in ecus for retail sales. This follows an increase of 14% in 1987. It must be remembered that the price of rough diamonds is normally dollar-based, and that the fall in the value of the dollar over this period encouraged European sales.

Retail sales in Italy in 1987 were just short of ECU 1.5 billion, and Germany exceeded ECU 1 billion, followed by Spain, the UK and France, all of which countries had sales worth around ECU 1 billion. In recent years, Germany, Italy and Spain have been the fastest-growing markets. The average retail price in 1987 for an article of diamond jewellery in Europe was around ECU 500, and this compares with an average sales price in Japan of about ECU 2 000.

Diamond-ring sales in the UK in 1987 represented 81% of the total value of UK diamond retail sales. Comparable figures for other countries were 79% in Japan, 59% in the USA, 67% in Italy, 76% in France and 49% in Germany. On the other hand, sales of neckware and bracelets in Germany accounted for 33% of the market, compared to 19% in the USA, 16% in Japan, 12% in France, 10% in the UK and only 8% in Italy. Diamond jewellery sales for men were appreciable in Italy and the USA at 7% of each country's total market, but the low figure for Germany of around 1% in 1987 is believed to have increased by 50% in 1988.

Employment

Accurate employment figures are difficult to obtain because of the large number of very small units in the industry. Many units employ fewer than 20 people, and many craftsmen and outworkers in the industry prefer to be self-employed. The figures show very little change in the number employed between 1987 and 1988, and even between 1985 and 1988.

There was a substantial fall in the number of persons employed in the early 1980s because of the slump in trade, and more capital-intensive production methods have probably allowed greater production in the industry in the years since then without increasing the labour force.

Comparing Tables 1 and 4, one sees clear differences in the labour intensiveness of the jewellery industry in the various EC countries. In 1988 Italian employees produced about ECU 160 000 worth of jewellery while their French counterparts succeeded in producing only ECU 66 000 worth of jewellery per employee. However, one should take into account the differences in the social structure of employment in different EC countries, for Table 4 excludes homeworkers, who are likely to account for a larger part of the jewellery industry labour force in Italy.

Trade

The general trends in trade are exhibited in Tables 5 and 6, which include only jewellery (as opposed to

Table 5
EC imports of articles of jewellery of precious metal or precious metal plated ware, and goldsmiths' and silversmiths' wares (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Origin								
Extra-EC 12	244.1	322.1	401.6	444.9	687.4	503.9	576.4	543.9
USA	37.4	62.2	60.4	43.9	70.8	44.0	54.9	52.4
Japan	16.7	20.1	19.6	21.9	37.8	40.3	36.3	34.1
Intra-EC	423.2	395.0	417.0	494.9	538.0	444.8	500.3	620.5
Belgium and Luxembourg	14.7	13.0	10.3	10.9	12.6	9.7	13.6	22.4
Denmark	3.4	2.8	2.0	2.3	3.8	3.1	3.4	2.6
FR of Germany	49.2	46.5	48.5	48.0	46.7	54.3	60.3	66.2
Greece	1.1	.9	.9	1.6	1.6	2.7	3.0	3.0
Spain	22.2	29.7	26.5	21.6	27.0	27.8	29.9	33.0
France	107.6	80.6	88.7	127.0	141.0	46.3	53.0	106.2
Ireland	1.9	1.8	4.8	2.8	1.2	1.2	1.1	.4
Italy	177.2	183.4	205.1	245.5	266.1	262.9	299.5	342.2
Netherlands	9.4	9.6	7.0	7.6	8.9	8.9	9.1	9.4
Portugal	2.8	2.1	2.2	3.2	2.7	2.4	2.9	3.4
United Kingdom	33.8	24.8	21.0	24.3	26.5	25.6	24.4	31.6

(1) 1980 EC 9; 1981-83 EC 10.

Source: Eurostat (Comext).

loose stones and the processing of these goods) and goldsmiths' and silversmiths' wares, and articles made of platinum.

The most significant general feature of these tables, which cover the period 1980 to 1987, is the unevenness of the figures. Nominal exports from the EC to the world as a whole have approximately doubled in terms of ecus between 1980 and 1987 but the overall period was one of slight decline. Of course, the fact must not be lost sight of that in this period the value of the dollar declined by nearly one-third against the ecu.

The most consistent trend is in EC exports to Japan. Between 1980 and 1987 the value of the yen practically doubled against the ecu yet even in terms of yen, exports nearly tripled, and by 1987 they were well over five times the 1980 figure in ecus.

At ECU 2 998 million, exports from the EC to the rest of the world considerably exceeded imports from the outside world at ECU 544 million in 1987. There was a large rise in imports from the rest of the world in terms of nominal ecus between 1980 and 1984, but this period was followed by an irregular decline.

The breakdown of EC imports into the various EC countries emphasizes the importance of Italy as a producer of jewellery. In the early 1980s, imports by EC countries from Italy accounted for 42% of total EC imports. In 1987, Italy was supplying more than 55% of EC import requirements. Overall, France was in second place, but was exceeded by Germany in 1985 and 1986.

Geographic features

The industry has a great need for specialists and therefore one continues to find aggregation in particular places where the infrastructure has grown up over many years. Similarly, the aggregation is further specialized, so that some locations confine themselves to higher-quality jewellery and some to quantity production, and larger silver articles for example may be produced by groups in another location.

The main manufacturing centres in Italy are in Arezzo and Vicenza, probably followed in quantity by Valenza and Milan.

In Germany, about 75% of the trade is believed to be based in Pforzheim, with Idar-Oberstein an important centre, especially for the stone industry. Other centres are Schwabisch Gmund, Hanau and Kaufbeuren.

In France, Paris and Lyons account for a great part of the industry, as does St Amand. In the United Kingdom the main centres for jewellery are London and Birmingham, Sheffield being the centre for cutlery and a large part of the table-silver industry. In Belgium, Antwerp is the centre of the jewellery industry.

The impact of 1992

The impact of harmonization of the jewellery industry exposes and emphasizes very radical dif-

Table 6
EC exports of articles of jewellery of precious metal or precious metal plated ware, and goldsmiths' and silversmiths' wares (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987
Destination								
Extra-EC 12	1 344.5	2 288.5	2 854.6	2 822.5	3 840.8	3 849.6	3 248.4	2 998.5
USA	268.3	459.2	657.9	672.1	1 129.1	1 489.8	1 262.6	1 037.4
Japan	28.8	37.7	63.6	58.3	67.2	76.1	118.3	153.0
Intra-EC	512.7	478.2	485.0	553.8	659.9	557.3	622.1	754.0
Belgium and Luxembourg	35.4	28.9	32.2	29.8	34.8	34.6	42.6	58.3
Denmark	7.1	6.8	7.8	8.6	13.0	13.5	17.5	14.1
FR of Germany	152.2	129.6	97.3	129.8	144.0	133.8	157.2	189.5
Greece	.5	1.2	2.4	2.6	2.5	3.5	2.3	2.8
Spain	9.2	5.3	6.4	5.1	5.3	7.5	13.5	13.7
France	117.4	90.9	109.9	137.0	172.9	91.0	117.6	175.1
Ireland	7.2	5.6	5.5	4.3	4.7	4.7	3.4	4.6
Italy	9.8	15.8	19.3	17.0	21.0	20.5	20.5	25.7
Netherlands	55.5	48.9	47.4	50.6	57.2	56.6	58.1	58.2
Portugal	1.3	3.2	2.1	2.6	4.6	3.5	2.7	6.6
United Kingdom	117.1	142.1	154.6	166.3	200.0	188.2	186.5	205.4

(1) 1980 EC 9; 1981-83 EC 10.

Source: Eurostat (Comext).

ferences in the means of certification of precious metals within the EC, and in the content or standards of precious metals that are permitted.

In six Member States, recognized independent assay offices certify goods by marking each article. In the other Member States, reliance may depend on an authorized punch being applied by the manufacturer or importer, and on whatever general consumer protection legislation may apply.

The 'hallmarking States' are reluctant to see their public lose the protection of hallmarking, which in some cases has been a feature of their law for many centuries, while the 'non-hallmarking States' are reluctant to accept hallmarking, which they regard as a barrier to trade and an unnecessary additional cost to production.

The hallmarking States contend that only independent hallmarking protects the public and that this is evidenced by the complaints about substandard goods circulating in non-hallmarking countries in the world generally (and not just in Europe) and the quantity of goods that their assay offices reject as substandard. The non-hallmarking States believe that the public can be adequately protected in other ways.

The issue of different standards of precious metals is also complicated by the fact that there are 10 different standards of gold in use in the EC as a whole, most States permitting more than one standard; similarly there are seven different standards for silver and two for platinum. Most States are not willing to accept articles of different and certainly of lower standards than they presently permit and those using lower standards are unwilling to forego them.

A further difference between Member States has to do with the methods by which they test precious

metals, but this may be an easier matter on which to reach agreement than the more vexing questions of certification and standards. It is, however, important if the tests carried out in one Member State are to be accepted by another.

While it is understandable that the sensibilities in this subject are very strong, because of the financial implications of any decisions, it is essential that a solution is found, and to achieve this, it must be approached in a spirit of good will and compromise.

Outlook

It is particularly difficult to make a forecast in the jewellery industry because sales depend so much on factors over which the industry has no control, such as economic prosperity, fiscal measures and rates of exchange.

Given that the general outlook is one of stability, and within the EC possibly one in which rates of taxation may be harmonized downwards rather than upwards, there is reasonable optimism within the industry. This view is supported by gold fabrication levels in the early months of 1989, which were generally on a par with 1988 levels.

The early indications for diamond sales in 1989 are also encouraging. The UK reported an increase of 14% over the same period in 1988. However, further appreciation of the dollar is likely to adversely affect sales in countries whose currencies correspondingly weaken.

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COSTUME JEWELLERY

(NACE 491)

Summary

The fashion jewellery industry varies considerably in each of the EC countries involved in its production. Unebif, the Union of European Fashion Jewellery Manufacturers who provided the data referred to in this text, also incorporates non-EC nations.

In most cases no information is available due to the fact that in all EC countries the industry consists of mostly small units, employing under 20 people, who find it difficult to provide statistics. Even in countries where production units are larger, the companies do not always respond to the surveys for information, making it extremely difficult to compile an overall view of the sector.

The industry has grown considerably since the early 1980s. What used to be known and accepted as imitation jewellery, i.e. imitating the real thing, has become fashion jewellery, moving along with fashions such as style and colour. It is now taking its cue from the dress trade as a supplement to a lady's outfit. It incorporates fashion accessories such as fancy haircombs and ornaments.

Description of the sector and industry structure

As is the case in most other countries, statistics from the Federal Republic of Germany do not include data for manufacturers employing fewer than 20 persons; and, as stated above, this is the case for most production units. They manufacture all types of costume jewellery, brooches, ear-rings, necklaces, bracelets, finger-rings, hair ornaments, hat ornaments, shoe ornaments, cuff-links, tie-clips, etc. They also make dress accessories such as buttons, dress adornments, belts, bags of all types from the simple to the most complicated stone-set items. Moreover, there is a whole industry making parts known as fittings and findings, used in further manufacture. These are, among others, rocaille beads and other beads, sew-on stones and pearls, imitation stones plain, foiled and fancy, etc., religious articles such as rosaries, crucifixes and crosses, etc., gift and advertising articles, chandelier drops in great variety.

The fashion jewellery industry is however extremely cyclical, as is generally the case for similar industries. To avoid the disruptions caused by such cyclical activity, the industry has diversified production, and became involved in the trade of other products such as plastic parts for cars, TVs, toys, display materials, locks, technical and optical equipment parts.

Many items must still be handmade and are therefore somewhat labour intensive, wages per worker are generally high, especially for out-workers. Cheaper merchandise nearly always comes from low-wage countries such as in the Far East. Quality producers trying to be more competitive supply directly to the shop, leaving out the wholesaler, i.e. cutting out one intermediate profit taker.

Current situation

The employment trend is stable and not affected by increased automation, because of the small size of manufacturers.

However, since the EC producers are small, considerable investment will be needed in the future as a result of environmental controls and computer equipment requirements. Many customers in this trade only pay after some delay.

A change in the structure of trade is not expected.

Low profits and competitive prices are essential, because of frequent changes in style, which partly results from the fact that competitors in the Far East are very quick at copying products to sell them at a lower price, and have even become better at this in recent years.

In the Netherlands, there are no more than 50 producers, most working with metal and all employing fewer than 20 persons. They sell mostly individual creations (ear-rings, etc.) to both wholesalers and retailers at moderate prices and of quality workmanship. Trade is done via exhibition centres, of which three are in the Netherlands.

The distribution system is now changing and there are more and more cash-and-carry wholesalers. Quality brand names are distributed through selec-

Table 1
Costume jewellery
External trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988
EC trade									
Exports extra-EC (1)	74.0	87.7	86.0	84.5	114.4	161.8	179.0	183.6	177.4
Index (2)	48.5	57.4	56.2	55.3	70.7	100.0	110.6	113.5	109.6
Imports extra-EC (1)	92.6	107.3	112.0	110.6	142.6	181.4	248.1	275.5	292.2
Index (2)	52.2	60.2	62.8	62.1	78.6	100.0	136.8	151.9	161.1
X/M	.8	.8	.8	.8	.8	.9	.7	.7	.6
Imports intra-EC (1)	88.1	83.3	92.0	92.0	111.1	138.8	162.1	203.0	208.6
Index (2)	64.8	61.0	67.3	67.3	80.0	100.0	116.8	146.3	150.3
US trade									
Exports	N/A	N/A	N/A	N/A	N/A	73.3	75.2	73.6	93.9
Index	N/A	N/A	N/A	N/A	N/A	100.0	102.6	100.4	128.1

(1) 1980 EC 9; 1981-83 EC 10.

(2) Taking into account changes in EC membership.

Source: Eurostat (Comext), US Department of Commerce.

tive dealers but are mostly supplied by other European countries (Christian Dior, etc.).

The quality of plating has increased in Europe in order to face the Far East competition.

Many producers are located close to large towns, the biggest concentration being around London. Their production ranges from ear-rings, brooches, necklaces, bracelets, etc., to all fashion accessories, but there is no plastic industry to speak of. The shoe and bag/belt accessory trade is separate, except where it conflicts and becomes fashion. Again, the trend is to sell more and more directly to the retailers. There is a large cash-and-carry trade situated in the main centres such as London, Manchester, Birmingham, Leeds, Glasgow, etc. (mostly in London) but, due to the fact that many producers now sell directly to the customers of the cash-and-carry trade, this trade concentrates more and more on imports. The United Kingdom has, by tradition, always been a major importer of fashion jewellery.

External trade

All fashion jewellery manufacturers must keep ahead of fashion, and offer high quality and better service. The EC's external trade balance was in def-

icit by about ECU 115 million in 1988, and the import penetration ratio was 60%.

Far East competition is mainly price competition, as opposed to fashion competition. Too much effort, however, seems to be made by these producers to enter a market in which sales prospects are limited, given the excessive number of producers fighting for market shares. The proliferation of fashion jewellery producers is such that the latter may just auto-suppress themselves. But it also reduces the image of EC merchandise by trying to make a line cheaper and cheaper, resulting in lower quality products.

Copying is also a problem, as is the case in the clothing industry but, since designs have a short life, the damage is mostly in proportion, unless a major producer's style of goods continues to be involved (such as Cartier).

The trend in Europe is for quality fashion merchandise at medium to higher prices.

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MUSICAL INSTRUMENTS

(NACE 492)

Summary

There has been an increasing demand for musical instruments in the 1980s as a result of changing lifestyles and the development of musical culture in the general public. Asian imports account for a large part of the supply of electronic instruments, which have a fairly large share of the market. Current trends in Community production are likely to continue into the 1990s with the emphasis on traditional, high-quality instruments, the gradual development of electronic instruments and increasing activity in the restoration of old instruments.

Description of the sector

The following products are part of the musical instruments sector:

- keyboard instruments (such as upright and grand pianos, organs and harpsichords),
- wind instruments (such as oboes, flutes, saxophones, bagpipes),
- string instruments (such as violins, guitars, mandolins, banjos),
- other instruments (such as accordions, percussion instruments, electronic organs, synthesizers),
- accessories and parts (bows, strings, bridges, components for electronic instruments).

This definition includes both traditional instruments, whether early or modern, and sophisticated electronic instruments.

Current situation

During the 1980s, the EC market for musical instruments grew at an average of 1.9% annually. However, this trend does not necessarily reflect an increase in private music-making, as purchasing an instrument and actually playing it are two very different things. The resale of instruments and the rental market, which are significant in all European countries, must also be taken into account.

Three basic factors are likely to have a favourable effect on the musical instrument market:

- the rise in purchasing power and changing lifestyles, which have led to a renewed interest in music-making,
- higher enrolment in national music academies and regional music schools,
- an increase in instrument-playing stimulated by more music-making in the home, particularly in France and the United Kingdom, and a diversification of outside musical activities as in the Federal Republic of Germany, Benelux, Denmark and France, where there is a relatively large number of concerts and festivals.

In a growing consumer market, the Community's musical instrument industry has failed to establish a firm position and is lagging behind its competitors. There are a number of reasons for this.

Firstly, high labour costs are a major handicap for an industry which has to compete with foreign companies that are sometimes larger, and use more efficient and more flexible production methods.

Table 1
Main indicators, 1980-89 (1)
Musical instruments

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987 (2)	1988 (2)	1989
Apparent consumption	653	708	724	769	847	898	969	1 050	1 096	N/A
Net exports	-133	-191	-170	-168	-173	-175	-231	-285	-328	N/A
Production	520	517	554	601	674	723	738	765	768	879
Employment (1 000)	19	18	17	17	16	16	15	15	14	15

(1) Excluding Belgium, Greece, Ireland and Portugal.

(2) Estimated.

Source: Eurostat (Inde, Comext).



Secondly, due to the small size of European firms and tendency toward national specialization, musical instrument manufacturers tend to be individualistic, and highly independent. As a result, investments in production and marketing are low for the sector as a whole, except for one or two larger companies which have achieved reasonable profitability levels. The case of electronic musical instruments is an illustration; investments in the EC grew initially but are still not sufficient to match the sums laid out by Japanese, Korean and American firms.

Thirdly, because of poor financial resources, production automation has developed only slowly, in contrast to the persistent streamlining efforts made in Japan and the United States in recent years. These two countries have achieved large production runs by using computer-aided design and micro-computer and software developments to produce musical instruments at lower costs. In addition, American and Japanese firms have introduced greater manufacturing flexibility by subcontracting the manufacture of electronic components. This has given them a further advantage over their European counterparts, for whom this type of flexibility is virtually unheard of.

The EC industry may be outflanked in size and number, but it nevertheless has a number of advantages, which a few dynamic firms with good technical and human potential are beginning to exploit. European firms concentrate on products in the top of the market range. This high-quality production implies smaller production runs or even single instruments being made to order, and is geared to an experienced clientele rather than to the general public. The EC industry, with its specifically national features, also plays an important role in transmitting European musical culture through the instruments it manufactures — baroque flutes in France, pianos and violins in Germany and guitars in Spain.

Consumption

The Community industry has a large market, which is estimated at ECU 1 096 million in 1988. However, consumption of musical instruments in the EC remains low compared with that in the United States and Japan. This is certainly due to the fact that the market is made up of individual national markets with specific characteristics, which are still very marked. There is, nonetheless, a trend towards

Table 2
Production and external trade

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC (1)	520	517	554	601	674	723	738	765	768	879
Index	72	72	77	83	93	100	102	106	106	122
USA (2)	804	1 020	935	1 062	1 028	950	754	663	672	N/A
Index	85	107	92	112	108	100	79	70	71	N/A
Japan (2)	304	639	494	500	472	520	544	604	700	N/A
Index	58	123	95	96	91	100	105	116	135	N/A
Production in constant prices										
EC	754	695	676	682	714	723	706	709	740	764
Index	104	96	93	94	99	100	98	98	102	106
EC trade in current prices										
Imports extra-EC	294	367	355	381	408	429	464	507	550	N/A
Index	69	86	83	89	95	100	108	118	128	N/A
Exports extra-EC	161	176	185	213	235	254	233	222	222	N/A
Index	63	69	73	84	93	100	92	87	87	N/A
X/M	.6	.4	.5	.6	.6	.6	.5	.4	.4	N/A
Imports intra-EC (3)	213	209	207	190	182	177	190	201	208	N/A
Index	120	118	117	107	103	100	107	114	118	N/A

(1) 1987-88 estimated by Eurostat.

(2) Census of Manufactures and Eurostat estimates.

(3) Excluding Greece, Spain, Ireland and Portugal.

Source: Eurostat (Inde, Comext).

greater uniformity where electronic instruments are concerned.

Production

With production estimated at ECU 768 million, the EC was the largest world producer in 1988, for the second consecutive year. The USA (with a production of ECU 663 million) and Japan (ECU 604 million) ranked second and third, respectively.

EC production grew by 5% a year on average between 1980 and 1988. Japan has had the highest production growth rate over the last three years (+ 35%) while production decreased in the USA.

In constant prices, production showed a slight increase in 1987, and this trend strengthened in 1988, and possibly also in 1989.

However, the situation varies greatly according to the type of musical instrument and the country concerned, as shown in Table 3. In 1988, as in 1980, the

Table 3
Production in constant value

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987 (1)	1988 (1)	1989
EC (2)	753.9	695.5	676.4	682.4	714.1	723.0	705.9	708.3	740.4	765.0
Denmark	4.5	4.8	6.3	5.8	5.3	4.0	3.9	3.6	4.3	4.4
FR of Germany	366.2	339.8	317.6	308.4	309.1	300.9	295.4	280.4	290.3	296.6
Spain	13.2	12.4	15.0	12.1	11.6	12.1	12.7	12.5	13.1	13.5
France	56.7	66.1	62.3	74.5	62.0	56.9	56.0	56.4	58.4	56.8
Italy	209.2	190.9	186.8	191.2	240.8	216.2	224.1	238.7	267.2	285.4
Netherlands	17.1	17.5	15.8	15.0	16.1	62.2	52.6	49.9	40.6	40.7
United Kingdom	87.0	64.0	72.6	75.4	69.2	70.7	61.2	66.8	66.5	67.6

(1) Estimated.

(2) Excluding Belgium, Greece and Portugal.

Source: Eurostat (Inde).

bulk of European production came from the Federal Republic of Germany and Italy, which together account for 75% of EC production (except Belgium, Greece and Portugal).

Employment

In 1988, the Community musical instrument industry included some 180 firms with more than 20 employees. However, many firms, both cottage industries and larger concerns, had gone out of business in the previous six-year period as a result of commercial and financial difficulties.

The number of people working in the industry fell from 19 258 in 1980 to 14 444 in 1988. The evolution varies from country to country. Mirroring the geographical location of production, employment is mainly concentrated in the Federal Republic of Germany (7 277 employees or 50% of the total), Italy (2 431 employees), the United Kingdom (1 623) and France (1 508). The largest job losses since 1980 occurred in the United Kingdom, Spain and Italy. The decreasing trend was smoother in the Federal Republic of Germany and France, and it is only in the Netherlands that employment figures have been increasing since 1985.

Trade

In 1988, half of the EC musical instruments market was supplied by imports, compared to only 5% in 1980. EC industries are continually faced with stiff competition from other European countries such as Austria, the German Democratic Republic and Finland, in the field of traditional instruments, and from non-European countries such as the United States and Japan when it comes to up-market, soph-

isticated instruments. There is also a challenge from Israel, the Republic of Korea, Hong Kong and China. Asian countries have succeeded in gaining a firm foothold in the EC market, mainly by selling technically sound products of consistent quality at lower prices.

In contrast, EC manufacturers are not big exporters. Musical instrument exports only account for 29% of total production. The EC's balance of trade figures in this area have therefore shown a deficit throughout the 1980s.

Industry structure and geographic features

The EC musical instrument industry suffers from two major structural handicaps. To begin with, the industry is fragmented with many small and medium-sized firms. Only 180 out of 300 firms employ more than 20 people. Secondly, the EC lacks multinational firms similar to those of the United States and Japan. This situation has led to restructuring and mergers in all the EC countries.

There are only a few large companies in the EC musical instrument industry. They include:

- in the Federal Republic of Germany: Hohner, Schimmel, Steinway and Sons,
- in Denmark: Forbenius and Sonner, Drittel, Daneben,
- in France: Selmer, Savarez, Piano de France, Courtois, Promifi,
- in Greece: Ecorda,

Table 4
Employment

	1980	1981	1982	1983	1984	1985	1986	1987 (1)	1988 (1)	1989
EC (2)	19 258	18 273	17 318	16 708	16 150	15 938	14 651	14 495	14 444	14 871
Denmark	132	125	124	124	133	142	146	143	141	143
FR of Germany	8 569	8 418	7 889	7 601	7 262	7 315	7 289	7 284	7 277	7 550
Spain	1 062	813	784	707	669	523	492	509	509	580
France	1 773	1 848	1 884	1 991	1 746	1 691	1 568	1 532	1 508	N/A
Italy	4 084	4 113	3 836	3 631	3 933	3 378	2 608	2 507	2 431	1 466
Netherlands	394	380	363	343	334	809	819	820	955	2 489
United Kingdom	3 244	2 576	2 438	2 311	2 073	2 080	1 729	1 700	1 623	970

(1) Estimated.

(2) Excluding Belgium, Greece and Portugal.

Source: Eurostat (Inde).

- in Italy: Crumar, Elka, Farfisa,

Outlook

- in the United Kingdom: Fletcher, Coppock and Newman, Grainger and Campbell, H. H. Electronic.

Italy is in fact the second largest producer of musical instruments in the EC, behind the Federal Republic of Germany. Italian production fell between 1980 and 1983 but, since 1985, it is increasing and 1989 figures are expected to continue following a positive trend. In 1985, 100 firms were recorded with about 4 000 to 5 000 employees.

In 1985, Italian consumption decreased for the third consecutive year and reached ECU 149 million, of which 72% were keyboard instruments, 7.2% wired instruments and 5.2% percussions.

Increasing labour costs have had a negative impact on the competitiveness of the industry over the last few years. Imports grew substantially and are mainly composed of electronical instruments, pianos, wind instruments and accessories and parts. Most of the imports come from Asia, the USA and Canada. Exports are mainly string instruments, accordions, organs and accessories and parts. Trade with other Member States is also quite important.

Geographically, the bulk of the firms in the industry are concentrated in four countries — the Federal Republic of Germany, Italy, France and the United Kingdom — which accounted for more than 90% of total EC production in 1988. Some local regions have gained world-wide reputations. These include Paris and Mirecourt in the Vosges in France, Berlin and Baden-Württemberg in Germany and London in the United Kingdom.

EC musical instrument production continued to grow in 1988 as a result of the growth of music-making by individuals, private groups and military associations. A 3% growth in constant prices is expected in 1989. Demand is likely to reflect a gradual return to acoustic music and a steady development of electronic music through new applications.

The medium-term EC musical instrument market should continue to grow in volume up to 1990. Musical instrument playing by the general public is likely to continue to develop as a result of musical education in schools and special institutions. The trend will be sustained by the spread of public festivals like the midsummer night *Fête de la musique* in France and Belgium, or private festivals such as rock festivals. However, there is one factor that could adversely affect this development. Consumers will probably become more selective than they have been in recent years in dividing their spending between at-home and outside leisure pursuits, with musical instruments being included in the former.

Imports from Asian countries — Japan, the Republic of Korea and Taiwan — are likely to increase in this growth market. Technological advances in electronics coupled with computerization have enabled Japanese firms to develop a strong competitive edge in terms of price and quality compared with other firms in the sector, including EC firms. In spite of certain advantages, the EC musical instrument industry is likely to be faced with a number of difficulties in the next few years, owing to the nature of its professional structure and its lack of flexibility in responding to the latest consumer trends which favour high-quality, reasonably-priced, all-electronic products. The impact of parallel mar-

Table 5
National specialization of production

	B-L (1)	DK	D	E	F	IRL	I	NL	UK
Keyboard instruments		x	x					x	x
Wind instruments					x	x			
String instruments				x	x			x	x
Other instruments	x						x	x	x
Accessories and spare parts			x						x

(1) Specialization of trade activity, not production for Belgium.

Source: Cafim.

kets, such as the second-hand piano market, which often distort competition, may also cause problems.

The EC industry can, nevertheless, consolidate the position it has already achieved and improve its domestic and foreign market positions by organizing an effective development strategy geared toward:

- musical research, which is generally led by composers in public institutes, universities and private companies,

- the improvement of distribution channels and a more equitable distribution of profits down the line, especially among distributors and music teachers,
- promoting the design of traditional instruments, especially high-quality instruments, by stepping up staff training programmes at all levels.

Edited by DRI Europe on the basis of information published in *Panorama of EC Industry 1989*

TOYS

(NACE 494)

Summary

The EC toy industry is presently experiencing some difficulties due to the changing pattern of international trade, and especially increased imports from the Far East. However, a policy of cooperation between European manufacturers, enabling them to reach the critical mass required to compete on the international market and a choice of more aggressive development strategies (leadership in traditional toys at the top and middle of the market and development of marginal opportunities in down-market products in order to break into this end of the market) should allow the EC industry to strengthen its position on both the domestic and foreign markets.

Definition of the sector

The toy industry has been defined in terms of the following products:

- cars and wheeled vehicles for children, such as pedal cycles, scooters, hobby-horses, pedal cars, dolls' prams and similar toys;
- dolls of all types (made of plastic or other materials), accessories and spare parts for dolls;
- other toys and scale models such as wooden toys, trains and electrical circuits, weapon projectors and other optical toys, musical toys, model kits, construction games, miniature models made of cast metal, toys for babies and toddlers, figurines, structures with characters, soft toys and all other toys made of plastic, metal fabrics, rubber and other materials;

- articles for parlour games, such as playing cards, non-electronic board games, table-tennis equipment, billiards, video games.

Coin-operated amusement machines, articles for entertainment and parties and articles or objects used in open-air games and sports were not included in the statistical survey of the toys and games sector.

Production

With an estimated output of ECU 4.3 billion in 1986 and 1987, the EC 9 is the second largest producer of games and toys in the world after the United States. Production value in Community industries rose 2.6% a year during the 1980-87 period, but this represented a yearly volume drop of 3%. However, beneath the overall pattern there is considerable variation in development trends from one country to another.

Consumption trends

The Community toy industry has a large domestic market which represented some ECU 4.1 billion in 1986 and ECU 4.3 billion in 1987. Apparent consumption of games and toys is however, two-and-a-half times lower than in the United States owing to a much lower unit consumption. Also, national market consumption varies according to strongly individual characteristics, although a certain degree of homogenization is taking place.

Whilst the American market has continued to grow, despite large fluctuations, the European market has

Table 1
Main Indicators, 1980-89 (1)
Toys

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	N/A	3 833	3 980	4 146	5 229	4 664	4 796	5 101	6 365	N/A
Net exports (2)	N/A	-330	-441	-492	-533	-531	-686	-853	N/A	N/A
Production	3 702	3 476	3 650	3 705	4 737	4 153	4 286	4 415	4 718	4 929
Employment (1 000) (3)	111	97	89	81	79	75	71	70	69	70

(1) Nimex codes: 9701-04.

(2) Excluding Ireland, Luxembourg and Portugal.

(3) Excluding Luxembourg; 1987-88 estimated.

Source: Eurostat (Inde, Comext).



been slack since 1980, especially in France, the Federal Republic of Germany and Italy. This is linked to:

- Europe's shrinking child population (9% fewer under-14s between 1980 and 1986);
- stiff competition from other leisure products such as clothes, records, cassettes and travel for the over-10s.

In general, the European companies are specialized in traditional toys, contrary to the companies located in other countries who produce fashion toys which request high publicity costs and have a short life.

Foreign trade

The EC market is basically covered by production from Community countries, which accounted for 83% of apparent toy and game consumption in 1986.

But EC manufacturers are nevertheless having to cope with a strong and rising tide of products from South-East Asia on the domestic market. These represented 70% of total extra-EC imports in 1986 as against 45% in 1980.

The Community industry's export capacity represented 42% of production in 1986 (intra and extra-EC) but its share of non-Community markets remains low (14% of European production). Although the situation has improved slightly, the Europeans only hold a meagre share of the American market which is the most promising in terms of size and growth potential. In 1984, the EC accounted for barely 6% of imports, which altogether make up only 20% of the American market.

The imbalance between imports and exports in EC trade with non-Community countries has created a situation in which the balance of trade represents a structural deficit, characterized by an import-export ratio of 41% in 1986 as against 45% in 1980.

Employment trends

The EC toy industry counted some 2 700 firms in 1986. A relatively large number of both small and medium-sized firms in difficulty (10 to 25% depending on the country) have disappeared from the scene since 1980, causing a drop in employment levels. Staff reductions have varied considerably from country to country. From 1980 to 1986, they hit as much as 20 to 30% of the sector's workforce in the

Table 2
Production and external trade (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC	3 702	3 476	3 650	3 705	4 737	4 153	4 286	4 415	4 718	4 929
Index	90	84	88	90	115	100	103	107	114	119
USA (2)	5 124	7 359	8 427	8 405	10 644	9 941	7 820	7 457	8 762	N/A
Index	52	74	85	85	107	100	79	75	88	N/A
Japan (2)	2 227	3 114	3 259	4 162	5 207	5 728	5 990	5 958	8 184	N/A
Index	39	54	57	73	91	100	105	104	143	N/A
Production in constant prices										
EC	4 971	4 336	4 408	4 150	4 327	4 153	4 227	4 239	4 389	4 426
Index	119	104	106	99	104	100	101	102	105	106
EC trade in current prices										
Imports extra-EC	N/A	651	653	774	857	982	1 033	1 166	2 751	N/A
Index	N/A	66	66	79	87	100	105	119	280	N/A
Exports extra-EC	N/A	294	323	333	365	449	502	480	1 104	N/A
Index	N/A	65	72	74	81	100	112	107	246	N/A
X/M	N/A	.4	.5	.4	.4	.5	.5	.4	.4	N/A
Imports intra-EC (3)	915	1 021	1 134	1 213	1 271	1 316	1 597	1 722	1 775	N/A
Index	120	118	117	107	100	107	113	117	140	N/A

(1) Excluding Portugal, Luxembourg and Ireland.

(2) Census of Manufactures and Eurostat estimates.

(3) EC 10.

Source: Eurostat (Comext, Inde), national professional organizations and BIPE.

Federal Republic of Germany, France and the United Kingdom.

Factors behind the economic situation

The difficult situation in which the Community toy industry finds itself can be attributed to the characteristics and trends of the domestic market outlined above. However, a number of other factors which are symptomatic of the state of the industry are also responsible for the weak competitive position of the EC toy industry as a whole.

The small investment capacity of EC companies, linked to their small size

Lack of financial resources is a basic handicap for European industries in their bid to compete with other producers. The problem can be seen at various levels:

- 'fad' toys, which represent an increasingly large share of the market, require a large advertising budget, which can be as high as 10% of turnover;
- investment in R&D is a decisive factor in competition. Novelty is becoming a strong selling point on the traditional market as well as on the market for 'fad' toys. Innovation is a means for distinguishing a firm's products from the competition in a market where imitation is rife;
- the EC companies' lack of financial muscle has limited their ability to go international at a time when the spectacular spread of television has introduced a worldwide dimension into the toy market. This was one of the major trends observed in the 1975-85 period;
- finally, for lack of financial resources, the EC toy industry runs the risk of lagging far behind the multinationals which dominate the market in production automation. This type of modernization is becoming increasingly important for stock control and cutting material costs which represent 35 to 50% of the cost of a toy on markets with large production runs.

The absence of international-scale specialized design firms in the EC

The lack of such an infrastructure to promote innovation has also curbed the EC toy industry's innovative capacity. In comparison, some 50% of American manufacturers' new products are designed outside the company.

Insufficient production runs

Owing to the patchwork nature of the EC market and the small size of firms, production runs are too small to be able to benefit from economies of scale comparable to those made by American multinationals which offer a single worldwide range. These extra costs accumulate at different levels: purchase of raw materials (35 to 50% of turnover), subcontracting, advertising costs and particularly the cost of television advertising. Undersized production runs also put a brake on production investments which could reduce production costs.

High wage costs in Europe

This is a major handicap for the EC toy industry in relation to foreign competitors, most of whom have relocated to South-East Asia. China and the Republic of Korea have become the hub of international subcontracting because of the marginal cost of labour in these countries (USD 0.5 per hour instead of USD 16.50 in the Federal Republic of Germany). The handicap represented by labour costs, which account for about 15% of the ex-works product price in Europe, is particularly penalizing in a sector where assembly operations are numerous and difficult to automate for small production runs.

Lower production flexibility in the EC toy industry, although the situation is improving

Home-based piecework and national subcontracting are widely developed in the Community toy industry, particularly in southern Europe. However, EC manufacturers have very little recourse to international subcontracting compared with American and Japanese multinationals in the sector, who often have more than 50% of their products manufactured in Taiwan and Hong Kong. There are, however, clear indications that EC manufacturers are beginning to follow the pattern set by their large competitors.

The flexibility offered by this type of production presents a major advantage for toy manufacturers, who have to deal with a cyclical market influenced by fashion trends.

Weak international managerial capacity

Ignorance of foreign distribution channels, especially those further afield, is a serious obstacle for small and medium-sized EC firms with international ambitions. Indeed, their marketing approach is much less developed than that of foreign multina-

tionals. Few Community firms now have the capacity to develop a licensing policy or to open up factories abroad.

Strong points and a viable 'traditional' product

Although the EC toy industry suffers from a number of disadvantages compared with its competitors, it nevertheless includes a number of young, dynamic firms capable of holding their own on both domestic and international markets. The success of such firms illustrates the strong points the EC toy industry should be concentrating on:

- its creativity;
- the quality of its products;
- the ability to transmit European culture through the traditional toys it offers (e.g. educational toys).

There is also room on the international market for marginal production of ordinary, down-market products, an area in which a number of small and medium-sized EC businesses have operated with some success because of an aggressive marketing policy as well as a combination of a flexible production market and subcontracting to keep production costs down.

Financial structure

Profitability levels have fallen in EC companies specializing in the toy sector since 1980. This is mainly due to a rise in production, marketing and advertising costs, which are difficult to pass on to the consumer because of the strong competitive pressure in the sector.

They tend to have a shaky financial structure due to a lack of equity, associated with a low self-financing capacity which rarely covers more than 50% of financial requirements. Another feature is high short-term debts, linked to the seasonal nature of sales and high financial costs. Financial costs on average represent 3 to 5% of turnover in EC companies. They remain high because of the strain of seasonal selling on company funds and the lack of equity.

Major structural features

The EC toy industry suffers from two main structural handicaps. The first is the number and diversity of firms in the sector. It is estimated that 80 to 90% of the firms operating in the sector on a full-time basis (excluding seasonal activity) employ fewer than 20

salaried workers. The second problem is the absence of multinational firms comparable to American and Japanese groups, with the exception of Lego. This explains why production is so dispersed. The share of the 10 largest companies (national and foreign) is never more than 50% of national production in the EC's main producing countries. The sluggishness of the domestic market and the pressure of competition in the sector have caused a number of companies, even medium-sized ones, to go out of business in the past few years (—10 to —30% in the EC's five main toy manufacturing countries between 1980 and 1984).

Geographical features

The industry is highly concentrated geographically. Some 95% of the firms, accounting for approximately 90% of EC production are situated in the Federal Republic of Germany, Italy, France, the United Kingdom and Spain. Within those five countries, firms are often located in a particular region: Bavaria and Baden-Württemberg in the Federal Republic of Germany, Lombardy in Italy, the Jura and Rhône-Alpes (Ain) in France, and the Alicante and Barcelona provinces in Spain.

The main American multinational firms are Hasbro, Mattel, Fisher Price and Kenner Parker Tonka. In Japan, Bandai and Tomy are the leading multinationals.

The Federal Republic of Germany

In 1987 the Federal Republic of Germany was the fourth toy producer in the world and the second producer in Europe. The German production reached a value of ECU 829 million in that year. Plastic toys, model trains and paper toys are the principal categories of toys produced in the Federal Republic of Germany, accounting for 60% of total production.

In 1987 the consumption of toys totalled ECU 998 million. Compared to 1986, this is a progression of 15.6%. Compared to 1980, consumption rose by 55% in current value. Despite the absence of demographic growth in the Federal Republic of Germany, the toy market could be enlarged. There are two reasons for this development:

- to counteract the trend toward growing imports, the German producers expanded the product offerings by introducing new products on the market;

- because of the changing demographic composition of the German population, the industry encouraged adults (i.e. older than 20 years) to use toys, so that new market segments were created.

The greatest advantage that German producers benefit from is their know-how. The technical aspect in particular was strongly worked on, e.g. a completely new system of electric train control (digitalized) was developed. On the other hand, German managers were very successful in diversifying production. As a consequence of the increasing import menace, a lot of new products and new strategies were developed to prevent a loss of turnover, e.g. stronger sales efforts, more promotion or product development.

Italy

With a production of ECU 870 million in 1987, Italy was the first European producer and the third world producer of toys. The Italian offering consists mainly of traditional toys such as bicycles, dolls and board games. A low efficiency in the distribution chain affected demand for Italian toys because of the high retail prices.

Although Italy is first on the list of European producers, it is only the fourth consumer with ECU 823 million in 1987. The consumption of ECU 85 per child is beneath the European average.

Italy, together with Spain and Ireland, has a positive trade balance.

The main handicaps that the Italian toy industry suffers from are high raw material and energy costs.

The main advantages are:

- great flexibility thanks to a large degree of subcontracting, which lowers fixed costs;
- high product quality thanks to demanding safety requirements, furthermore, strong emphasis is put on the cultural value of the toy, and its design, the latter being an area in which Italians have a very good reputation.

France

France is one of the leading countries in the world ranking of toy producers and third in the EC, behind Italy and the Federal Republic of Germany. Production reached ECU 592 million in 1987.

Consumption increased by 22% between 1985 and 1987 to ECU 1.1 billion, bringing France to the top of Member States' consumption figures. Contrary to

the general trend, there are a large number of children younger than 14 (approximately 12 million). Also, French households spend ECU 155 per child per year on average, the highest figure in the EC.

The major categories of toys are die-cast and mechanical toys (15%), board games (10.5%) and stuffed toys (8.5%).

The main asset of the French toy industry is the quality of its products and the know-how in plastics transformation.

The French toy industry has been developing a dynamic export policy and seeks to improve its position in third countries.

The United Kingdom

In 1987, the UK was the fifth producer in Europe, with a production of about ECU 509.5 million. The UK toy industry is fairly export-oriented, since it exports 41% of its production. However, this is largely due to a strong presence of (American) toy multinationals, which use their British branches to export throughout Europe. In spite of a diversification in the toys produced in the UK, British production still has a relatively high level of specialization. In 1985 about 50 to 55% of total production consisted of metal and plastic miniatures. On the other hand, the United Kingdom maintains a large production of board games. In 1987 the three major categories of toys produced by the British industry were plastic toys (14%), table and board games (8%) and die-cast (8%).

The UK is the third European market for toys and games. This is due to the fact that the UK is the country in Europe with the second highest number of children aged less than 14 (10.8 million in 1985), behind France (12 million).

One typical feature of the toy industry is that sales are highly seasonal. In the UK, 60% of all toys are sold in the six weeks before Christmas.

Spain

In 1987 Spain produced ECU 524 million, and was the fourth producer in the EC. The market has stagnated since 1985.

Hourly wage costs are still below the European average, which means that the Spanish toy industry was able to remain highly competitive. Still, the entry of Spain into the EC did not stimulate the toy industry as much as expected.

The rate of investment in innovation was near to 36% in the period 1982-86, which is extremely high, compared to other Member States (5%).

Outlook

The EC toy market will probably not expand much in the coming years, given the prospect of a further decline in the child population and stiff competition from other leisure products.

However, the main problem is the extent to which large South-East Asian companies have penetrated the EC market and the impact this has had on the organization of the sector. This invasion is likely to continue if market access conditions remain unchanged.

In this case the present trends in EC toy production can be expected to continue in the short and medium term. These include a slowing-down of home production and an increasing shift of manufacturing to

South-East Asian countries. Also, firms are likely to diversify into less seasonal leisure products. In this difficult context, the survival of the Community toy industry, which represents an important economic and cultural stake for Europe, will depend on the development of a policy of cooperation between EC manufacturers so that they can reach the critical mass required to establish their position on the international market. It will also depend on their choosing one or other of two development strategies: leadership in traditional toys in the luxury and middle markets, or marginal opportunities strategies at the bottom end of the market to gain a foothold.

The fact that a number of EC firms have shown the will and tenacity to maintain a strong position on both domestic and international markets suggests that, in spite of the threatening climate, the Community toy industry's development potential should be encouraged.

DRI Europe

BUILDING AND CONSTRUCTION

The economic importance of the sector

Construction is a fundamental sector of the economy of the European Community; it employs more than 8 million workers, or about 7% of the working population and is divided in a relatively homogeneous manner throughout the territory of the Community, as Figure 1 illustrates.

In the countries in the South of Europe the construction sector has a comparatively higher share of GDP.

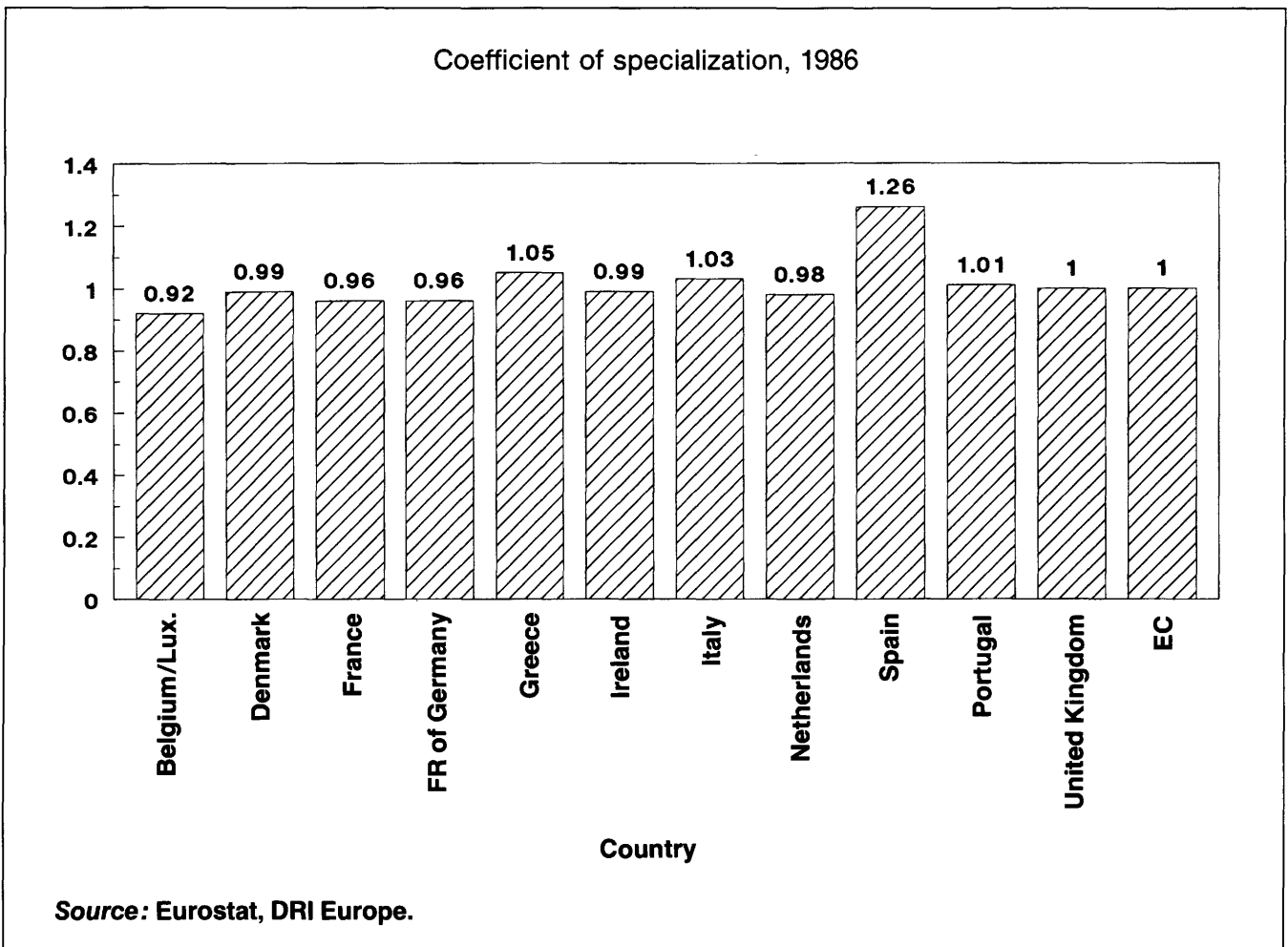
As the real estate and industry infrastructure is less developed there, they make a greater investment effort.

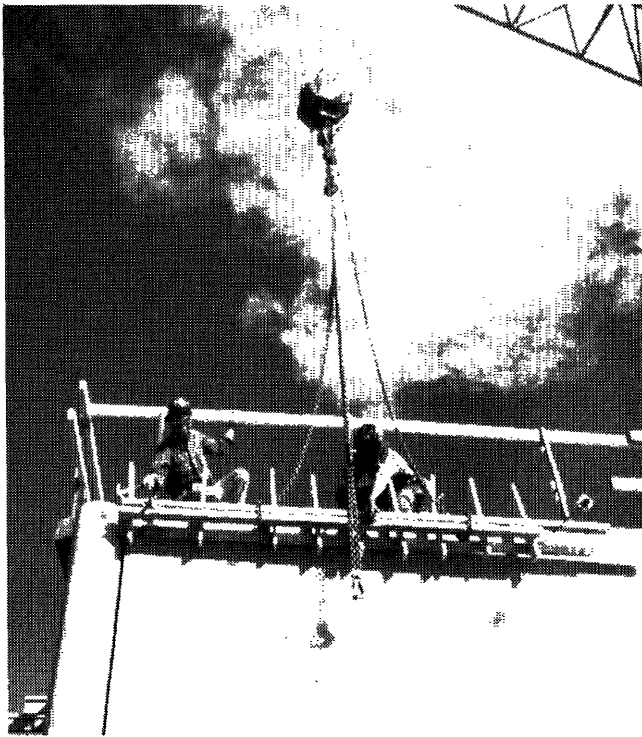
The construction sector depends first and foremost on demographic trends, as 65% of its production is in housing, either for new buildings or for the renovation of old ones.

Even though a slight rise in the population is still expected between now and the year 2000 (from 324 million inhabitants in 1988 to 332 million in 2000), long-term forecasts predict a drop in the population, which would amount to 326 million inhabitants in 2025. The important rise in the average age of the population also has an effect on housing, as the elderly no longer invest in real estate.

In light of the foregoing, the long-term trend for the construction sector is negative. There is for that

Figure 1





matter a marked decline of the share of construction in the overall economy. Only renovation activities continue to grow steadily. The increase in production shown in Figure 2 is essentially due to higher prices. In fact, the volume of production started to rise only in 1986.

In parallel, employment has fallen in this sector, by 1.8% per year on average since 1980.

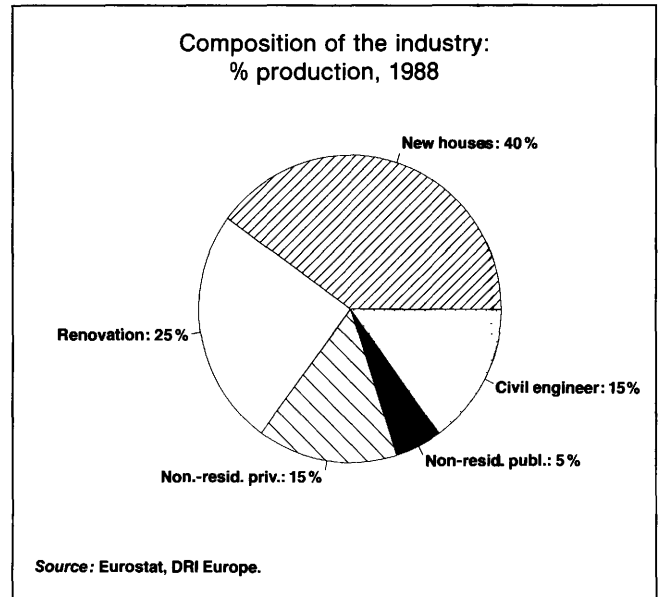
A recovery has been observed since 1985. Demand had been very low since the 1970s, and investment decisions were delayed because of bad economic conditions. The return of higher growth enabled this potential demand to surface.

The recovery occurred a little earlier in the United Kingdom where growth resumed in 1982. In Denmark, construction remained a very dynamic sector, even during the most severe phase of the recession. Nevertheless, since 1987, the dynamism of this sector has been diminishing, following tight economic policies introduced by the authorities in an effort to reduce internal consumption and to restore the balance of trade. Among other things, the tightening of credit caused GDP to drop in volume terms in 1987 and in 1988, and no major improvement is expected in the short term.

Whereas in Europe the construction sector did not start recovering before the second part of the decade, growth was much more sustained in the United States. Residential construction went through a boom. It is estimated that about one sixth of existing dwellings on the other side of the Atlantic are less

than 10 years old. From 1980 to 1985, the construction sector as a whole grew by an average annual rate of 4%, calculated in current dollars. The growth rates were often more than 10% for the residential sector.

Figure 2



Description of the industry

The construction of new dwellings accounts for 40% of the activity compared with 25% for renovation of existing buildings. Two thirds of production therefore go to residential construction; 20% to non-residential construction (three fourths of which for the private sector) and 15% for civil engineering projects.

The demand in this sector therefore depends on the demand of households. Another important part comes from companies, when they invest to increase their production capacity.

Investments in construction require large sums, and the cost of financing this investment has a crucial impact on the decision to invest. The economic policy of governments and central banks can consequently have a strong influence on the market by raising or lowering interest rates as well as creating or abolishing tax incentives. This applies to residential investments by families as well as to non-residential investments, for example investments to expand industrial companies.

International trade is very small in this sector. Only contracts for 'major works', chiefly civil engineering projects, can result in sizeable exports.

Structure of the industry

By its very nature, this sector is little amenable to mechanization; it is seasonal, and activity slows down considerably during winter. Production often takes place on the construction site itself, and this precludes taking advantage of important economies of scale. Therefore, the productivity of this sector grows at a slower pace than in most other sectors, and there are fewer prospects for profit.

As a result, the major firms in this sector are looking for ways of diversifying their activities. Diversification takes place either in related sectors (building materials, for example), which enables the companies to have more control of their economic environment, or in totally different sectors, in order to be more aware of variations in the current economic activity. A series of examples are given in the monograph on construction.

With a view to the single market, these companies are also trying to establish themselves abroad, either through a cooperation agreement, or through merger or acquisition.

The small and medium-sized companies in this sector are also affected by this trend. They can be absorbed by these big companies, or specialize in subcontracting and maintain their competitiveness in a very specific market.

The single market

As the residential construction market is first and foremost a local market, the completion of the single market should not have much influence in this sector. On the other hand, important changes are expected in the sector of public contracts. Whereas up until now they were *de facto* reserved for local companies, they shall henceforth be open to all. The big companies involved in this market are going to face keener competition. In this regard, companies are undergoing restructuring aimed at increasing their financial assets and to enable them to establish themselves in other Member States. This contributes largely to the diversification and merger and acquisition moves mentioned above.

Prospects

The long-term trend is and remains negative. Nevertheless, this trend has been reversed since 1986. This reversal should last another few years, provided the same factors remain present. We should make up for the lack of investment during the recession years, something now made possible by better economic growth and more stable interest rates. Furthermore, an increasing demand in the infrastructure of recreation and better quality housing contributes to these optimistic expectations, at least in the medium term.

DRI Europe

HOUSING

(NACE 501)

Summary

The Community housing sector has been in decline for the first half of the 1980s, but has partially recovered since 1986. The sector is widely dispersed throughout the Community, with many small-scale firms. There is practically no trade. The outlook for the sector is good, and, towards the early 1990s, activity in the housing sector could once again attain the 1980 level.

Description of the sector

The housing sector comprises such activities as the construction and/or renovation of dwellings, as well as services like the management, maintenance and financing of dwellings. Hence, this sector is involved in construction for sale to owner-occupiers, for renting and for various forms of shared ownership.

The housing sector has several unique characteristics which set it apart from other consumer goods industries and from other building sectors in particular. These are:

- a diversity of construction techniques and styles which reflect consumer taste, environmental issues (for example, solar heating) and the style of the surrounding neighbourhood;
- a low degree of geographical mobility which imposes on-site production on the one hand, and encourages the proliferation of independent submarkets on the other;
- a high degree of temporal immobility given both the long life of the product and the significant cost of investing in new housing.

These characteristics influence both the cyclical factors which affect the housing sector and the trends and developments within the industry.

Current situation

The specific characteristics of the housing sector and its pattern of development can be drawn from the nature of its products and markets. The large diversity in style and construction gives rise to a strongly differentiated product. This disrupts any analysis based on pure quantitative comparison of volume figures within a country as well as across countries.

The high degree of geographical immobility multiplies the number and variations of submarkets, subdividing national housing markets into a heterogeneous pattern of production, pricing and trade cycle dependence.

As a result, an industrial survey of the EC housing sector can rarely produce an overall view without identifying and discussing in greater detail the qualitative differences of these submarkets, most of which are not interconnected, not even within national boundaries.

Measurement of this sector is also made difficult by the large component of 'self-employed' production (those individuals who renovate or build their own home) which is not included in industrial production indices in all of the Member States.

Given the size of the investment required by a household to purchase its own dwelling, the cost of financing is most important. Thus, the effect of interest rates and of government policy, notably tax incentives, on the demand for new residences is very significant. These same factors also influence the pro-

Table 1
Housing

(1 000 dwellings)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Total new residential construction (1)	1 607	1 695	1 653	1 808	1 772	1 557	1 476	1 355	1 415	1 422

(1) 1980 excluding Italy; 1981-82 excluding Greece, Ireland, Luxembourg and Portugal; 1986 excluding Ireland and Luxembourg; 1987-89 excluding Greece, Ireland and Luxembourg.

Source: UECL; FIEC for 1988 and 1989.

Table 2
Overall new residential construction

(1 000 dwellings)	EC	B-L	DK	D	GR	E	F	IRL	I	NL	P	UK
1980	1 468	49	30	363	103	263	378	28	N/A	110	41	103
1987 (1)	1 355	27	25	195	N/A	180	308	24	270	105	40	205
1988 (2)	1 415	28	24	180	150	189	308	23	260	96	45	201
1989 (3)	1 422	29	23	189	187	196	311	24	262	96	47	193

(1) Source: FIEC for Greece and Ireland.

(2) Source: FIEC for Greece, Spain, Ireland and Portugal.

(3) Source: FIEC.

Source: UECL.

pensity to undertake maintenance and repair activities.

The products of the housing sector are used as consumer goods as well as private long-term investment assets. In the long run, the development of the housing sector is also influenced by the anticipated return in the real estate market.

The development of the housing sector is thus more closely linked to political and financial factors than to production costs or technical progress in this industry.

Production trends

In 1987, the volume of production of new houses in the EC dropped to its lowest level since the beginning of this decade. Details on these trends are given in Table 3. A recovery, however, has been observed in most Member States since then.

Since the above figures also include non-commercial dwellings, for example those constructed by self-

employed owner-occupiers, no exact report can be given on the state of the industrial production of the housing sector. In addition, the statistical basis is unreliable because of varying degrees of illegal activities in this sector. In the extreme, as is the case in some parts of Italy, more than half of the stock of new dwellings have been constructed illegally over the last decade.

Overall industrial production in the housing sector is experiencing a downward trend. Only renovation activity continues to expand in nearly all countries of the EC. In some of them, the volume of these activities already equals that of new residential construction. Since 1984, the renovation subsector has grown at an average of 4% per year. This has helped to offset the decline in new house construction over this period.

The production of the housing sector is most commonly divided into individual (single-family houses) and collective residential buildings (rental houses or houses of shared ownership). The proportion of individual to collective housing is quite different in indi-

Table 3
Annual changes in the volume of construction by country

(%)	1981	1982	1983	1984	1985	1986	1987	1988 (1)	1989
EC	-5.3	-3.7	1.8	-1.5	-3.7	.8	1.2	4.3	1.6
Belgium	-42.0	-6.9	-3.7	-1.9	5.9	1.9	3.6	15.8	3.0
Denmark	-13.5	-2.0	3.5	7.9	4.1	13.8	-5.7	-7.4	3.3
FR of Germany	-5.5	-5.2	4.7	.7	-11.2	-2.3	-1.5	4.5	3.6
Greece	-12.8	2.4	24.5	5.6	47.0	19.6	22.3	18.8	25.2
Spain	-7.0	-5.0	-4.0	-6.0	1.0	5.0	7.0	5.4	3.7
France	-2.2	-3.5	-5.2	-4.5	-2.2	-1.0	1.1	3.8	1.5
Ireland	8.0	-18.7	-0.3	-6.1	-3.4	-6.5	-6.3	-9.9	5.3
Italy	-0.1	-5.0	4.0	.8	-1.9	-1.7	-3.5	.8	1.0
Netherlands	-8.8	-5.2	-0.2	4.9	.8	5.5	3.0	6.3	.2
Portugal	14.4	9.0	3.6	-18.1	-6.6	2.3	7.0	6.0	0.0
United Kingdom	-13.4	1.8	11.0	.5	-1.2	5.6	8.1	8.8	-0.2

(1) Estimated.

Source: FIEC.

vidual Member countries of the EC and develops differently. In Belgium, Denmark and the Federal Republic of Germany, 70 to 85% of new residential construction are single-family houses, whereas this sector represents only about 35% in Italy. In these countries, the proportion of single-family houses is still increasing. In the UK and France, single-family homes account for 60% of the housing sector and this share is expected to decline further.

The change in the proportion of individual to collective residential housing affects the measured level of construction activity in each of the Member States. In France, for example, there has been steady growth in the volume of collective housing since 1985. This is reflected in the strong performance of industrial products in France's housing sector over the last several years. The downturn in new residential construction in the Federal Republic of Germany, as measured by the weakening performance of industrial production in the housing sector, is primarily due to an abrupt shrinkage in the construction of flats for rental purposes.

International comparisons

The participation of foreign firms in the production of the housing sector in the EC is marginal.

As to the production of the housing sector at world level, the most comparable market evolution is that of the US housing sector, where recent population and economic growth has initiated the largest increase in housebuilding ever experienced over a 19-year period. About 17% of today's housing stock was built in the last 10 years. This increase was concentrated on single-family houses mostly on the fringe of existing urban areas. To a considerable degree, renovation activities were orientated at core areas, where older houses in well-located neighbourhoods were changed into shared ownership.

A comparison of the overall level of production of the housing sectors of the USA and the EC cannot be drawn exactly, as housing units should be compared to dwellings. With a level of housing construction at 1.6 million private housing units and 0.2 million mobile homes, the per capita production of the US housing sector can be considered as nearly double that of the EC.

Employment trends

Employment conditions in the housing sector can hardly be appraised by the national statistics of the

member countries as they do not distinguish the housing sector from the rest of the construction sector.

To a large extent, the employees and manual workers of the sector are employed by very small firms. The firms often operate with independent subcontractors or self-employed workers. A large number of firms do not limit their activities to the housing sector but also carry out other construction work.

Even the hourly labour costs cannot always be deduced from the direct contractual payments and the social security contributions. Voluntary payments can vary largely in relation to regional disparities in the development of the construction sector. At present this is especially the case for the southern parts of England.

Outlook

The overall prospects for the housing sector in the EC are difficult to summarize given the need to consider the specific national and regional developments in the member countries. In general, the following macroeconomic conditions, as well as the specific key factors, are true for the housing sector in most of the Member States:

- solid rates of economic growth;
- continued growth in real earnings;
- pressure to keep real interest rates down, or at least stabilize them;
- favourable tax reforms;
- shortages of dwellings in the most dynamic parts of the EC.

Given these expected developments, new residential construction may be expected to attain its 1985 level of production in the early 1990s. The estimated figures include non-commercialized production of owner-occupiers. Given a growing proportion of single-family and detached houses, this could mean a further decline in the overall commercialized production of the housing sector. Of course, such general estimates conceal the regional and qualitative disparities that are outlined in this report.

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CONSTRUCTION

(NACE 50)

Sector definition and description

The construction industry includes the construction, maintenance, improvement and renovation of

- houses
- apartment and office blocks
- industrial, commercial, agricultural, military, hospital, school and service buildings
- civil engineering works: roads, bridges, railways, tunnels, dams, waste water plants, etc.
- installations and equipment in these buildings and works.

Construction output is primarily dependent on private initiative, but is also heavily influenced by public policies on investment, taxation, savings, interest rates, home-buying incentive schemes, urban planning and environment.

The sector's activity and employment are difficult to estimate because of its diversification and geographical dispersion.

Administrative surveys and records do not cover all kinds of products and activities.

Maintenance and improvement activities, mostly performed by small firms or individuals, are often overlooked by official statistics. These statistics concentrate on firms with 20 or more employees. Construction firms with less than 20 employees are

estimated at 82% of all construction firms in the Federal Republic of Germany, 47% in France, 52% in the United Kingdom and 79% in Italy.

The extreme but unavoidable physical and geographical dispersion and the discontinuity of production are the main reason behind the continuous loss in relative productivity and therefore increase in prices characterizing the construction sector.

Current situation and summary

The construction activity in the EC, which had declined by 10% from 1980 to 1985, continues on its positive trend started in 1986.

The highest yearly increase in production was the 6% registered in 1988. A 3% increase was registered in 1986 and 1987 and is also estimated for 1989

Countries with the highest increases in construction activity for 1988 are Belgium, Spain and Portugal (over 10%) and the UK (over 9%). Countries with a declining trend — about 6% — are Denmark and Ireland.

The continuation of the growth in 1989 is expected to cover all sectors and all Community countries with the exception of Denmark. In this country, a huge current account deficit has led the government to severely constrain demand, through fiscal policy and an increase of interest rates. This had, and will

Table 1
Total construction
Change in production in real terms over previous years

(%)	1981	1982	1983	1984	1985	1986	1987	1988(2)	1989
EC (1)	-4.5	-2.8	-0.3	-1.3	-1.3	2.9	3.2	5.9	3.2
Denmark	-15.1	.5	.6	4.9	9.3	14.0	-0.4	-5.8	-5.4
FR of Germany	-4.7	-3.8	.9	.8	-6.3	1.9	-0.2	4.5	2.6
Spain	-2.5	.5	-2.5	-5.5	.5	5.0	7.0	10.0	10.0
France	-1.1	-4.7	-4.7	-4.8	0.0	2.3	3.7	6.4	1.9
Ireland	7.0	-9.0	-12.4	-9.0	-5.9	-4.9	-5.2	-6.2	5.0
Italy	-1.4	-6.7	1.1	0.0	-0.5	.8	-1.3	.5	1.8
Netherlands	-10.6	-6.6	-2.3	4.2	2.1	5.4	2.7	6.2	1.1
Portugal	5.3	11.6	-2.8	-18.0	-5.8	7.4	10.0	10.1	7.0
United Kingdom	-9.8	2.2	5.2	3.2	.8	3.5	8.0	9.4	3.2

(1) Excluding Greece and Luxembourg.

(2) Estimated.

Source: FIEC.



have in the coming years, adverse effects on the construction sector.

At sector level the major increases are presently foreseen for the private non-residential sector (almost 6%) and, at country level, for Spain (10%).

Construction work of European firms in traditional foreign markets continues to decline while increasing attention is paid to work in industrialized non-European countries, particularly in the United States.

Because of a slowly growing population, the long-run trend of construction in Europe is in fact negative and the realization of the European market will make competition even sharper. Many firms therefore consider a larger financial and economic

basis to be a necessary condition of success in the 1990s.

Together with the expansion of construction activities in other industrialized countries also through acquisitions and mergers, many large European construction firms are diversifying their activity not only in fields connected with construction, like construction materials and components or real estate development and brokerage, but also in totally different sectors like mining, hotels and mass media.

Production trends

Production in the main construction subsectors reacts to different types of demand which are in turn influenced by different sets of factors. They are

Table 2
Construction in the European Community
Change in production in real terms over previous years (1)

(%)	1981	1982	1983	1984	1985	1986	1987	1988(2)	1989
Total building	-5.0	-3.2	.2	.5	-2.9	2.5	3.5	5.1	2.5
of which:									
Housing	-5.3	-3.7	1.8	-1.5	-3.7	.8	1.2	4.3	1.6
New housing	-8.7	-5.8	4.2	-3.0	-10.1	-2.6	-2.3	4.4	.5
Modernization and maintenance:	.8	0.0	.6	3.9	3.9	5.4	3.8	3.6	2.0
Non-residential	-3.6	-2.8	-2.9	1.0	2.2	3.9	6.8	6.9	4.9
Non-residential private	-4.4	-1.1	-2.2	3.2	4.4	5.1	8.0	9.2	5.7
Non-residential public	-1.6	-3.5	-0.7	-0.4	-1.8	1.5	-3.3	1.9	1.2
Total civil engineering	-2.6	-1.9	-0.9	-2.4	.1	4.7	1.3	8.3	6.1
Total construction	-4.5	-2.8	-0.3	-1.3	-1.3	2.9	3.2	5.9	3.2

(1) Excluding Greece and Luxembourg.

(2) Estimated.

Source: FIEC.

Table 3
New housebuilding
Change in production in real terms over previous years

(%)	1981	1982	1983	1984	1985	1986	1987	1988(2)	1989
EC (1)	-8.7	-5.8	4.2	-3.0	-10.1	-2.6	-2.3	4.4	.5
FR of Germany	-11.2	-9.1	9.8	0.0	-20.5	-11.2	-10.1	6.0	5.0
Spain	N/A	N/A	N/A	N/A	N/A	N/A	4.0	5.0	3.5
France	-4.6	-6.8	-7.4	-9.2	-7.2	-3.2	1.8	5.7	1.0
Ireland	13.0	-16.4	-0.5	-6.8	-4.9	-13.8	-13.0	-3.4	6.1
Italy	-0.9	-6.0	2.1	-2.9	-3.5	-5.3	-6.9	.3	.6
Netherlands	-12.6	-7.3	3.7	3.1	-10.2	9.6	1.8	7.5	-0.5
United Kingdom	-18.7	5.2	16.5	-4.4	-7.4	7.1	10.4	9.5	-3.9

(1) Excluding Belgium, Denmark, Greece, Luxembourg and Portugal.

(2) Estimated.

Source: FIEC.

therefore to be examined separately. The shares of the various subsectors are approximately the following:

Housebuilding:	25%
Renovation:	40%
Non-residential (private):	15%
Non-residential (public):	5%
Civil engineering:	15%

Housebuilding

The reversal of trend from negative to positive in new house construction is one of the big changes of 1988. As in most parts of the European economy, which enjoyed very high growth rates in 1988, there has been a surge of demand for new housebuilding.

Between 1980 and 1987 new residential building in the European Community had shrunk by about 25% with the sharpest falls of 40% in Germany and Ireland. In 1988 work levels increased by 4.4% on average.

Important gains are reported for Belgium (15%), the UK (9.5%), the Netherlands (7.5%), Germany (6%), France (5.7%) and Spain (5%).

Production in Ireland and particularly in Denmark has declined.

A further, although modest, increase (0.5%) is forecast for housebuilding in 1989 in the Community as a whole, with 5% and 6% increases expected in Germany and Ireland respectively.

Renovation and maintenance of residential buildings

As in all the preceding years of the present decade with the exception of 1982 (zero growth), the renovation and maintenance of residential buildings again expanded in 1988.

Average Community growth in 1988 was 3.6%. This is lower than in 1987 (3.8%), which in turn was lower

Table 4
Housing rehabilitation and maintenance
Change in production in real terms over previous years

(%)	1981	1982	1983	1984	1985	1986	1987	1988(2)	1989
EC (1)	.8	0.0	.6	3.9	3.9	5.4	3.8	3.6	2.0
FR of Germany	6.4	2.0	-3.4	2.3	5.2	9.5	6.2	4.6	2.1
Spain	N/A	N/A	N/A	N/A	N/A	N/A	12.0	6.0	4.0
France	1.5	1.0	-2.2	1.2	3.3	1.1	.6	2.0	2.0
Ireland	-13.0	-31.3	0.0	-0.3	5.2	34.0	18.1	-27.6	2.2
Italy	1.6	-2.9	8.0	8.1	.9	4.3	1.5	1.5	1.5
Netherlands	-3.3	-2.2	-5.2	7.1	16.3	.1	4.6	5.1	.8
Portugal	-3.4	25.2	-5.3	4.6	.8	31.4	12.0	13.0	10.0
United Kingdom	-9.1	-0.6	6.6	4.9	3.6	4.5	6.4	8.4	2.4

(1) Excluding Belgium, Denmark, Greece and Luxembourg.

(2) Estimated.

Source: FIEC.

than in 1986 (5.4%). A further decline in growth is forecast for 1989 (2%).

The slow down of average Community growth is not common to all countries. With respect to 1987 a higher growth rate for 1988 is in fact reported for the UK, France, the Netherlands and Portugal. In Ireland there has been a shift from growth to decline (from +18 to -27%).

The sector is very sensitive to changes in tax and financial incentives, as exemplified by Ireland in 1988 and by Denmark in 1987. The sudden reduction or abolition of incentives tends to cause serious damage to the numerous small companies operating in the sector and, even more importantly, slows the indispensable qualitative adaptation of existing residential buildings to the needs of the population.

Non-residential building

The sector is still on a trend of sustained expansion. Growth rates for the Community as a whole were close to 7% both in 1987 and 1988 and forecasts for 1989 point to a further growth of 5%.

These average growth rates are nevertheless based on trends differing considerably between the private and public sectors.

The private sector felt the impact of positive economic trends and in 1987 turned in a growth rate of 8% and in 1988 one of 9% with forecasts pointing to a rise of about 6% in 1989. Production in the public sector declined by more than 3% in 1987 and rose by less than 2% in 1988. Forecasts for the current year point to a rise of slightly more than 1%.

In 1988 the highest growth rates for the private sector were observed in Spain (9%), the UK (12%), Belgium (13%) and Ireland (almost 15%). Activity declined only in Denmark where another heavy downturn (-13.5%) is forecast for 1989. Particularly strong rises for 1989 are forecast for the UK and Ireland (9%).

In the public sector the Netherlands was the only country to turn in a strong rise (8%) while Ireland reported a substantial drop (-22%) with forecasts of a further severe decline for the current year (-10.6%). A significant fall is forecast also for Denmark (-6%).

There are several reasons for this downward trend. The past decades have seen a high demand for new construction from public authorities, which were launching big projects, like hospitals. The need for new construction is thus lower. Moreover, governments have often to face tough budget constraints and tax-cut programmes. In this case, investment programmes are often the first to be cancelled.

In some cases, demand is decreasing. This is, for example, the case for schools, because of the declining share of children in the total population.

Civil engineering

The sector's strong growth in 1988 (+8.3%) and the growth forecast for 1989 (+6.1%) was unexpected. Forecasts made in the autumn of 1988 pointed to a rise of only 4.1% and 1.8% respectively.

The highest growth rates for 1988 were observed in Spain (20%) and Portugal (13%), where the 1989 forecasts point to an even steeper rise of 23 and 15% respectively.

Table 5
Non-residential building
Change in production in real terms over previous years

(%)	1981	1982	1983	1984	1985	1986	1987	1988(2)	1989
EC (1)	-3.6	-2.8	-2.9	1.0	2.2	4.0	6.8	6.9	4.9
Denmark	-23.6	-19.2	-5.2	20.2	21.7	15.2	17.0	-5.0	-11.7
FR of Germany	-2.2	-1.8	-1.0	-0.5	-2.0	5.2	2.2	4.4	2.3
Spain	-5.0	-3.0	-5.0	-4.0	1.0	6.0	9.0	9.3	9.2
France	1.9	-4.6	-2.4	-2.6	.5	3.3	4.6	5.9	3.0
Ireland	5.8	-8.7	-21.9	-19.8	-7.4	-5.5	4.2	-2.9	.9
Italy	-3.3	-6.3	-5.6	-2.0	.6	2.7	2.0	2.5	2.5
Netherlands	-15.4	-8.3	-5.0	4.3	3.5	7.8	5.0	6.5	2.1
Portugal	3.9	10.9	-0.8	-26.5	-4.8	13.0	12.1	12.0	9.4
United Kingdom	-5.0	1.1	-0.8	10.2	6.4	2.7	11.4	9.9	7.6

(1) Excluding Belgium, Greece and Luxembourg.

(2) Estimated.

Source: FIEC.

Table 6
Civil engineering
Change in production in real terms over previous years

(%)	1981	1982	1983	1984	1985	1986	1987	1988(2)	1989
EC (1)	-2.6	-1.9	-0.9	-2.4	.1	4.7	1.3	8.3	6.1
Denmark	-6.8	33.2	-1.1	-14.0	12.0	13.2	-5.5	-2.6	-2.3
FR of Germany	-7.3	-3.6	-6.7	3.7	0.0	7.2	-2.2	4.9	.5
Spain	12.0	14.0	8.0	-7.0	-2.0	3.0	4.0	20.0	23.0
France	-2.9	-7.0	-6.4	-8.6	4.3	8.3	7.5	12.5	.9
Ireland	7.4	11.1	-16.4	1.6	-8.7	-1.2	-13.7	-3.4	10.0
Italy	-2.0	-13.3	5.3	1.3	2.3	6.0	.2	2.0	3.0
Netherlands	-3.5	-6.5	-2.0	2.5	2.5	0.0	-3.7	4.4	2.0
Portugal	-2.5	12.9	-11.7	-15.9	-6.7	4.6	12.0	13.0	15.0
United Kingdom	-7.4	4.8	.6	-0.3	-3.0	-1.2	1.4	10.1	4.6

(1) Excluding Belgium, Greece and Luxembourg.

(2) Estimated.

Source: FIEC.

A substantial growth rate for 1988 also occurred in the UK (10.1%) and France (12.5%) together with diminished work levels for Denmark and Ireland. Forecasts point to a further decline for Denmark in 1989 and to a strong climb-back for Ireland (10%).

1987 was mainly accounted for by operations in the United States, Australia and Hong Kong. The easing of the political situation in the Persian Gulf region should also allow new markets to develop.

Construction abroad

Operating in EC countries other than their own has been quite exceptional for European firms. In the last few years, however, there have been signs of increasing interest for European foreign markets which resulted in a few — sometimes successful — participations in construction tenders in other EC countries. Only a few major firms have tried these new European markets up to now.

However, construction work in traditional foreign markets (Africa and Middle East) continues to decline, due mainly to the financial difficulties of countries in those areas, to their greater degree of self-sufficiency and to increasing competition from non-European countries, but also to a rise in domestic demand in countries such as the UK, France and Spain, which diverted resources from the export front to the domestic market.

An increasingly important outlet is represented by work in industrialized non-European countries, particularly in the United States.

The turnover of affiliated companies or branches of German companies operating in the United States is now twice as large as that accounted for by traditional foreign markets. For Italian companies the Americas accounted for more than one third of all orders booked abroad in 1987. The approximately 30% growth in foreign orders booked by UK firms in

Employment trends

The positive developments recorded in the last few years by the European construction industry are having positive effects also on employment. Actual increases in employment are mentioned only in some countries like Spain, Portugal and the United Kingdom, but in other countries (Germany, France), employment levels are stabilized whilst a clear declining trend can be observed in Denmark.

Table 7
Construction's share in total employment

(%)	1980	1984	1988
EC (1)	7.2	6.9	6.9
Denmark	7.4	6.3	6.6
FR of Germany	7.0	6.7	6.2
France	9.0	8.3	8.3
Italy	4.2	4.3	4.7
Netherlands	11.6	10.0	10.2
United Kingdom	7.0	7.1	7.3

(1) Excluding Belgium, Greece, Spain, Ireland and Portugal.

Source: Eurostat (log).

These short-term effects of the increase in production on employment only partly offset the long-term negative tendency of employment in construction. Between 1970 and 1985 employment in the European construction industry has recorded an average

yearly loss of 1.5%, while it was stable in the average of all industry branches.

Table 8
Percentage mean annual employment variation

(%)	Construction		All Industries	
	1988/80	1988/84	1988/80	1988/84
EC (1)	-1.38	1.30	-1.47	-1.76
Belgium	-1.44	-1.63	-1.48	-1.64
Denmark	1.12	1.55	-1.21	0.74
FR of Germany	-1.30	1.36	-1.36	-1.27
France	-1.44	-1.24	-1.50	-1.95
Italy	-1.54	-2.01	-1.49	-2.14
Netherlands	-1.40	0.74	-1.41	-1.99
United Kingdom	-1.52	-1.79	-1.55	-1.89

(1) Excluding Greece, Spain, Ireland, Luxembourg and Portugal.

Source: Eurostat (lcg).

Nevertheless in almost all countries the sector meets problems in finding specialized manpower and new apprentices despite important training programmes carried out by public agencies and by the industry.

Investment and related issues

The few available statistics indicate a generalized negative trend in investments in equipment by the European construction industry. This negative trend corresponds to the equally negative long-term trends of employment and value added.

Productivity is nevertheless increasing, but at a much slower pace than in the rest of the economy. Between 1970 and 1985 apparent labour productivity has increased at an average yearly rate of 0.9% in construction, 3.4% in manufacturing, 4.5% in the energy sector and 4.8% in agriculture.

This lower productivity in construction is mainly due to the fact that construction activity is neither regular or continuous and cannot therefore take advantage of economies of scale or location as manufacturing can. The necessary high labour intensity in this sector leaves few possibilities of productivity increase through more intense use of capital.

Because of their limited size, most of the construction companies lack the financial basis to conduct research and development. This explains why the public hand and the industry promote and support the research carried out by special research institutions such as:

- the Building Research Establishment in the UK
- the Centre Scientifique et Technique du Bâtiment in France
- the Centre Scientifique et Technique de la Construction in Belgium
- the Instituto Eduardo Torroja in Spain
- the Danish Building Research Institute
- the Zentrum Raum und Bau in Germany
- the Stichting Bouwresearch in the Netherlands.

Where research centres specialized in construction do not exist, research in this field is promoted through special programmes of non-specialized research institutions.

The Italian National Research Council has recently launched a special Building Research Programme with an investment of more than ECU 80 million in some 150 research projects over the next five years.

Most of the national research centres also carry out training and continuing education programmes. Building research programmes are also carried out by universities, sometimes in cooperation with the industry.

Some of these research programmes are supported by the EC through special projects such as Comett, Erasmus and the like.

Structural changes

The generalized shrinking of traditional foreign markets (Africa, Middle East) and the perspective of the European market are the main reasons behind the structural changes that can be observed in the construction industry.

These changes mainly concern the very big construction firms, largely active on the international markets, but the reactions to their initiatives filter downstream reaching also middle-sized firms operating only at the national and/or sectoral level, often as subcontractors with the bigger firms.

The main change that can be observed is a tendency towards an increasing diversification of the activities on the domestic and international levels, corresponding to a tendency towards an increasing specialization among medium and small firms.

As the long-term trend for the construction sector is rather downward, this diversification concerns not only activities which are contiguous to construction but also activities in completely different sectors.

Among the contiguous activities are:

- upstream: construction materials and components (for instance, the French firms Screg and Nord France, and the German firms Holzmann and Bilfinger & Berger);
- downstream: specialized activities such as electrical and air-conditioning installations, waterproofing, waste-treatment (Bouygues, SGE, Dumez, Fougerolle, SAE in France) or service activities such as real estate development and brokerage (Bouygues; John Laing; Wimpey; the German firms Heitkamp, Strabag, Holzmann and Bilfinger & Berger).

Among the activities in different sectors, examples are the acquisitions of the TV network TF1 by the French Bouygues, hotels and freight activities by the British Trafalgar House, mines by the British Tarmac, Costain and Wimpey.

The result of these diversification policies is an increasing share of the companies' turnover outside the construction sector.

This share has reached, for instance, 75% for the French Spie-Batignolles and more than 50% for the British Tarmac.

Inside the construction sector the tendency to concentration and to increased firms' size gave rise to a number of acquisitions inside and outside the firms' countries.

In Italy the Fiat-owned firm Impresit has acquired Cogefar, the largest construction firm of the country. In France No 1 Bouygues has acquired No 3 Screg which had previously acquired Colas; Spie-Batignolles has acquired Coignet, Clecim, CEE and SGCFM; SGE has acquired Cochery, Brice, Sainrapt and Sobea; Razel has acquired Soter, Star, Bianco, Trarieux-Rogard and Ducler; in the UK, Trafalgar House has acquired RGC Offshore, Scott Lithgow, Dowsett Engineering Construction, John Brown; Balfour Beatty has acquired Haden and Heery International; Costain has acquired Land & Marine Engineering, Streeter of Godalming, Petro-carbon Developments, Haig & Ringrose.

Important acquisitions have been recently carried out abroad and especially outside Europe.

In the USA, Bouygues has acquired HDR (engineering and construction); Spie-Batignolle has acquired Comstock; Philipp Holzmann has raised in the USA, through the Jones Group, 48% of its turnover in 1986; the British Tarmac has acquired

Lonestar, Massey Sand & Rock, Van Scot Concrete and others; Hochtief has acquired Dames & Moore.

In Canada, Dumez has established Dumez Investment and acquired Westburne International Industries; Wimpey has acquired Mac Namara Construction; Hochtief has branches or companies in Brazil, Australia, Hong Kong and the Netherlands. Hollandsche Beton owns CEI in Belgium and Edmund Natali in the UK. Dragados owns Dycasa in Argentina. Bouygues and the Italian Berlusconi Group will partially integrate and cooperate in construction, real estate and television.

The information provided here is only based on examples and in no way exhaustive. As it can be seen, the concentration and diversification process concerns almost exclusively the major construction firms. This process influences, however, also the medium and small-sized construction firms which are also reconsidering their objectives, structures and market strategies.

The process of international and intersectoral integration will probably accelerate in the next few years.

Environment

Ecological issues are influencing construction in several ways.

One way could be generally considered negative for the industry in so far, because of ecological considerations and environmental impact studies, some constructions are delayed, modified or even cancelled.

On the other side, ecological considerations have enhanced a special market segment, that is water and waste treatment outlets, and have accelerated the process of renovation particularly of industrial buildings.

The single market

The unified European market will affect the construction industry especially through the opening of national construction tenders to international competition. As in other industrial sectors, this evolution will induce the large firms involved in the international competition to rationalize their structures, to seek agreements or associations with other firms, to lower production costs and to improve quality. This will result in economic and social advantages for the clients and the public at large but also in

some failures of firms not able to survive in this evolving economic and normative environment.

As it has been already seen, the major European construction firms are actively operating in this perspective. Also several smaller firms are restructuring in view of becoming specialized subcontractors of larger general contractors. The opening of the European market will only reinforce a tendency towards increased interregional and international competition which is already present.

New production technologies

Technological evolution in construction is traditionally bound — more than to revolutionary innovations — to rationalization of building technologies, to improvement of traditional materials, to process rationalization.

The process of transfer of construction operations from the building site to the factory is still going on, but the goal of a total 'catalogue building', dreamed of in the 1970s, has been revealed impracticable.

All these industrialization forms, however, bring about increases in productivity and require increased controls on the production cycle and quality management.

Quality systems inside the building firms are becoming a necessity because of production, contractual and normative reasons.

Forecast and outlook

It is difficult to say if and for how long the present growth phase of the construction activity in Europe

will last. It is by and large sustained by the positive trend of the whole European economy but also by the necessity to recover from the fall of the first part of decade. Also public investments in infrastructures have resumed after the cut-backs made necessary by the fight against inflation.

As already pointed out, long-term trends are negative. The construction industry's shares in value added, employment and investment are declining in the long run.

There are, however, some positive indications about elements that can counterbalance these trends. One is the growing consciousness of governments about the importance of a modern infrastructure stock to sustain growth. Another is the increasing importance and use of private financing to integrate public efforts in this field. Third, growing industrial competition sustains the demand for industrial and business premises. Fourth, there is also a consistent demand for better living accommodation and leisure facilities from families, which means new and more comfortable homes, modernization operations and construction of hotels, second homes and related facilities.

All these factors converge in indicating that the long-term negative tendency of the European construction industry might be at least partly offset in the next few years and that a slightly positive trend can develop in the 1990s, if major external negative factors do not interrupt the present general growth phase.

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INDUSTRIAL ENGINEERING

Summary

The EC industrial engineering sector is a world leader in terms of activity; its exports remain substantially higher than those of both the United States and Japan.

Although domestic market conditions have improved, thanks to the general improvement of the economic situation in the EC, demand from the developing countries remains well below levels achieved in the 1970s.

The creation of a single European market in 1992 should have a favourable impact on engineering activity, particularly in the spheres of public infrastructure and environmental projects, as well as industrial projects based on new technologies and using higher-performance production processes. Furthermore, actions to reduce Third World debt will certainly have positive effects on the demand for new industrial projects.

In general, an industrial engineering company is responsible for ensuring that industrial investment projects or collective infrastructure projects are implemented and completed. Industrial engineering is therefore a mixed activity comprising an important manufacturing aspect, as well as technological expertise.

Description of the sector

The main groups of economic activities directly related to the plant-making business in the EC are listed below:

- NACE 31 — Manufacture of metal structures;
- NACE 32 — Construction of machinery and mechanical equipment;
- NACE 34 — Electrical and electronic construction;
- NACE 37 — Medical-surgical equipment.

It is difficult, however, to define the industrial engineering sector solely by the NACE system used above. The sector has changed and expanded over the last decade and it encompasses activities often associated with another industrial classification. Traditionally, the industrial engineering sector has been involved in the management of an industrial project; however, its role has expanded to include the construction of the plant, the manufacture and selection of machines, and the plant layout. In effect, they are

involved in every component of the project from its inception to its completion.

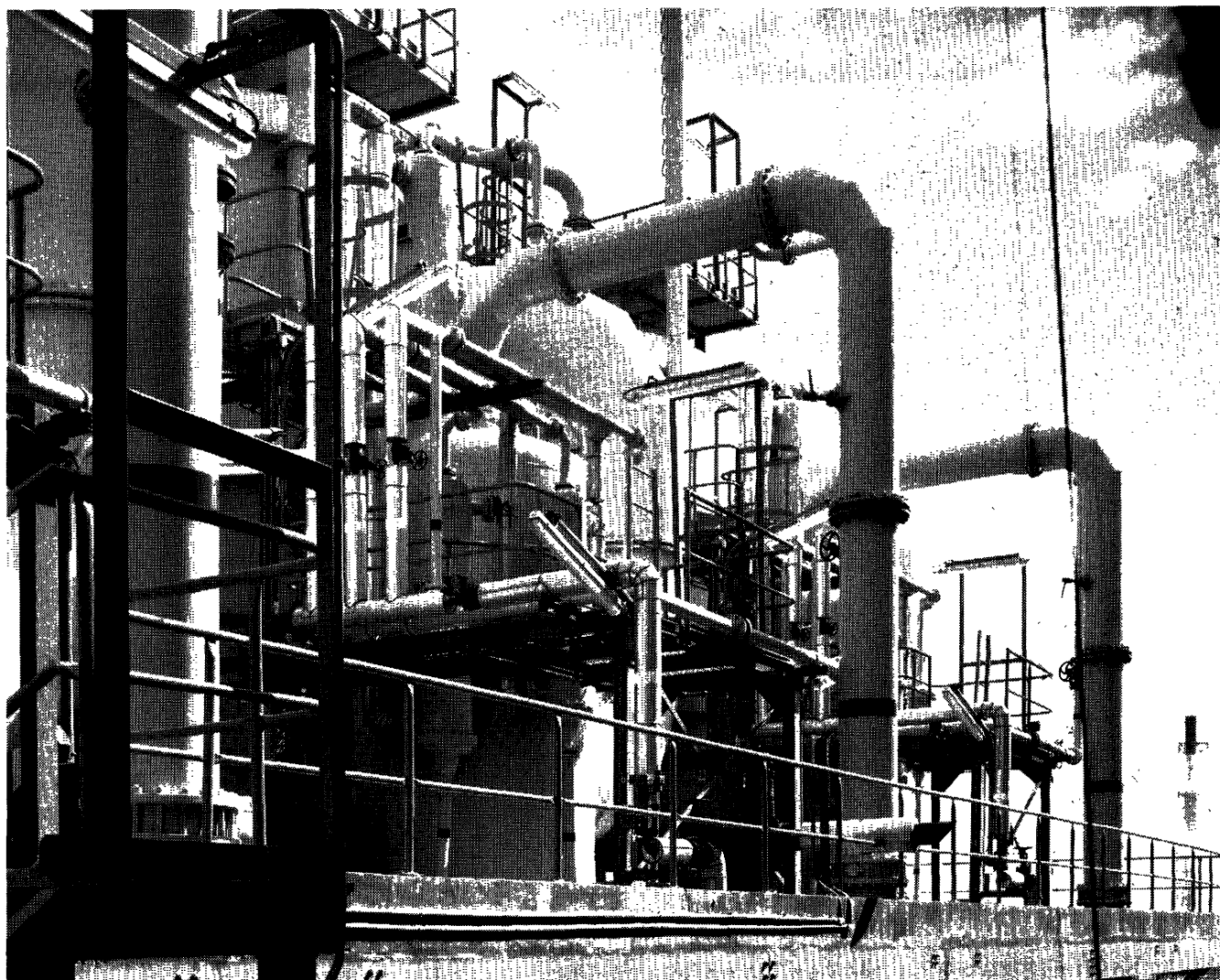
In an attempt to remedy the lack of reliable statistical information, the 'European Committee of Plant-makers' introduced, in 1970, a uniform and clear method of collecting data which is comparable to the annual survey on the number of contracts gained by the member firms of the national associations affiliated to the European Committee. Some Member States are, however, still not complying with this system, which makes data interpretation and comparisons very difficult. Data for the United Kingdom, for example, are still scarce.

The plant-making sector within industrial engineering established itself at the beginning of this century. The industry's first large contracts were completed in countries and sectors which, at the time, were eager to enter new technology fields developed by more industrialized western nations. This trend toward technology transfer particularly affected the following basic industries: steel, metallurgy, mining, chemicals and fertilizers, coke ovens, glass, textiles and food as well as activities relating to the public sector. The latter category includes railways, hydro-electric and thermal power generating stations.

The European industry's desire to improve its competitiveness in new products and to reduce costs caused them to look for technical, economic and financial means to achieve these objectives. In the glass industry, the manufacturing process involving float glass was developed in 1959, and completely revolutionized the industry, which gradually converted to this method of making glass.

Technological advances were astounding: new methods were perfected and diffused world-wide. An international commission set up research and development programmes with favourable results. The fertilizer industry was also affected, and started rationalizing when natural gas was discovered in Italy, France and the Netherlands. From 1955, the oil industry invested heavily to expand its refining capacity in most European countries and in 1960 began diversifying, mainly into the petrochemical sector.

The use of new raw materials, by-products and a wide range of new products such as plastics, synthetic fibres, synthetic rubbers, detergents and ammonia and nitrogenous fertilizers gave birth to a



new industry and has led to profound changes in the old production framework.

The sugar refinery industry has become very concentrated following a series of mergers. The treatment of sugar beet is now almost entirely automated and the daily capacity of processing sugar beet has been greatly increased due to technological improvement of installations for the continuous extraction of sugar juice. Stocking capacity has been improved as a result of the development of storage silos which can hold up to 60 000 tonnes of sugar.

This period of reindustrialization in Europe, which continued until 1970 in several EC countries, had a major impact on European plant-making which, during this time, developed numerous new technologies and improved its expertise in organization and contract management which will increase its value in the future. During this long period, Europe was the main market for contractors.

At present, the engineering sector is very diversified and its importance for each Member State is related

to its industrial power. In general, companies in this sector tend to be concentrated in large industrial areas. Of the 170 prominent EC plant-makers, nearly half of them are concentrated in the Federal Republic of Germany, France and Italy, while less industrialized countries such as Greece and Ireland have none.

The position of European engineering companies, especially within the EC, is strong and stable and the main plant-makers enjoy a very solid reputation. Among the main plant-makers from the EC are: Davy Corp., Fiat Impresit, Mannesmann Anlagenbau, Saipem, SPIE-Batignolles, Technip, Lurgi, Air Liquide, Ansaldo, SNAM-Progetti Coutinho, KHD, Humboldt-Wedag, Siemens, Abay, Techniberia, CGEE-Alsthom, F.L. Smith.

Since the 1960s, American engineering companies have also developed activities in Europe. The activities of Japanese firms are still negligible.

Current situation

The EC market in 1988

In 1980, the total world market for industrial engineering projects was estimated at ECU 77.6 billion. It increased to ECU 125.5 billion in 1982, then decreased again to ECU 61 billion in 1986 before recovering partially to ECU 86.6 million in 1987.

In 1988, the world market made a substantial recovery with a total turnover estimated at ECU 102 billion, mainly thanks to the revival of the investment trend in most industrialized countries. The market share of European and American engineering companies increased while the Japanese engineering sector had to face a persistent drop in its turnover.

In Europe, and to a lesser extent in the United States, there were huge needs for replacement and modernization equipment. This was not the case in Japan, where the industrial development is more recent. European and American firms benefited from the recent surge in investment demand, while the Japanese, whose market share in Europe and in the USA is very small, did not.

Within the EC, the activity of the engineering sector increased significantly and the global turnover produced by the sector, with the exception of the UK due to the lack of statistical data, can be estimated at ECU 37 billion, an increase of more than 5% on 1987. Sales within the European Community accounted for ECU 20 billion (54%).

In the United Kingdom, a sampling survey shows a comfortable increase of the activity of the engineering sector, which is fairly well backed up by the large investment flow mainly in the national oil and chemical sector.

The importance of the EC market in the world is increasing. Furthermore, one notices a general comeback from most EC engineering companies, which are expanding their presence in their home market. In general, the importance of the western industrialized countries as a major customer has increased significantly, while the importance of the Third World and particularly OPEC countries to the EC industrial engineering industry has steadily declined since the peak recorded in the late 1970s.

The EC market demand is firm. In many industries, the situation has been marked by the need to add new capacity, expand the size of existing units and close small and obsolete factories. Many industries are using outdated processes and have to invest in

new technologies using higher performance and more economical processes. This has been the case in the oil and chemical industries. The growing demand for many basic products has led to new capacity projects and closer links with the western industrialized countries. This shows clearly that the EC engineering sector remains a world leader, its position being supported by new processes, by constant diversification into new applications and by its impressive track record on highly sophisticated engineering services.

The ECU 37 billion turnover booked in 1988 by the EC engineering companies can be broken down as follows:

FR Germany:	34%
Italy:	28%
France:	21%
Belgium:	5%
Denmark:	5%
Spain:	7%

The 1988 orderbook was filled primarily with contracts in the area of power-generating projects, oil and chemical units, natural gas, steel mills and the food industry. Environmental protection projects, such as water treatment, urban refuse, air and soil decontamination have not yet emerged as a significant market, although the potential is significant in the western world.

The export market

There is a slight trend towards the internationalization of the industrial engineering sector and companies are engaging more in the establishment of subsidiaries abroad, joint-ventures, local partial production or assembly and subcontracting, and local engineering activities based on local employment. EC engineering companies are adjusting their policies in order to compete more effectively in light of these trends.

Nevertheless, the EC engineering sector had an export turnover of almost ECU 16 billion, an increase of more than 20% on the 1987 results. The German, French and Italian industries recorded outstanding results on foreign markets and restored some of the former importance of exports to the large scale plant building industry but, in general, the pattern of the market changed substantially and the trend towards smaller orders continues.

One must also underline the good results obtained in the American market, especially in the cement and

in the non-ferrous metal sectors, where European companies settled in the USA.

The Japanese engineering sectors

According to a MITI survey, the activity of the Japanese engineering sector is facing a moderate recession on both domestic and export markets.

The 1986 activity was close to ECU 34 billion, of which ECU 27 billion were domestic sales and ECU 7 billion represented foreign orders.

While the 1987 results on foreign sales were slightly better (ECU 8.8 billion), the results for the first half of 1988 are no more than ECU 3.7 billion, compared to ECU 5.1 billion for the same period of 1987. This corresponds to a 27% decrease which, in the present market situation, will not likely be offset in the second part of the year since domestic demand is still very low and the situation on the main export market, Asia, is not very bright.

The pattern of the plant export data shows an increase in the number of contracts awarded but a steady decline of the unit value of these contracts.

From the geographical breakdown of the export of plant and equipment, it appears that, in 1988, 52% of orders originated from South-East Asia, 14% from centrally planned economies, 9% from Central and South America, 8% from Africa, 7% from the Middle East, but only 6% from North America and 4% from Europe where there is nearly no competition from the Japanese.

It is also interesting to note that the types of plant exported can be split as follows:

Power station plant:	32%
Chemical plant:	30%
Industrial plant:	20%
Telecommunications systems:	8%
Steel plant:	5%
Textile plant:	5%

The main Japanese engineering companies originate from Japanese conglomerates such as Chiyoda Chemical Engineering and Construction Co., C. Itoh and Co., Fuji Heavy Industries, Hitachi Plant Engineering and Construction Co., Ishikawa-Harima Heavy Industries Co., JGC Co., Marubeni Machinery and Engineering Co., Mitsubishi Heavy Industries, Mitsui Engineering and Shipbuilding Co., Nippon Steel Co. Nisshin Plant Engineering

Co., Sumitomo Chemical Engineering Co. and Toyo Engineering Co.

In 1986, the Japanese engineering industry represented a labour force of almost 120 000 people, declining slowly from a peak of 140 000 workers in 1981 to 112 000 workers in 1988-89, according to a MITI forecast.

The American engineering sector

According to the annual survey made by ENR (Engineering News Review), most of the leading American firms in the design and engineering market have plenty of work. The growth of corporate partnering, industrial and powerplant upgrading, and environmental and infrastructure problems are buoying up the designers and engineering backlogs. But, as in the EC and Japan, the American engineering industry feels that the age of megaprojects is over.

Employment trends

The economic and social weight of this sector within the EC industrial structure is very strong; it represents almost 240 000 people, although there has been a slight decrease in employment since 1980, as a result of two main factors: a transfer of the activities of several large mechanical and electrical construction companies to newly industrialized countries, and the sluggish world demand. An example of this is in the Federal Republic of Germany where the plant-making sector employed 106 000 people in 1980, 95 000 in 1981 and 80 000 in 1987. This trend was also experienced in other EC countries, where companies had to adjust their labour force to match the required level of employment. The decreasing average size of contracts, even with an increase in their numbers, is responsible for the shrinking of labour requirements. Companies have difficulties in finding the necessary skilled labour to match the rising demand. Besides, the supply of experienced and committed engineers needed by the EC engineering sector tends to be very limited and could affect the present trend.

Structural features

The responsibilities entrusted to the plant-maker by the investor can be large, complex and involve high risks. In its simplest form, it may be a 'procurement' responsibility only.

In the mid-1960s, the 'turnkey' form of contract was widely used. It implied total responsibility on the part of the contractor who was expected to supply technology, equipment and its installation in correct working order and general technical services. From 1973, the 'product in hand' contract obliged the contractor to ensure the continuous operation of installations and also to train the owner's personnel, that is, to provide the necessary professional and technical training for the correct working order of installations. In the context of extending his responsibilities, the main contractor was forced to accept more and more technical risks.

The plant-maker had to fulfil three main tasks:

- technological — to inform the owner of the technology required to complete the project (this presupposes that the plant-maker has the necessary technological expertise and a knowledge of the design and construction of machinery and production systems as well as their adjustment to local operating conditions);
- project management — a responsibility to ensure that the qualitative and quantitative performance of the project should meet the terms of the contract. The planning, coordination and completion of the project in terms of cost deadlines, for example, are essential to successful project management.
- financial capability — a sufficient knowledge of financial engineering.

The structure of plant-making firms can be split into three main types. Firstly, there is the general contractor for coordinating engineering; these firms do not generally have any specific technical expertise — they obtain this from the market. They do not manufacture equipment, but they are skilled in technical negotiating, organizing and coordinating projects and delegate different tasks such as civil engineering, process equipment and other assistance to specialized firms. They often have knowledge of finance for engineering and may be able to arrange financing for the project on favourable terms. This type of contractor emerged in the 1970s.

The second type of firm is the plant-maker with one specific area of expertise. Some industrial groups using original technological procedures have undertaken to pass on or to transfer through training their technology. This policy of training in technological methods has permitted those who have those qualifications to increase indirectly their share of the market.

Finally, there are the manufacturing concerns; some large European heavy equipment manufacturers were induced to develop the additional functions of plant-makers to respond to market demand. This phenomenon occurred particularly in the iron and steel, metal, chemical, cement, and electricity production industries. Thus, the construction contractor performs a complex job which includes providing varying proportions of top-level technology closely linked to the business of construction. The aim of this is to complete an investment project, generally 'turnkey'.

Plant-makers must sustain a constant research and development policy in order to maintain competitiveness in their field. To master procedures, they must discover how to optimize their ability as entrepreneurs, especially at the level of contract management. This is one of the key elements for the successful execution of these contracts, especially when the project is in a foreign country where institutional, political and administrative problems are difficult to master.

Negotiation of a turnkey contract is a long, complex and highly risky process. Initially, it relies on an intention or a decision to invest and it is often preceded by market surveys and feasibility studies, technical procedures and geographical location evaluation to allow the investor to make the best decision. The drawing up and negotiation of these contracts implies an in-depth knowledge of the local monetary problems of exchange and financial transfers. Currently, the conclusion of a complete contract in a developing country often requires three years of negotiations. The setting-up of these contracts — which is the moment when the investor receives the down payment — frequently requires a year. This situation involves a considerable increase in negotiation expenses and reduces the profit margin for the plant-maker.

Outlook

Short-term forecast

After several years of recession, the economic situation in the western industrialized countries is improving very well and has favourably influenced the engineering sector, particularly in the EC.

One can expect that the rate of new investment and rehabilitation projects, as well as the amount of infrastructure projects, will have a positive effect on the EC engineering sector. The industry is also

making efforts to concentrate its activity on the internal EC market.

In summary, the EC plant-makers are expecting their present level of activity to stabilize.

Medium-term forecast

For the next five years, the prospects remain quite favourable. The completion of the single market in 1992 has caused numerous commentators to consider that Community plant-makers will take advantage of this situation. The prospects for public infrastructure projects as well as projects from the private sector seem very positive. As a result, EC

engineering companies are convinced that they must concentrate their activities more on the Community market and less on export markets.

However, for exports, they will have to relocate geographically their market and concentrate more on the Asian and OECD countries, developing their markets in new technology and high-tech activities such as environmental protection, although the re-scheduling of the debt of the Third World could have a positive effect for them.

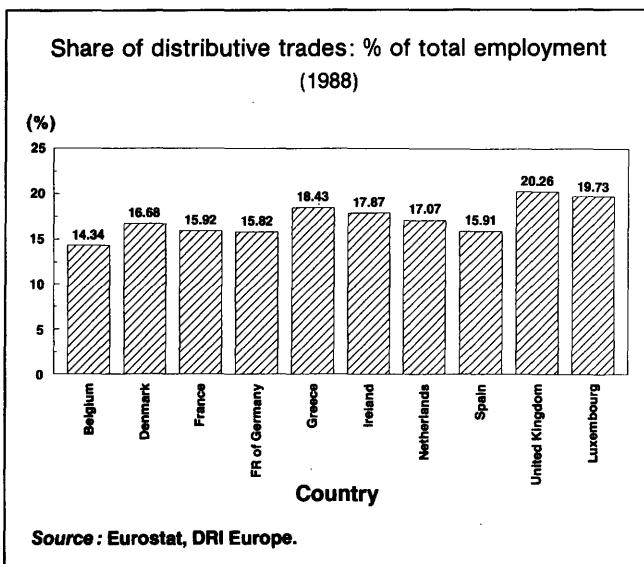
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DISTRIBUTION

The economic importance of the industry in the EC economy

Almost all goods, and many services, pass from supplier to customer via some sort of process of distribution. The distributive trades in Europe find themselves in a paradoxical situation. On the one hand, they are intimately involved in the process of intra-Community trade; on the other hand, however, success in distribution depends on an ability to identify with the customer's needs. This is one reason why firms in the distributive sector tend to have a strong regional or national identity and why the structure of distribution and commercial custom varies so extensively within the Community.

Figure 1



The progressive integration of the single European market for goods and services will, to a considerable extent, depend on the emergence, during the 1990s, of some sort of European distributive system at a continental level. The chapters that follow on wholesale and industrial distribution (Chapter 23.1), retail trade (Chapter 23.2), recycling (Chapter 23.3) and hotels, restaurants and travel services (Chapter 24), are designed to give an overview of the distributive

trades as they prepare to meet this challenge. The most important general conclusions are as follows:

- The distributive trades, and their role in the economy as a whole, are undergoing a rapid and profound process of transformation. There is a marked tendency towards concentration in all forms of distribution — especially in retailing — associated with the rapid penetration of automation and information technology, and with much closer vertical links between distributors/traders and suppliers/manufacturers.
- Basic services — such as warehousing and stock-holding in scrap metals, physical distribution, and cleaning services in the hotel and catering trades — are increasingly supplied only as one element in a package of services, a package whose overall design requires sophisticated marketing and information.
- The distributive trades will remain labour-intensive and continue to offer important entry-level employment and business experience for low-skill and part-time workers, including school leavers and migrants. At the same time, however, the distributive trades urgently need new skills with which they can adapt to the new technology within the sector. At a time of rapid demographic change, this implies that survival of individual firms, and especially the small family businesses which are still typical of the sector as a whole, will depend on their ability to retrain the existing workforce.
- The structure of trade differs markedly from country to country. The process of concentration and vertical integration is closely associated with the level of economic development, but with important exceptions. The UK retail trade, for example, is significantly more, and the Italian less concentrated than the norm for countries at their level of development. There are three times as many shops per head in Italy as in the UK, a difference that appears to be related both to geography and to the regulatory environment.

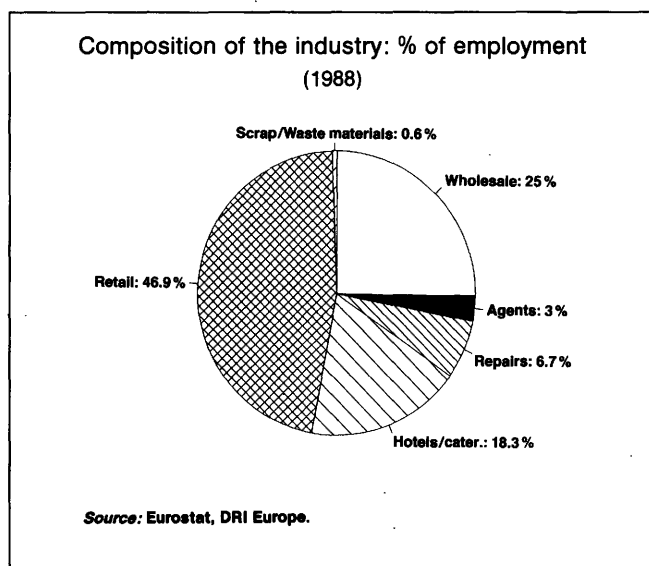
- International links between traders already exist as a natural outgrowth of the process of trade. Nevertheless the distributive trades are of their very nature predominantly local businesses. Mergers and takeovers, and cooperation between traders in international purchasing are already contributing to the internationalization of the distributive sector. It remains to be seen, however, whether the very marked differences in commercial structure and custom, as well as in the regulatory environment in individual Member States, may not prove an obstacle to this process.

Description of the industry

The distributive trades — retailing, wholesaling, repair and recovery services, hotels and catering, and other distributive trades — account for about 15% of output and employment in the European economy.

Table 1, which shows the share of these trades, minus hotels and catering, taken from the National Accounts Statistics for selected countries and years, suggests that this share has remained broadly constant over time. Table 2 shows, for selected countries in 1986, reported total employment by subsector.

Figure 2



These figures need, however, to be treated with great caution. They provide no reliable basis for inter-country comparison, since distinctions between subsectors are very difficult to define. There are no internationally recognized definitions which define the frontiers between, for example, retailing and retail-like activities such as 'cash and carry', mail order houses, travel agencies and entertainment, or between wholesalers and the sales offices and/or subsidiary distributors of manufacturing companies. It is for this reason that the surveys contained in the following three chapters focus on the identification of trends that are significant to the economy as a whole, while recognizing that the quantitative statistical basis for analysis is not yet satisfactory.

Table 1
Share of the value-added for the distributive trades (1) on the total of the branches

(%)	Wholesale and retail trade services (2)		Lodging and catering services		Total	
	1980	1986	1980	1986	1980	1986
Belgium	15.02	16.92	3.03	3.28 (3)	18.05	20.20
Denmark	14.28	15.31	1.28	1.47	15.56	16.78
FR of Germany	12.18	11.24	1.52	1.63	13.70	12.87
Greece	12.88	13.73	N/A	N/A	15.47 (4)	16.30 (4)
Spain	14.72	14.25	4.15	6.68	18.87	20.93
France	13.43	13.34	2.42	2.89	15.85	16.23
Ireland	10.87	11.49 (3)	2.33	2.32 (3)	13.20	13.81
Italy	17.08	17.19	2.83	3.59	19.91	20.78
Luxembourg	15.51	15.79 (3)	2.55	1.99 (3)	18.06	17.78
Netherlands	13.37	13.21	1.86	1.92	15.23	15.13
Portugal	18.00	16.82 (3)	3.16	3.61 (3)	21.16	20.43
United Kingdom	11.59	13.32	1.72	1.98	13.31	15.30
EC	13.54	13.59	2.59	2.57	16.13	16.16

(1) At factor cost.

(2) Including recovery and repairs.

(3) Data for 1985.

(4) Estimates.

Source: Eurostat.

Marketing

The weakness of statistics on distribution, at national as well as Community level, reflect an important truth about the economics of the distributive trades. Distribution is more usefully thought of as a function rather than as a sector of activity. However, the extent to which this role is exercised by traders who are independent of manufacturers, rather than by the marketing, transport and logistics arms of manufacturing companies or by the upstream activity of major retailers, are questions more of arbitrary definition than of substance.

Until recently, there was a general tendency to view the distributive sector as a purely reactive vehicle, operating in more or less mechanical response to the process of supply, for moving goods from the factory gate to the final purchaser. This is no longer a realistic view, since:

- distributors, and especially the purchasing centres of the retail trade, play a pivotal role in translating trends in consumer preference into final demand;
- the modern science of marketing takes into account the nature of distribution channels in planning the positioning and design of products before they are manufactured. It is no longer true that distributors operate by reacting to decisions taken by suppliers. It is increasingly true that manufacturers operate by reacting to trends in distribution;

- successful marketing consists increasingly not simply of providing the right goods at the right time and place, but of coordinating a complex mix of different business services — design, marketing, publicity, packaging, logistics, credit, insurance, after-sales services, etc. The traditional distinction between 'wholesaling', 'retailing' and other forms of trade no longer convey the complexity of the supply chain — a theme which is developed in more detail in the following chapter on wholesaling;
- rapid advances in information systems and telecommunications and, in particular, the EPOS (electronic point of sale) and EDI (electronic data interchange) revolutions — described in more detail in the chapter on retailing — mean increasingly that it is possible to capture sales data as the sale occurs, and to manage the entire supply chain on the basis of a flow of information from point of sale to manufacturer. This has the effect of encouraging synergy between manufacturing, distribution and all the different types of service involved in the supply chain.

Risks and opportunities

The emphasis placed above on 'marketing' reflects the very great importance for all manufacturers and distributors of the completion of the internal market. It is not appropriate here to enter into any detail on the implications for distribution of the Community programme designed to ensure free movement of

Table 2
Number of wage and salary earners in the distributive trades, 1988

	Wholesale	Scrap and waste materials	Agents	Retail	Hotels and catering	Repairs	Total distributive trades	Total economy employment	Share in distributive trades (%)
Belgium (1)	164 112	4 045	3 123	164 992	65 524	35 000	436 796	3 046 797	14.34
Denmark (1)	152 675	2 004	5 410	174 742	52 587	15 050	402 468	2 412 200	16.68
FR of Germany	953 192	25 379	188 508	1 757 340	458 795	310 200	3 693 414	23 348 000	15.82
Greece (1)	89 362	1 564	15 517	325 193	160 143	69 557	661 336	3 587 662	18.43
Spain (1)	262 200	5 400	141 600	527 400	318 600	128 100	1 256 200	7 896 699	15.91
France	837 000	18 700	54 300	1 386 500	460 700	123 000	2 881 000	18 097 000	15.92
Ireland	37 800	0	0 700	67 100	35 000	6 600	147 200	823 600	17.87
Luxembourg	8 600	0 200	0 500	14 200	6 400	0 500	30 400	154 100	19.73
Netherlands (1)	276 700	6 500	6 500	361 100	85 200	54 600	790 700	4 631 500	17.07
United Kingdom (1)	928 201	21 702	28 478	2 110 490	1 036 982	244 235	4 370 086	21 574 926	20.26
EC 10	3 709 842	85 494	444 636	6 889 057	2 679 931	986 842	14 669 600	85 572 484	17.14
Share of the total economy (%)	4.34	0.10	0.52	8.05	3.13	1.15	17.14	100.00	

(1) Data for 1987.

Source: Eurostat.

people, goods, services and capital by 1993. It is sufficient to note:

- first, that the removal of obstacles will not in itself bring about completion of the internal market unless traders actually perceive the European market as a single one and treat it as such; and
- second, that the most immediate cost savings to trade arising from the '1992' programme are those associated with the abolition of frontier formalities and transport deregulation. While these savings may be modest in relation to the economy as a whole, they are very substantial in relation to the cost of distribution.

It follows that, as the process of completing the internal market gathers pace, distributors will have a particularly powerful incentive, as well as the opportunity to look further afield, beyond their local and national markets, and beyond their traditional functions and skills, in seeking the best value for money in merchandise, and the best service that the new technologies can offer in supplying them.

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WHOLESALE TRADE

(NACE 61)

Summary

The traditional role of the wholesale sector in supplying warehousing and transport services is being rapidly eroded by technology, and by the development of advanced techniques for logistics management which create direct links between manufacturers and the point of sale. Traditional wholesale services are still in strong demand, but increasingly they are supplied as part of a sophisticated package of services including marketing know-how, financial services, and design and engineering consultancy. This process of emerging synergy between wholesaling, retailing and the business service sector is much further advanced in the more mature economies of northern Europe than in the Mediterranean countries. A major issue for the 1990s will be whether these differences in the level of development will act as an obstacle to the internationalization of distribution in the single European market.

Description of the sector

Wholesale distribution is defined, according to NACE 61, as:

'Units exclusively or primarily engaged in the resale of goods in their own name to retailers or other wholesalers, to manufacturers and others for further processing, to professional users, including craftsmen, or to other major users. The goods can either be resold in the same condition or after undergoing processing, treatment, packing or repacking to which they are usually subjected by the wholesale dealer. Generally speaking, the latter's role involves, on the one hand, the storing of goods and, on the other, taking title to and/or having the right to dispose of the goods in question.'

This definition reflects the traditional role of the wholesale trade as suppliers of warehousing and transport services, with particular emphasis on the bulk supply of consumer goods to the retail trade, and of raw materials and other bulk goods to industry and agriculture. But for reasons outlined in the survey that follows, it is becoming increasingly difficult and decreasingly useful to define the frontiers between wholesaling and other commercial activities, so that the NACE definition, and statistics collected in accordance with it, no longer reflect

properly the nature and extent of activity in bulk distribution. Existing statistics on the wholesale trade in the EC are to be treated with great caution since they may or may not include such related commercial operations as:

- traditional wholesalers also involved in retailing or retail-like activities (e.g. retailers' cooperative purchasing centres, franchisors of retail services, and 'cash and carry');
- mail order and telemarketing operations;
- the sales and distribution subsidiaries and/or exclusive distributors of manufacturing companies;
- freight carriers, commercial agents, and other suppliers of distributive services who facilitate trade without necessarily taking title to the goods traded.

Current situation

Mainly because of these definitional problems, there are no useful statistics covering wholesale distribution for the Community as a whole. The brief overview that follows draws, in particular, on a survey of wholesaling prepared in 1985-87 by a group of expert officials from national administrations and on a number of authoritative commentaries relating to the wholesale trade in individual Member States.

The incomplete figures given in Tables 1 and 2 of the overview to the chapter, for value added and employment in the distributive sector as a whole within the Community, are based on data collected by Eurostat. They suggest that economic activity in the distributive trades over the last 10 years has grown at a rate broadly comparable with that of the economy as a whole. There is evidence to suggest that the growth of commercial activities other than retail shopkeeping (i.e. wholesaling broadly defined) may have been more rapid than that of the retail trade; the French National Council for Commerce estimates that the wholesale sector is growing at 1% per annum more than the growth rate of GDP.

This growth is, however, taking place against a background of rapid change, involving the disappearance of many traditional businesses, especially smaller ones, and the emergence of new enterprises of a

markedly different character. This situation is so complex that new definitions and concepts need to be developed in order to provide an adequate description.

Until about 1965, wholesaling and retailing were clearly distinguishable activities, both in theory and in practice. Both were viewed as distinct but 'passive' sectors, purely engaged in providing the distributive needs of manufacturing and agriculture. This perception has two subsidiary elements, both of which encouraged analysts and political institutions to treat distribution as relatively unimportant to the economy as a whole. It ruled out a significant role for both sectors in foreign trade, in particular, and the balance of payments, in general. More importantly, it treated the sectors as being highly labour intensive, equivalent to a 'sponge' that absorbed spare labour released by manufacturing in response to cyclical and secular pressures.

These perceptions, which still underpin the statistical definitions used in the national accounts, view wholesaling as a distinct sector within a system in which all activity is defined as belonging in one of four sectors, the other three being production, intermediate activities and retailing. These four sectors are:

- production, where goods are produced, irrespective of the country of origin;
- intermediate activities, covering business services such as transport, finance and insurance, as used by wholesalers in order to facilitate the transfer and exchange of goods from producers to wholesalers;
- wholesaling, providing warehousing and transport services according to the NACE definition above and resale services with regard to three distinct kinds of products: food, non-food (including household durable goods) and industrial products and raw materials. The first two kinds were usually sold to retailers and the third to firms;
- retailing, involving the sale of goods to households.

But this model no longer succeeds in capturing the complexity of developments in a situation in which distribution is increasingly viewed, especially by manufacturers and retailers, as a process rather than as a sector. This erosion of the demarcations between different types of distribution, together with the development of close vertical links between suppliers and distributors, has been described in recent studies as the emergence of a new sector of activity, often referred to as the quaternary sector, in which

the traditional functions of wholesaling, retailing, and business services converge.

In more concrete terms, it is possible to identify trends in three areas — structural, environmental and operational — which are listed below.

Structural trends include:

- the integration of retail and wholesale functions in food and other household products;
- the increase in the market share of large enterprises, at the expense of small family-based enterprises without a special niche;
- the birth of small and medium-sized firms providing specialist distributive services with strong value-added;
- the increase in merger and takeover activities to achieve economies of scale;
- the existence of economies of scale;
- the use of the new information technology;
- the failure of official statistics to distinguish between individual manufacturers with in-house wholesaling capability and specialist wholesalers.

Environmental trends include:

- the increase in competition as retailers and wholesalers diversify into one another's areas, particularly with respect to food and non-food products;
- the growing diversification by wholesalers into upstream marketing, transport, after-sales service, and other intermediary services such as insurance, finance, repair, maintenance, recovery, marketing and merchandise;
- the growing diversification by wholesalers and retailers into upstream production;
- the growing international orientation, through the expanding base of buying and selling points;
- the stronger linkages with manufacturers, involving stable commercial relationships through the exchange of know-how relating to product design, content, marketing and logistics.

Operational trends include:

- the decrease in the number of shop establishments and increase in the average size (floor area) of establishment;
- the increase in the use of low-cost part-time staff in lower level occupations, particularly in retailing-type operations;
- the large-scale investment in new machinery, transfer automation, electronic point of sale

(EPOS) terminals and back office automation;

- the increase in control over all aspects of operations;
- attempts to reduce stock volume in depots, through the use of the 'just-in-time' mode of operation and delivery, using electronic value-added networks involving manufacturers, wholesalers and retailers within a national economy.

Industry structure

Individually, there is nothing novel about these trends: certain aspects have been evident in almost all industries. However, when taken together, they imply a fundamental transformation in the structure, scope and nature of wholesale distribution. They are:

- externalization
- verticalization
- specialization
- automation
- internationalization
- professionalization.

We address each of these factors in turn.

Externalization refers to the labour shake-out in the manufacturing sector in response to the 1974-75 and 1979-81 worldwide economic recessions. This has led to the externalization of the wholesale function, which was previously performed in-house as a subsidiary activity in many manufacturing firms. This proved mutually beneficial in that:

- it increased the business volume in wholesale distribution;
- it promoted economies of scale through specialization in various wholesale functions;
- it enabled manufacturing firms to enjoy these economies of scale and focus their efforts on the better marketing of their products.

Business growth in turn enabled wholesalers to widen the scope of their activities by diversifying into ancillary functions such as transport, export-import, finance, marketing and retailing; thereby internalizing a larger segment of the distribution cycle into their business mix (this we refer to as verticalization). Higher growth also enabled wholesalers to forge closer links with their suppliers as a way of securing economies of scale in buying, finance and distribution. For example, some 50% of wholesalers in the Federal Republic of Germany

engage in activities outside their traditional industry's boundaries. Indeed this process has extended to producers, in that many of them are also now internalizing wholesaling in order to secure distribution channels. Thus alongside externalization, there are also trends towards internalization.

Diversification was more evident in product lines catering for the household market. Alongside that, there was also significant specialization relating to industrial products and raw materials usually bought by the corporate sector. This form of specialization was promoted by growing complexity of the technical and distribution characteristics of the items in question.

Expansion in the scale and complexity of the operations could only be achieved cost effectively with the use of information technology. Automation has been used in order processing, vehicle booking, warehouse management, stock control, dispatch, proof of goods delivery, invoicing, financial reporting, budgeting, market research and rapid communication with 'upstream' suppliers and 'downstream' retailers. Those wholesalers who have diversified into retailing have also introduced elaborate EPOS terminals at check-out. Whatever their product range, wholesalers have been receptive to the new technology, as the concept of 'just-in-time' has spread from manufacturing into distribution. However, it is worth emphasizing two features of technological usage in wholesale distribution. First, it is very much confined to functions associated with inventory and logistics management rather than the physical handling of goods. Second, so far, it is aimed at creating national rather than international value-added networks involving products, wholesalers and retailers.

Economies of scale and scope — both in buying and selling — has enabled wholesalers to expand their supplier and customer base on an international scale (internationalization) in pursuit of low-cost supplies and high-margin sales. This is corroborated by two indicators: growth in intra-Community trade in semi-finished manufactures; and the exceptional growth in the Community's trade with Far Eastern suppliers who as yet do not have their own well-defined selling points in the Community.

All the above developments have witnessed a dramatic increase in the know-how component of all wholesale functions (professionalization). The industry has, as a result, witnessed an increase in the share of the professional occupations such as management, accountants, lawyers, information systems specialists, technologists, technicians, business planners, marketing specialists and logistics experts.

These developments, which are reflected in a wide range of service industries supplying high-value knowledge-based services, imply in the case of wholesaling:

- large-scale use of information technology;
- globalization in buying and selling;
- product and market diversification through the provision of value-added services;
- rapid product innovation;
- rising know-how content work;
- industrial polarization, involving growth of large firms alongside rapid emergence of small and medium-sized firms offering specialist services.

Technological developments

The convergence of country differences in market structure, business environment and technological usage will be conditioned by the rapid penetration of information technology, as well as by the progressive removal of obstacles to the free movement of goods and services in the context of the Community's commitment to the completion of the internal market.

The impact of information technology and the telecommunications revolution is more immediate and more apparent, and is bringing about three types of innovation:

- as a process innovation, automating all the routine operations (e.g. cash balancing, stock control, logistics);
- as a product innovation, facilitating the creation of new services (e.g. charge cards, travel booking);
- as an organizational innovation, facilitating the establishment of larger but fewer stores, the removal of managerial levels and greater centralization of common services (e.g. pricing, marketing and distribution).

Geographic features

The process of transition from the traditional four-sector model to the emerging 'quaternary sector' is described in more detail below. Within the EC, there are marked differences in the maturity of the distributive sector, associated above all with the general level of economic development. These geographic variations are examined in more detail in the next chapter on retail trade. The fully integrated quaternary sector is already emerging in Denmark, Germany, France and the UK, while at the other end of

the scale, Greece, Portugal and Spain are only just beginning to witness the emergence of a business service sector and the breakdown of demarcations between wholesalers and retailers.

One consequence of this uneven development is that businesses in distribution, and especially in wholesaling, still tend to have a strong local or national identity, and that national differences in market structure, business custom, and approaches to technology remain highly distinctive.

Outlook

At the same time, there are significant inter-country differences in market structure, business environment, and technological usage in the wholesale distribution sector in the individual Member States. At the same time, there is little doubt that these differences are weakening. The completion of the internal market will doubtless provide fresh impetus towards greater convergence. But the pace of convergence is unlikely to be rapid. This is because the dissimilarities in the trading and regulatory environment between the Member States give rise to a danger that the current segmentation of distributional networks along national frontiers will persist, thus slowing down the integration of the European market well into the 1990s.

Yet convergence will occur. Following the past pattern, it will be an evolutionary process. Despite its continuous nature, it is possible to identify some overlapping but nevertheless distinct phases towards greater convergence. Of course, the pace of evolution would vary between individual Member States such that individual wholesale distribution sectors would be in different phases at a given point in time.

Nevertheless, all Member States provide examples of a sequence of development roughly as follows:

- Internal restructuring phase: this phase will see the continuation of two distinct developments, both of which have already been occurring since about the middle of this decade in many Member States. First, there will be further weakening of demarcations between retailing and wholesaling particularly in household lines, involving food and non-food products. Second, alongside the diversification we will see the emergence of large wholesalers specializing in industrial products and raw materials. In other words, the wholesale distribution sector will continue to become polarized between specialist and generalist wholesalers. Within the polarity, the implied vertical diversifi-

cation will occur in non-specialist lines in order to serve a wider customer-base. In contrast, specialization is likely to occur in industrial products and raw materials that have a narrow customer base and high value-added component in the form of, for example, repair, recovery and maintenance.

- **Transitional phase:** retailing of goods and services which hitherto had been carried out as separate activities will increasingly overlap in response to the diversification occurring into the goods sub-sector. In this phase, many mainstream retailers of household lines will offer financial, travel, entertainment, catering and dry-cleaning services through their outlets. Thus, the conventional downstream retail sector will see the emergence of many generalist retailers. As a part of this process, some of those wholesalers who have diversified into retailing of household goods will also be drawn into generalist retailing, as a competitive response. This form of horizontal diversification will occur in order to enjoy the economies of scale and scope.
- **Greater integration phase:** under this phase large wholesalers and retailers will begin to diversify into intermediate business services such as transport, insurance and export-import. The diversification will take one of two forms: creating outright ownership of productive capacity in these services through organic or acquisitional growth; or forming vertical links through collaborative ventures — formal or informal — with the established business service firms. The object will be to enjoy further economies of scale and scope associated with vertical diversification. However, specialist suppliers of logistics and transport services will still witness a temporary spurt in their business volume as intra-Community trade in goods expands. This is because of the gradual pace of deregulation of the transport sector.

In general, the process of internationalization of the wholesale trade appears to be inhibited by the marked differences in the level of development, pace of change, and commercial structure and custom between Member States. In terms of the model presented above, it seems that Greece, Italy, Portugal and Spain are currently in the first stage, whereas Denmark, Germany, France and the UK are approaching the third.

This uneven development could inhibit the pace of change in the wholesale sector, in which case there

are important implications for the pattern of integration of the internal market.

It is not easy to predict the impact of the evolving single market on the wholesale trade. The high priority which the manufacturing industry is giving to distribution issues in this context seems likely to provide a competitive stimulus to the evolution of the wholesale trade, particularly in terms of:

- product and service mix
- market environment
- industrial structure
- technological usage, leading to the emergence of the electronic market place
- international orientation
- industrial orientation
- horizontal and vertical linkages.

There is no doubt that these new opportunities are already being anticipated by firms who are developing strategic alliances and cross-border joint venture arrangements. There is, however, some evidence that suggests that the initiative for developments of this kind is at present coming from outside the wholesale sector itself, and that the pace is being set not by traders but by, for example, the physical distribution industry, for whom the prospect of transport deregulation and frontier facilitation has very important implications, and by manufacturers. There is as yet little sign of the emergence in Europe of a trading system in inter-industry goods, independent of manufacturers, of the kind that exists, though in very different forms, in Japan and the USA. It seems that the emergence of some sort of European distributive system on a continental scale will prove to be a necessary condition for the successful exploitation of the opportunities arising from the completion of the internal market.

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RETAIL TRADE

(NACE 64 and 65)

Summary

Retail trade remains by far the most important sector for the transmission of goods from supplier to consumer. Table 1 shows that retail sales account for approximately half of consumer expenditure in nearly all Member States.

Table 1
Retail sales as a percentage of consumer expenditure

	1980	1981	1982	1983	1984
Belgium	58.8	57.3	57.1	54.1	51.7
Denmark	49.2	49.0	48.7	48.5	48.4
FR of Germany	49.6	49.4	48.4	48.0	47.7
Greece	60.4	58.4	54.8	54.6	54.2
Spain	48.0	49.0	49.0	50.0	50.0
France	53.1	52.5	53.9	51.1	50.7
Ireland	57.7	56.2	57.2	55.1	53.3
Italy	55.0	55.0	56.0	57.0	60.0
Luxembourg	71.0	73.7	76.7	74.7	74.0
Netherlands	42.0	41.9	41.3	40.6	39.0
Portugal	70.3	68.1	62.1	61.5	60.5
United Kingdom	43.4	42.2	41.8	41.6	42.2

Source: Euromonitor.

This survey is divided into five sections. The first section provides a brief description of the sector according to the General Industrial Classification of Economic Activities within the European Communities (NACE); the second attempts an overview of the developing structure of the retail trade in Europe and its links with the rest of the economy; the third describes developments in each of the main subsectors of the retail trade; the fourth examines three themes of particular importance to the evolution of retailing, the regulatory environment, technology and consumer behaviour; and the fifth examines the extent of differences in the retail market within the Community by means of a country-by-country survey.

Description of the sector

The retail sector as defined by NACE 64 and 65 includes the retail distribution of:

- food, drink and tobacco
- dispensing chemicals
- medical goods, cosmetics and cleaning materials

- clothing
- footwear and leather goods
- furnishing fabrics and other household textiles
- household equipment, fittings, appliances, hardware and ironmongery
- motor vehicles and cycles
- motor fuels and lubricating oils
- books, newspapers, stationery and office supplies
- photographic, optical, jewellery and other retail distribution.

Current situation

The level of economic development of different countries and regions within the Community (see Table 2) is associated with marked differences in structure. Typically, the richer regions and countries have experienced a rapid process of concentration in retailing, while the independent family shopkeeper retains a larger share of the market in the less developed and rural areas.

Table 2
Retail sales and per capita retail sales, 1984

	Retail sales (million ECU)	Per capita retail sales (ECU)
Belgium	33 700	3 108
Denmark	18 100	3 234
FR of Germany	212 700	3 076
Greece	15 700	1 373
Spain	69 600	1 658
France	201 400	3 335
Ireland	7 100	2 012
Italy	164 300	2 608
Luxembourg	1 700	4 291
Netherlands	37 600	2 323
Portugal	9 700	829
United Kingdom	139 000	2 127
EC	910 600	2 528

Source: Euromonitor.

However, all countries, even those in which the retail structure remains fairly fragmented, have seen the emergence of large-scale retailers whose operations involve one or more of three salient characteristics:

- very large outlets (hypermarkets and supermarkets), often purpose built for a high degree of automation;

- geographically dispersed operations through extensive networks of outlets; and
- significant purchasing power associated with increasingly intimate vertical links with suppliers, including an increasing proportion of goods sold under retail brand names.

Table 3 lists the most important large retail firms in the Community, many of whom are now in the process of extending their operations outside their countries of origin both by means of merger and acquisition, and by participation in collaborative purchasing and merchandising arrangements.

Table 3
Major retail-based organizations in Europe

Company	Turnover 1988/89 (million ECU)	Domestic base
Metro	17 108	Germany
Tengelmann	16 873	Germany
Leclerc	10 159	France
Intermarché	9 522	France
Carrefour	8 900	France
J. Sainsbury	8 885	UK
Albrecht	8 584 (1)	Germany
Rewe-Leibbrand	7 857	Germany
Marks & Spencer	7 714	UK
Vendex International	7 497	Netherlands
Tesco	7 105	UK
Asko-Massa Group	7 039	Germany
Karstadt	6 895	Germany
Migros	6 875	Switzerland
Gateway	6 807	UK
Promodès	6 563	France
Ahold	6 544	Netherlands
Otto Versand	6 411	Germany
ICA	6 331	Sweden
Co-op AG	6 026	Germany
Au Printemps Groupe	5 795	France
Schickedanz-Quelle	5 708	Germany
Argyll	5 566	UK
Kesko	5 467	Finland
K F Konsum	5 090	Sweden
Co-op Schweitz	5 021	Switzerland
Auchan	4 899 (2)	France
Casino	4 854	France
Delhaize le Lion	4 854	Belgium
Euromarché Groupe	4 410	France
Sears	4 075	UK
Boots	4 072	UK
ASDA	4 066	UK
Kingfisher	4 066	UK
GUS	3 955	UK
GIB	3 916	Belgium
C&A Brenninkmeyer	3 836 (2)	Germany
FDB/Brugsen	3 748 (2)	Denmark
Co-op Italia	3 708	Italy
Cora	3 553 (1)	France
System U	3 521 (2)	France

(1) Estimate.

(2) 1987.

Source: Institute for Retail Studies, Stirling University.

The emergence of these large retailers has transformed the competitive environment in the market for consumer goods, especially in northern Europe, over the last 20 years; it is therefore inevitable that their growing importance is sometimes viewed with misgiving not only by competitors (especially smaller independent retailers), but by some manufacturers (especially firms who have allowed themselves to become over-dependent on the custom of individual retail groups), and by consumer protection interests (for whom large retailers form a conveniently easy target).

At the same time, however, there is little doubt that, in general, the retail scene remains highly competitive. All leading retailers are keenly aware that continued profitability depends on an ability to respond very rapidly to price and quality competition and to shifts in the preferences of an increasingly sophisticated shopping public. Effective competition requires increasingly high standards of service and efficiency, and of marketing and merchandising. Failure by individual players to maintain these standards is quickly reflected in profits; this is particularly evident whenever there is a cyclical downturn in consumer spending, as demonstrated by the high level of takeover activity, restructuring, and corporate failure in retailing in 1989.

Against this background, the completion of the internal market presents the retail trade with a particularly complex challenge over the next 10 years. On the other hand, all retailers depend for their survival on their ability to respond to demand at the point of sale; they therefore need to remain close to local markets which will continue to differ widely in taste, custom, and demographic and cultural conditions. But on the other hand, they will need to extend the geographical range of their purchasing capacity so as to reflect the wider availability of a larger range of products at increasingly convergent prices.

Industry structure

Not only does the structure of retailing differ widely between countries and regions within the Community, but the type of business formula, including the organization of the supply chain, the structure of ownership and shop density are much more varied than is generally appreciated outside the retail sector itself. An out-of-town hypermarket may belong to a multinational chain, or it may be the only outlet belonging to an independently owned family business; the 'corner shop' may be a private family business, or part of a multinational chain, or owned by

its customers; a department store may be one arm of a major company which specializes in the design of its own branded products, or it may obtain all its merchandise by 'shopping around' for new ideas and value for money in a world market.

This variety defies any simple statistical descriptions, but some of the complexities are illustrated in Tables 4, 5, 6 and 7. The notes that follow give a brief description of some of the more important retail formats.

The definition of hypermarkets varies widely but the most commonly used is 'a store with a sales area of 2 500 square metres or more, with at least 35% of the selling space devoted to non-food products'. In some countries, the term applies only to stores of over 5 000 square metres, in which case stores with a sales area between 2 500 and 5 000 square metres are called superstores. Both types of store tend to be located out of town with ample parking facilities; they operate extended opening hours and other services — petrol, car maintenance, dry cleaning — are often found at the same location. The heavy space requirement for car parking means that the opportunity for expansion in this sector is restricted in many countries.

Hypermarkets are important in all the major European retail markets, but there are indications that the rapid growth of recent years may be slackening. France has the most highly developed hypermarkets sector, accounting for 13% of retail sales. French retail firms have been prominent in introducing hypermarkets into the Mediterranean countries, especially Spain and, to a lesser extent Italy where the relatively low level of penetration (less than 10%) of hypermarkets reflects the existence of strict development controls.

A supermarket is commonly defined as 'a store with a sales area of between 400 square metres and 2 500

square metres, selling at least 70% foodstuffs and everyday commodities'. Superettes have a sales area of less than 400 square metres and usually restrict their stock to food and household necessities. Supermarkets and superettes in the more developed markets usually belong to multiple chains, except in the Netherlands where most are owned by independents. Similarly in the more fragmented retail markets such as Greece and Italy, supermarkets and superettes are usually independent and often family concerns. Supermarkets complement hypermarkets in countries where the latter are restricted by planning controls, and are especially important in areas which do not have sufficiently dense population to sustain a hypermarket. Traditionally, they have been locked within urban areas and within shopping centres.

Department stores are commonly defined as stores 'having a sales area of at least 2 400 square metres, selling mainly non-food merchandise, having at least five different departments — of which one is often a supermarket'. Department stores tend to occupy city centre sites on several floors, sell women's clothes, and have at least 25 employees. The success of department stores varies greatly from country to country. They are most important in the UK where they account for 13.6% of retail sales. In Spain department stores increased their market share by 16% per annum during the early 1980s, while in France, market shares have fallen in response to fierce competition from hypermarkets.

Department stores have responded to fierce competition from other formats, in many cases in one of two ways; specialization in two or more areas such as fashion and furniture, or the introduction of the 'shop within a shop' concept, varying in size from a few shelves to whole departments. Other changes have included diversification into mail order or fast food, or, as in Belgium, into specialist food stores.

Table 4
Percentage of retail sales by outlet

Country	Hypermarkets and superstores	Supermarkets	Department and variety stores	Mail order
Belgium	N/A	N/A	5.7	0.8
Denmark	5.0	29.0	7.0	1.0
FR of Germany	9.0	14.3	5.8	4.8
Spain	N/A	N/A	5.0	1.0
France	12.9	10.9	5.0	2.5
Ireland	N/A	N/A	6.0	N/A
Italy	0.4	N/A	N/A	N/A
Netherlands	N/A	15.5	5.2	1.2
United Kingdom	6.6	13.4	13.6	3.3

Source: Euromonitor.

There is no generally accepted definition of independent retailers. Some major multiples, department stores, and even hypermarkets are privately-owned family businesses. But the term 'independent' is usually reserved for the small proprietor who operates and manages his own shop with the help of his family and without salaried employees. The truly independent shopkeeper, who buys in his stock from wholesalers and in food markets, is under increasing competitive pressure resulting from the superior buying power of the large retail groups, and for this reason, a growing proportion of independents are 'affiliated traders', either operating under franchise or as part of a purchasing group (see below).

Consumer cooperatives are retail outlets which are operated by salaried employees on behalf of their customers, to whom profits are distributed in proportion to their purchases. They exist in all types of retail outlet, from hypermarkets to small local supermarkets, but are much more prominent in the food and household sectors. They are particularly important in Denmark, where they account for 22% of total retail sales. In France, the market share of cooperatives is static at 3%. In an attempt to improve sales, cooperatives have been expanding into less traditional sectors and into the south of the country.

Itinerant and street market trading has remained a vigorous and resilient sector, especially for the sale of fresh food, despite intense competition from more conventional retailers. In Portugal, such trade accounts for 16% of retail sales. Many countries view market trading as a useful source of competition in retailing, as well as offering healthy opportunities for new businesses to enter the market. Itinerant and market trading is fairly closely regulated in most countries and this has had the effect increasingly of confining such activity to authorized street markets;

in practice many stallholders in such markets are also established shopkeepers operating from permanent premises elsewhere. Genuinely mobile shops continue to operate in rural markets but seem to be losing market share.

Mail order is conventionally defined as the purchase of goods through the postal system, either by direct response to an advertisement or mail item, or through a catalogue with goods often being purchased on credit. More recently mail order has also been associated with newer forms of retailing such as tele-shopping. In practice 'mail-order' deliveries are now distributed through channels other than the postal system. Mail order sales are mainly of items other than food and household necessities. In remote areas such as southern Italy there are few non-food outlets, and 40% of all Italian mail-order sales come from the Mezzogiorno.

But though the mail-order sector traditionally derives its strength from rural areas and countries where the retail structure is relatively backward — and growth is still particularly rapid in Spain, Portugal and Italy (and, incidentally, Japan) — there is an increasingly important market among high-income professional customers. In the Federal Republic of Germany for example, mail order has a larger (though declining) market share than in any other EC country, and is an increasingly sophisticated business spending on average 10% of their annual turnover on advertising and replacing catalogues every six months. Conventional retailers are increasingly adopting mail order methods as part of their marketing mix, while mail order houses themselves are opening catalogue stores and showrooms where their goods can be viewed.

Table 5
Retail trade by organization (1)

	Year	Cooperatives	Department and variety stores and mail order	Multiples	Affiliations	Independents	Total
Belgium	1983	N/A	7	15	9	69	100
Denmark	1984	16	N/A	28	(56)		100
Spain	1984	3	5	10	8	74	100
France	1983	3	8	25	16	48	100
Ireland	1984	1	8	34	7	50	100
Netherlands	1985	N/A	2	27	34	37	100
Portugal	1984	4	(40)		4	52	100
United Kingdom	1984	5	18	47	5	25	100

(1) Cooperatives — cooperative societies; Multiples — including hypermarket chains; Affiliations — voluntary chains and buying group members; Independents — non-affiliated independent retailers.

Source: Euromonitor.

Home selling means the distribution of goods to consumers in their homes, through personal explanation and demonstration; this may be on a 'person-to-person' basis or through a 'party plan' where one person acts as host and invites friends to a demonstration of products. These methods give the consumer the advantages of one-to-one attention and the opportunity to examine goods in the relaxed environment of their own home. Home selling has been particularly successful in the sale of domestic appliances, beauty care products and books. Some observers believe that the importance of home selling may be eroded by the introduction of sophisticated video-catalogues on compact-disc as soon as their technology is available in the household.

Purchasing groups are essential to the financial survival of the small local shopkeeper. There are two main types, voluntary chains, and cooperative purchasing groups. The two types together are sometimes known as 'affiliated retailers'. Voluntary chains are wholesaler-owned and offer shopkeepers and the retailer the opportunity to affiliate to a 'symbol' offering preferential buying prices and the advantages of a corporate image and joint advertising. The two largest chains, SPAR and VG are among the largest and most international of all retail operations in Europe. Purchasing cooperatives are retailer organizations, comprised mainly of independent retailers who jointly control a centralized buying organization, with its own corporate identity and sufficient purchasing power to negotiate on equal terms with manufacturers. Purchasing groups are predominantly found in non-food areas, especially independent department stores. They offer a range of services as well as purchasing, including advice on marketing, advertising, financial and legal matters.

Franchising and exclusive distribution

A franchise is the right to use the name, product or concept of a 'parent' granted by the franchisor in return for a percentage of turnover. In some ways franchising is similar to the affiliated sector, but it usually involves a specialized product, of proven commercial value, to which the franchisor continues to devote substantial marketing and publicity effort. It offers the franchisee the opportunity to start their own business with the backing of a proven formula and an established company.

Two main types of franchise can be identified. First generation franchising, often known as exclusive distribution or supply dealership, is used by manufacturers who require a defined and secure distribution network; the franchisor in general has no

involvement in the franchise business and provides minimal support to the franchisee. In some cases, franchises take a 'fractional' format, which constitute only part of a broader business operated by the franchisee. Exclusive distribution is in principle prohibited under EC law, subject to certain important exceptions, notably in the automobile sector.

A second type of franchise is the second generation or 'business format' franchise, which offers a detailed and defined trading format and style, active involvement of the franchisor in the control, support and development of the franchised network, and a legal obligation defining in great detail the conditions under which trade is to be carried out and the respective roles and responsibilities of the franchisor and franchisee. Business format franchising is experiencing very rapid growth and now accounts for about 4% of total retail sales in the Community.

Structural change

Success in retailing will therefore depend on an ability to remain successful both at local and international levels. There are three themes which retailers, throughout the Community, recognize as pivotal for the evolution of their businesses in the 1990s:

- the regulatory environment and its impact on corporate structure
- the penetration of information technology
- trends in consumer behaviour.

The retail structure in each EC country reflects its geography, its economic and social structure, and the culture of its people.

Two types of structure are easily identified. The highly fragmented structure, such as Italy's, which has the highest density of shops (measured by people per shop), is at one end of the scale. At the other end of the scale is the UK which has a highly developed structure and the lowest density of shops.

The general trend is towards fewer shops and a greater rationalization of the retail market. One of the most noticeable features of this trend will be the increasing size of the outlet.

Hypermarkets are now prominent in a number of major markets. They account for an average of 50 to 60% of all food sales and are becoming increasingly important for non-food sales. Department and variety stores, either operated by cooperatives or multiples, are very important in both Germany and the UK, but on average only account for 5% of retail sales.

Table 6
Number of retail outlets by country

	Year	Total outlets
Belgium	1984	121 690
Denmark	1981	50 826
FR of Germany	1979	412 714
Greece	1978	160 599
Spain	1970	391 434
France	1984	661 390
Ireland	1977	24 864
Italy	1983	1 033 725
Luxembourg	1981	3 872
Netherlands	1984	157 642
Portugal	1976	81 074
United Kingdom	1984	342 022

Source: Euromonitor.

Table 7
Shop densities — Number of persons per store, 1984

United Kingdom	165
FR of Germany	148
Portugal	125
Ireland	110
Denmark	101
Spain	99
Luxembourg	92
Netherlands	91
France	83
Belgium	81
Greece	62
Italy	55

Source: Euromonitor.

Many food multiples and consumer cooperatives are trying to increase their share of retail sales by introducing more non-food products. The multiples are steadily increasing their dominance, resulting in a high degree of concentration. In France, for example, three central groups have gained control of approximately one-third of total retail sales and half of food sales. The UK market is even more concentrated, and recent mergers and takeovers have further consolidated the growing strength of the multiples.

Purchasing groups and voluntary chains are discussed at greater length later in this report. They are most important in Germany and the Netherlands. Generally speaking, multiple stores tend to buy directly from manufacturers or importer/agents. Buying is usually a head office function, with some scope to cater for regional variations. Many independent stores tend to buy from wholesalers or conduct their buying through some sort of purchasing group. In some countries, however, multiple chains also belong to purchasing groups, as in France for instance. Furthermore, in France and the UK for example, there is a trend away from the retail trade

towards other distribution channels. Many manufacturers have opened their own outlets, often selling end-of-line products in the following product areas: goods related to vehicles and textiles and dairy products. Similarly, there has been an increase in direct wholesaler sales to the public; these are most significant for food products and large consumer items; also important for all types of goods are sales through exhibitions.

Regulatory environment

The dominance of the retail market by multiples and hypermarkets has been restricted in some countries by legislation. In Italy, Law 426, which was introduced in the 1970s, in effect controls the entry into the retail market of new commercial enterprises. In many countries, especially France, Belgium and the UK, planning restrictions have curtailed further development of hypermarkets.

The hours which retailers may open are governed by legislation and vary greatly throughout the Community. In some countries legislation is exercised on a national basis, and in others on a regional or provincial basis.

The number of opening hours permitted per week on average is 50, but in practice this varies from 40 to 59, and in France, in theory, it is possible to open 24 hours a day. Restrictions for food and non-food shops vary as they do for tourist and non-tourist areas. Over half of the EC countries do not permit opening on Sundays with exceptions such as newspapers and pharmaceutical products. Liberalization of shop opening hours has proved politically controversial in many Member States, and laws are not uniformly applied or enforced. There is significant pressure for liberalization in some quarters, but it is interesting that in those countries which are the least strictly regulated (Spain, Portugal, Ireland and Scotland) trading is not in practice conducted very differently by comparison with other countries.

In some countries, retailers need to obtain a licence in order to trade. This may only be in relation to the selling of certain types of merchandise, for example, in the UK where there are the least controls on retailing, a licence is needed to sell certain products such as alcohol and game. In other countries, retailers need a licence to open an outlet and to trade. In order to do this, it is necessary to satisfy certain requirements; for example, in the Netherlands it is necessary to hold various qualifications to obtain a licence. This may, in its simplest form, require the person to have attended a training course on market

trading to obtain a licence to operate a market stall. More formal qualifications are needed to open an established retail business.

In all EC countries, there are rules and regulations relating to hygiene, health and safety and employment matters that need to be observed. These, however, are not limited to retailing and retailers but are common to all industries and activities and all employers.

Technological developments

The use of computers in retailing has improved capture, storage and transmission of data. Harnessing this increased ability to process data resulted in the development of electronic point of sale (EPOS) systems. These systems enabled retailers to monitor customer requirements and to implement more quickly corresponding alterations to stock requirements.

Article numbering, in Europe, has developed as the foremost means of automatically controlling stock throughout the whole distribution chain. Article numbering gives all products a unique number and bar code which identifies the country of manufacture and the manufacturer. Grocery products were the first to achieve widespread bar coding, which could be read at the point of sale by either scanning or using wands or light pens. EPOS systems can make use of data captured in this way either within individual stores or centrally, as in the case of multiple retailers. The Federal Republic of Germany makes the most use of the developed article numbering system.

Although there is some consumer resistance to EPOS technology, there is little doubt that scanning stores achieve quicker and more accurate service at the checkout. More importantly, however, EPOS increasingly linked to electronic data interchange (EDI) with management and with supplier firms, and by new systems for assessing turnover and profitability in each location and for each product line (Direct product profitability — DPP) is opening up the prospect of increasingly automated logistics, and greatly improved management information.

Following on from EPOS has been the introduction of electronic funds transfer at point of sale (EFT-POS). The use of EFT-POS is most advanced in France and Belgium where retailers and banks have joined together to implement EFT-POS schemes. These schemes are widely found in petrol stations and hypermarkets. Individual schemes vary in application, the most sophisticated being found in

France where Smart Cards are being introduced. Smart Cards, the same size as credit cards, contain a microchip able to store and process data itself. The aim, though it is not always achieved, is that retailers should benefit from faster payments, less paperwork and with no risk of loss of money or time associated with troublesome cheques.

The development of advanced methods of communication has also given rise to the advent of tele-shopping, i.e. shopping using an adapted television set or a special computer terminal. Tele-shopping uses either cable TV networks or established national data-networks for the transmission of data. The most obvious development is for the use of tele-shopping by mail-order companies, whose customers already do their shopping at home, replacing the catalogue with an interactive screen. The necessary organization and distribution channels for such retailing already exist within the mail-order sector and, to a certain extent, for many of the larger non-food stores. The success of tele-shopping is dependent upon a reliable telecommunications infrastructure and therefore a government commitment to encourage the growth of national data networks would help to boost the development of tele-shopping on a large scale.

Tele-shopping is most widespread and successful in France, thanks to the commitment by the French authorities to the development of the minitel network. More limited development is under way in Italy, the Netherlands, Spain and the UK.

The future for tele-shopping looks very hopeful, given the younger generation's increasing familiarity with and knowledge of computers, as well as more emphasis being placed upon the family with the home becoming the focus of society, and the rise in the number of working women. In the future, tele-shopping is likely to offer a much greater range of products, using more attractive presentations, and equipment which is becoming more user-friendly.

The use of personal computers has been of great benefit to smaller and independent retailers, as well as large retailers. By making many tasks such as bookkeeping, VAT returns, and stock control less time-consuming, the retailer is given more time to devote to the customer. The use of simple stock control packages has also enabled small shopkeepers to rationalize their product lines and respond to customer requirements much faster.

Changing consumer requirements

The most successful retailers are those who have developed market-led strategies and who constantly monitor and respond to changing consumer requirements. Styles of dress, eating habits and many other indicators, show the tremendous diversity of consumer taste and behaviour throughout the European Community. The different cultures, geographical distribution and lifestyles found throughout the Community all produce different consumer needs and desires. Dismantling trade barriers, as we progress towards the completion of the internal market, will not alter these differences. Consumers will never be 'approximated' or standardized like VAT rates or gas appliances, even though they have a standard European Community driving licence, passport and a Community identity.

There is no simple resolution of the resulting dilemma for the retailer. Retail operations will not simply spill over frontiers, because consumers in different countries will continue to demand different products. Nevertheless, consumer behaviour is unmistakably converging in some ways which will in time contribute to the evolution of an integrated European retail market.

In the first place, high personal disposable income appears to be associated with convergent tastes in relation to non-essential purchases. This means that retailers are increasingly able, throughout Europe, to target a new style of sophisticated consumer with a high disposal income, well-informed and cosmopolitan tastes, and high personal mobility. Such consumers are increasingly likely to be in full-time employment as well as shopping on behalf of their household, so they place an increasing emphasis on speed, convenience and reliability as well as on quality and value for money. The expansion of mail-order, home-shopping, 'convenience' and 'one-stop' shopping are all retail developments in response to the consumer's desire to use time efficiently.

A second trend is an interest in family time and investment in the home. This trend is characterized by an interest in the quality of the home environment. Retailers have responded to this trend by producing fully coordinating designs for interior decoration, for example, fabrics and china, by developing 'one-stop' shopping for all home products. Another characteristic is the trend towards working at home. This has resulted in office equipment being marketed through retailers aimed at individuals rather than companies. Finally, an increasing amount of time is spent on leisure activities in the

home. One very evident response to this has been the dramatic rise in the number of video-hire shops.

A third trend is a concern with the health of the individual and of the environment. This is noticeable in a desire for healthy eating, increased popularity of exercise and fitness, greater awareness of the body (i.e. looking good), well-being of the family, and a growing concern for the quality of the environment. Successful retailers have already responded to these requirements. For example, food retailers have produced detailed information on additives and nutritional content. There has also been a change in emphasis from price competitiveness to freshness. On the environmental issue, many retailers have publicly stated it is their policy to use biodegradable bags, and stock ozone-friendly aerosol products. Many have re-orientated their marketing strategies to stress environmentally-friendly products.

Geographic features

Belgium

The Belgian retail scene is easily misinterpreted. On the one hand, Belgian groups pioneered the superstore and hypermarket in the 1960s, and are leading players in the international retail scene, not only in Europe, but in North and South America. But on the other retailing is still highly fragmented with an exceptionally large proportion of the market held by independent small shopkeepers. Belgian consumers appear to have a preference for small, high-quality shops. Awareness of the opportunities offered by the single market is high since for many Belgians, parts of France, Germany and the Netherlands have always been identified as one single area. Any moves into the Belgian retail market by foreign retailers would have to meet the form of expansion by acquisition or merger.

Denmark

The retail market in Denmark is dominated by the 'Co-op', and is one of the most restricted retail markets found in the European Community. Basic rates of VAT are very high, at 22%, and additional taxes are levied on nearly all non-food items. Many observers believe that the Danish retail market will benefit from 1992 by the approximation of VAT levels and the freeing of consumer credit restrictions. This market is not likely to be a target market for foreign retailers and it is unlikely that any Danish retailers will seek to expand overseas.

France

The great strength and maturity of French retailers has, with a few exceptions, kept foreign operators out of their own domestic market. However, increasing interest is now being shown by foreign retailers who are identifying the existing areas of weakness, such as low capitalization to sales ratios.

Many French retailers have expanded overseas, especially the hypermarket operators who have moved into the southern Mediterranean countries. The French Government expresses great enthusiasm for the completed single market and has taken steps internally to facilitate it, such as the removal of very strict exchange controls (though some individual controls remain). The environment for expansion within France, for foreign retailers, and abroad for French retailers is a very positive one.

Germany

Germany has the highest per capita income and consumer expenditure, and the largest retail sector, as measured by sales area per head of population. The retail structure is dominated by large firms to a lesser extent than in France or the UK, reflecting strict German competition law inhibiting concentrations. Nevertheless, the major retailers are the largest in Europe, and the process of concentration is still continuing in the food and groceries sector. At the same time, however, the number of shops in the non-food sector is increasing, reflecting increasing demand for an extensive and specialized product range and high standards of service. The larger retail groups are now facing increasingly fierce competition from specialists and from an increasingly sophisticated mail-order sector — mail-order accounts for a higher proportion of retail sales than in any other EC country — as well as a relatively stagnant mass market resulting from the increasingly ageing population. This may explain why firms which have in the past tended to concentrate on the German domestic market have recently begun to show an interest in expansion, by way of merger, takeover and joint venture in other Community countries.

Greece

Modern retailing in Greece is confined to the two largest urban areas of Athens and Salonica. French retailers have already successfully introduced hypermarkets into the country and thereby shown the opportunities that exist. Only four to five modern retail chains are to be found in Greece and it is unlikely that foreign expansion would involve them.

Ireland

The Irish retail market has suffered from severe economic problems but is now showing signs of recovery. The market is also hindered by high VAT and damaging price wars between retailers. Some UK retailers are already operating in Ireland. With free movements, a common language, similar household spending patterns and brand awareness, Ireland is an obvious target for further UK retail expansion.

Italy

Although Italian retailing is dominated by small traditional outlets, two of the most successful, multinational fashion chains, Benetton and Stefanel are Italian. The private sector economy is strong and coupled with a high demand for consumer goods helps make Italy a country offering good opportunities for foreign retailers. There is already confidence in the growth of modern retailing, shown by the large number of planned hypermarkets and shopping centre developments. Several joint ventures with foreign retailers are already under way and the removal of physical barriers under the 1992 process will make a big impact on the ease and cost of supplying the Italian market, all of which will encourage foreign retailers to take advantage of the opportunities offered.

The Netherlands

Like the people of the Netherlands, the largest retailers are very international in outlook. Expansion within the home market has been curtailed by a lack of volume growth, thus leading to expansion abroad in Europe and North and South America. The retail market has been restricted by high VAT and limitations upon opening hours. The possible removal of both these should benefit any opportunities for expansion.

Dutch retailers have been at the fore in innovations, such as in-store electronics for pricing and stock-control, as well as marketing and the use of different business formats. For example one large supermarket chain introduced a franchise sales operation for its products in rural areas where a supermarket would not have been justifiable.

Portugal

Retailing in Portugal is dominated by small family businesses and a large number of mobile and itinerant retailers. Foreign retailers, noticeably French

and Belgian, are beginning to move into this market, much as they did into the Spanish market several years earlier.

Spain

The economy in Spain has been growing, strongly led by a high level of consumer consumption. Foreign retail activity began in the early 1980s and has been most noticeable in the hypermarket and department store sectors (with retail acquisitions from France, the Netherlands, and the UK). There are many barriers to trade in Spain, the removal of which will greatly benefit foreign retailers seeking to expand into the Spanish market. Opportunities also exist for specialist/niche retailers, especially to cater for the needs of the large expatriate community on the Spanish coast. Opening retail outlets in Spain should present opportunities for retailers which are not readily available elsewhere in Europe. Spain stands to be a 'net' winner as the result of the 1992 process.

United Kingdom

Multiple retailers are the strongest in the UK market, with control of the retail sector held by a relatively small number of companies. This is best seen

in food, where a very small number of supermarket chains dominate the market. Concentration also exists in the non-food sector, however, even though a small number of large companies involved prefer to operate under a number of 'brand' shop names. The high profit margins obtainable in the UK may attract overseas retailers, who will nevertheless be obliged to proceed by acquisition or merger rather than organic growth. With a few noteworthy exceptions, UK retailers have always been independent of the European continental market; but many are now seeking to expand overseas — both outside and within the EC — encouraged to look elsewhere by the saturation of the UK retail market.

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DEALING IN SCRAP AND WASTE METALS

(NACE 621)

Summary

The European Community has few ore deposits. The recovery of scrap and waste metals constitutes an internal source of raw materials which is reliable, flexible and economical, generating currency savings and ensuring regular supplies. The industry is widespread in all Community countries.

Scrap metal is the basis of a third of all Community steel production, with some 41.5 million tonnes in 1986 out of a total production of 124.6 million tonnes. The proportion is tending to rise in the Community as a whole since scrap metal resources are growing.

Recovery of the two principal non-ferrous metals, aluminium and copper, is increasing by volume. For the four principal non-ferrous metals, scrap recovery meets between 25% and 35% of needs.

The structure of the waste recovery industry differs from country to country. It is best organized in Germany.

Contrary to traditional circuits, the cycle of the waste recovery industry goes from the consumer to the producer. Geographical areas of high consumption are one of the two sources of raw materials for this activity, whilst outlets are in industrial sites (the iron and steel and metalworking industries). The second source of supply is manufacturing scrap, which is recovered at the end of the production process and returned, like consumer waste, to iron and steelworks or metalworks.

Scrap and waste-metal dealers can be divided into three categories: collectors, small wholesalers and large wholesalers. The small-scale collectors form the largest category collecting mainly household waste. Small wholesalers are the first stage in industrial waste recovery. Their suppliers are mainly industry, collectors, demolition firms and even public authorities. Large wholesalers run recovery operations on an industrial scale, buying and selling internationally. Automobile demolition firms also play a significant role.

Industry structure

Scrap dealing is widespread and varied. There are many small-scale firms as well as larger firms which are sometimes integrated into major European groups.

As demand for scrap iron is rather variable, scrap dealers bear the brunt of fluctuating economic conditions. Firms regularly enter and leave the industry, with some of them absorbed by larger firms. There is a general tendency towards concentration amongst large-scale wholesalers.

Description of the industry

Scrap iron represents, on a Community scale, about 50% of the value of recovered metals and over 90% of the quantity. The most important non-ferrous metals are aluminium (15% of the total value of recovered metals), copper (15%), lead (3%) and zinc (5%). Other metals are recovered on a smaller scale, including precious metals (gold, silver, platinum) and other metals such as chrome, nickel, tin, antimony, tungsten, titanium, etc. The share by value of each metal varies considerably from year to year, depending on changes in relative prices.

Table 1
Main indicators, 1980-87 (1) (2)
Scrap iron

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Apparent consumption	35.9	32.0	31.3	30.5	33.5	32.5	41.7	44.3
Net exports	0.4	3.2	2.6	4.5	4.4	4.7	-0.9	-0.6
Resources used (3)	36.3	35.2	33.9	35.0	37.9	37.2	41.6	43.7

(1) 1980-85 EC 9; 1986-87 EC excluding Greece.

(2) Excluding internal scrap from iron and steelworks recycled directly.

(3) In iron and steelworks and cast iron foundries.

Sources: International Iron and Steel Institute (IISI) and Eurostat (Sidr).

Ferrous metals

Scrap iron, bulky and useless to those industries and consumers who 'produce' it, is an important raw material for steel producers. As it has already been worked, smelted and purified, scrap iron is both an 'energy concentrate' and a resource which is little influenced by political uncertainties. It is thus economical to incorporate it into the manufacturing process, although the savings achieved vary according to its price. The longer a country has been industrialized, the more scrap iron reserves it has; they play an important and growing part in the EC, which has few ore deposits. This substitute raw material, to a certain extent, enables steel producers to choose the least problematical source of supply at any given time.

There are two main sources of scrap iron for the recovery cycle. Firstly, scrap metal from steelworks and manufacturers (e.g. production of steel tubes in the first case, production of items for the mechanical engineering or construction industries in the second). This scrap metal normally goes through the recovery cycle but within the iron and steel industry it can go directly from a 'producing' works to a 'consuming' works. The second source is scrap iron, including all discarded, demolished or dismantled ferrous objects. This is fed back into the economic cycle by scrap metal dealers who process it, transport and deliver it to EC or non-EC steelworks. Scrap iron is taking a growing share due to the development of resources and processing technologies which limit losses (recovery of bulky objects such as metal bedsteads, recovery of tin cans in waste incinerator plants, automobile crushers which can also process electrical appliances, etc.

There is one more major category of ferrous scrap, namely steel scrap from steelworks which is recovered directly by the steelworks themselves (internal scrap). As it does not go through the recovery cycle it has been excluded from the statistics provided here.

Scrap iron comes in many forms. As the sources of scrap iron are very different, so its shape and state differ (chemical content, thickness, dimensions, incorporation in a larger whole). The fact that scrap iron comes in various states, is geographically scattered and is worth relatively little, means that sorting classification and transport costs figure prominently in the sale price.

Non-ferrous metals

The recovery rate for non-ferrous scrap metal is fairly high. Recovered aluminium currently repre-

sents almost 30% of total consumption of the metal in the Community, and recovered copper almost 35%. Non-ferrous scrap metal is used mainly to produce either secondary metal or, after refining, in the manufacture of half-finished products; it may also be mixed with new metal.

There are two basic categories of non-ferrous scrap from pure metal or alloys:

- manufacturing scrap 'produced' by the clients of metallurgists (this may be recovered directly by metallurgists in exchange for new metal; otherwise it passes into the recovery cycle);
- scrap metal from discarded products (electrical conductors, household appliances, automobiles). This is returned to the industrial cycle by collectors and dealers.

As with scrap iron, this study does not take into account manufacturing scrap from metalworks (producing raw metal or half-finished products) which recycle their scrap directly and thus do not form part of the commercial recovery cycle.

There is a price for each category of scrap, based on its metal content and the relevant new metal prices. The evolution of scrap prices does not necessarily match that of new metal prices; fluctuations can be such that scrap metal recovery may become uneconomical. In this case, dealers may speculate or stockpile until conditions improve. Thus the amount of scrap which finds its way back into the industrial cycle varies in the short term according to its price.

Production and consumption trends

Ferrous metals

Recycled scrap iron has become increasingly important in the manufacture of cast iron and steel at a time when Western economies are increasingly dependent on developing countries for their supplies of raw materials. Thus scrap iron (excluding internal scrap) today forms the basis of 31% of Community steel production. The iron and steel industry is the principal user, both in electric furnaces, for which scrap iron is the only raw material, and in blast furnaces, for which it is more or less economical supplement depending on its price. Other users of scrap iron include cast iron foundries, steel foundries, re-rollers and electrometallurgy.

Despite the fall in Community steel production (from 127.7 million tonnes in 1980 to 112 million in 1986 for EC 10 and 141 million tonnes to 124.6 mil-

lion tonnes for EC 12), real consumption of scrap iron rose slightly from 36.3 million tonnes in 1980 to 37.2 million tonnes in 1985 (EC 10). It represents 28.6% of steel production in 1980 and 31% in 1985.

Community scrap iron resources outside the iron and steel industry rose between 1980 and 1985 before falling back sharply in 1986.

The two principal sources of scrap iron have evolved differently.

In steelworks, where the 'production' of scrap has decreased in line with falling demand for steel in client sectors (mainly the mechanical engineering, automobile, construction and oil industries), automation has led to less scrap. New steel scrap, which is generally stored and transported by dealers, represents a diminishing proportion of raw materials, down from 44% of Community scrap iron resources in 1980 to 33% in 1985.

Scrap iron from automobile demolition, ship breaking and discarded products in general always goes through dealers, who store, sort, classify, prepare, transport and finally sell it to European or foreign iron and steelworks. The older industrial nations in Europe have growing quantities of scrap iron; they now represent a dominant share of the Community's resources, up from 19 million tonnes (53%) in 1980 to more than 27 million tonnes (64%) in 1985 (EC 10).

In general, scrap iron resources vary rather slowly and depend more on the past than on the present. The present does however affect scrap iron prices and low prices can lead to a reduction in resources or to stock-piling. This was the case in 1986, when scrap iron resources fell by 15% as prices dropped sharply. Technological advances (in crushers, for example) can also increase the recovery rate of scrap iron. For reasons of cost, scrap iron is processed near collection points or along routes leading to major centres of consumption where prices are determined.

Demand, on the other hand, which by its nature is concentrated in heavy industry, can vary much more dramatically. It depends on the amounts of melting equipment in operation or idle at a given time, as well as on economic conditions in the iron and steel industry and is a determining factor in the pricing mechanisms.

The major problems for scrap dealers are demand and price fluctuations. The iron and steel industry plays a major role in determining prices as suppliers are less concentrated and less organized. Market

prices are highly unstable; this instability has direct repercussions on the number of dealers and the tonnage of scrap iron recovered.

Prices are relatively uniform throughout the EC even though levels may fluctuate considerably. Spain is the sole exception, prices being sustained by strong demand and more influenced by American prices.

Non-ferrous metals

Aluminium

Although the use of aluminium is comparatively recent it has become the leading non-ferrous metal, with consumption growing strongly. Its physical characteristics (immutability, good conductivity, lightness) guarantee many outlets in all industries, particularly the electrical and transport industries. It is thus highly important for an industrialized country, which explains why recovery rates are comparatively high: approximately 1.2 million tonnes in 1983 and almost 1.6 million tonnes in 1986. Since it can be used in so many different ways, it is mostly recovered when it is transformed into finished products, though it is also recovered from scrapped road vehicles, packaging, household appliances and construction products.

Aluminium scrap can either be used directly or remelted to make secondary aluminium. Germany recycles over 600 000 tonnes of aluminium scrap per year, Italy almost 400 000 tonnes.

Copper

Copper has been in use for millennia and, in terms of tonnage extracted and consumption, is currently the second most important non-ferrous metal. It is used either pure or in alloys such as brass (copper-zinc) or bronze (copper-tin). Copper is used extensively in the electrical and construction industries, since it is present in a wide range of electrical machines and appliances, vehicles and various hardware products.

Recovered copper, at over one million tonnes per year, represents about one-third of total EC consumption. Since 1985, there has been a tendency towards stagnation both in demand and in recovered waste. The main countries producing secondary copper are Germany (over 150 000 tonnes) and Belgium (100 000 tonnes). The main users of waste for direct production or half-finished products are Germany (250 000 tonnes) and Italy (almost 200 000 tonnes).

Table 2
External trade
Scrap iron

(million tonnes)	1980	1981	1982	1983	1984	1985	1986	1987
Exports								
EC(1)	3.1	4.4	4.2	5.7	6.3	6.7	3.3	3.4
Other Western Europe	.2	.3	.2	.3	.4	.4	.3	N/A
USA	10.1	5.8	6.2	6.8	8.6	8.9	10.6	N/A
Japan	.2	.2	.2	.1	.2	.2	.5	N/A
Imports								
EC(1)	2.7	1.2	1.6	1.3	1.9	2.0	3.3	4.0
Other Western Europe	1.3	1.6	2.3	2.7	3.3	3.4	3.4	N/A
USA	.5	.6	.4	.6	.5	.6	.7	N/A
Japan	3.0	1.8	2.0	3.9	4.0	3.3	3.2	N/A

(1) 1980-85 EC 9; 1986-87 EC 12 (excluding Greece).

Sources: International Iron and Steel Institute (IISI) and Eurostat (Sidr).

Lead

Recovered lead, mainly from old batteries, represents a considerable share (30%) of Community supplies although fluctuating international price levels inevitably affect the profitability threshold for lead recovery. Community leaders in the production of secondary lead are Germany and Britain, with each producing approximately 130 000 tonnes per year.

Zinc

Zinc scrap is either remelted or used directly for half-finished products. Brass scrap is generally recycled in the manufacture of half-finished brass products. The construction and automobile industries are the main sources of scrap zinc, representing about 25% of Community demand for the metal. Amounts of recovered zinc are tending to decrease due to the technical evolution of covering materials in the construction industry.

Trade trends

Ferrous metals

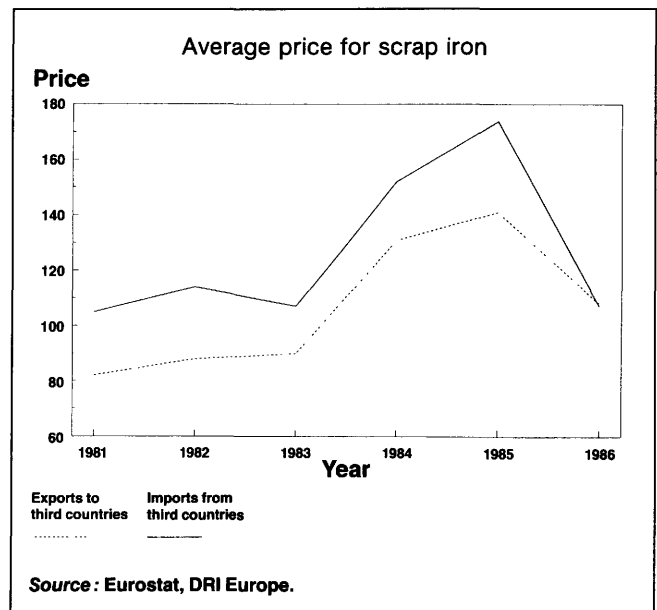
The international scrap iron market is largely dominated by the United States, which remains the largest exporter accounting for 10.6 million tonnes in 1986. The EC imported some 1 million tonnes from the USA, 60% of which was imported into Spain.

Despite American domination, EC foreign trade is significant. Exports increased to almost 7 million tonnes in 1985 whilst imports ran at around 3 million tonnes, giving a net export balance of over 3 million tonnes in 1985. Exports decreased in 1986

due to a drop in prices on international markets caused partly by the fall of the dollar.

Export prices caught up with import prices in 1986.

Figure 1



Outlook

Ferrous metals

In the future, the European Community should see new growth in the rate of continuous casting still relatively low in 1986 (barely 70% in EC 12) and in the automation of the iron and steel industry, providing improvements in productivity.

This will result in a fall in amounts of recycled internal scrap and hence an increase in the need for

external scrap iron as a relative share of production. But future progress is likely to be less significant than that achieved since 1980. Similarly, the comparatively slow development of electric steel is likely to lead to a slight decrease in demand for scrap iron as a relative share.

The major uncertainty in demand for scrap iron from outside the iron and steel industry is thus the level of steel production. If current levels were to be sustained for five years there would be an increase in demand for external scrap metal relative to 1986; this is likely to be mainly supplied from the recovery of scrap iron. Resources at that point should allow such an increase, given reduced levels of waste and a reduction in exports and taking into account past developments in the demand for steel. As the average lifetime of steel products is about 10 years, it is possible to ascertain that demand for steel fell some 10 years ago, in the early 1980s.

It is more likely that steel production will decrease. Under these conditions there would be only a slight

increase in demand for external scrap iron which it should be possible to supply from resources.

But as flat products become more important in iron and steel production, ferrous scrap will contain more and more non-ferrous materials (plastics, other metals), thus imposing new technical constraints on dealers and producers.

Because of the new competition with traditional converter steelworks, electric steelworks will be requiring increasing supplies of high quality (i.e. well-sorted) scrap iron. In the future, given the foreseeable spread of automation, the best use of scrap iron will depend on its having been well sorted and on its physical state (dimensions, density, etc.) being adapted to the new requirements of mechanized and computerized production and the necessary improvement in quality for finished products.

Written by DRI Europe on the basis of information published in *Panorama of EC Industry 1989*

HOTEL, RESTAURANT AND TRAVEL SERVICES

(NACE 66, 771)

Summary

The hotel, restaurant and travel services sector is a consistent and major source of employment and income for each of the Member States. Many young people obtain their first experience of employment in the hotel and catering trades which have, for many years, been leaders in the employment of migrant labour. Although tourism is very much more important to some Member States than others, hotel, restaurant and travel services are, in general, becoming increasingly important to the internationalization of the European economy.

The share of this sector in income and employment is of the order of 2 to 3% (see Table 1). Annual growth rates are estimated in a range between 3 and 10% (compared with 3 to 4% for the economy as a whole) with substantial national and regional differences.

Table 1
GDP and tourism revenue

(million ECU)	GDP	Tourism revenue	Share of GDP (%)
Belgium	114.4	2.32	2.03
Denmark	84.1	1.79	2.13
FR of Germany	910.4	8.00	0.88
Greece	40.5	1.87	4.62
Spain	232.6	12.16	5.23
France	737.6	9.88	1.34
Ireland	24.9	0.65	2.61
Italy	611.9	10.05	1.64
Luxembourg	5.1	N/A	N/A
Netherlands	179.0	2.29	1.28
Portugal	28.9	1.60	5.54
United Kingdom	556.0	8.06	1.45
EC	3 525.4	58.67	1.66

Sources: Eurostat; World Tourism Organization.

Description of the sector

The hotel and catering sector (NACE 66) comprises the following:

- hotels, motels, guest houses and boarding houses;
- other provisional lodging such as youth hostels, camping sites, holiday centres, holiday homes, convalescent and rest homes, furnished accommodation for tourists;
- restaurants, snack bars, cafes and other eating places (not providing overnight accommodation);
- public houses and similar establishments supplying drinks for consumption on the premises without entertainment;
- nightclubs, dance halls and other establishments supplying drinks for consumption on the premises in conjunction with entertainment;
- canteens and messes.

The travel services sector (NACE 771) includes units exclusively or primarily engaged in arranging transport, accommodation and meals on behalf of travellers.

A highly differentiated market

The collection of reliable statistics on the hotel, catering and travel services sector is complicated by the specific characteristics of the business, in particular by its highly differentiated character, regional variations and seasonality. The hotel trade, for example, embraces intercontinental luxury hotels at one end of the market, and, at the other, city-centre 'bed and breakfast' accommodation which is used *inter alia* by the welfare authorities as overspill accommodation for the homeless.

Furthermore, household expenditure data suggest that for most EC member countries, expenditure on tourism amounts to 2 to 3% of the household budget, but that such expenditure is a vulnerable item and is among the first to be sacrificed in the event of a general downturn in income and/or expenditure. Since expenditure may not simply be cut, but shifted to less expensive market sectors, the consequence is that growth rates are not only highly volatile but

may also show perverse effects, with north European destinations, and camping or activity holidays showing continued high growth in periods of slack growth in consumer expenditure as a whole.

Reliable statistics on employment are also not available since the hotel and catering trades are, of their nature, major employers of casual labour; employment rates show wide seasonal variations and are highly sensitive to small shifts in consumer demand.

Finally, estimates of the ratio of business expenditure to 'tourist expenditure' on hotels, restaurants and travel services range between 1:3 and 1:1. These wide discrepancies reflect:

- major regional differences, with a higher proportion of business travellers in cities and in northern Europe;
- the much greater degree of seasonality in the tourist market;
- the growing phenomenon, especially in the rapidly growing 'conference' sector, of combined business and leisure trips.

Current situation

The contribution of the hotel, restaurant and travel services sector to the business climate is greater than that which a purely statistical approach would suggest. Many Europeans first encounter the languages and cultures of other European nations in hotels and restaurants in their own countries. With the rapid growth of both the leisure and business travel sectors, the ability of modern hotel establishments to offer a sophisticated welcome to large numbers of tourists from other countries is a major catalytic factor in the internationalization of the European economy.

At the upper end of the business sector, there has been a trend to offer services that extend well beyond the traditional 'hospitality' categories, including travel assistance, secretarial and language assistance, and conference facilities. This expansion in the range of services offered is a significant factor in the ability of the European hospitality industry to rise to the challenge of adjusting its marketing performance to the rapidly changing conditions of the emerging single European market.

Industry structure

The importance of hotel chains

It is in this context that the developing concentration of the hotel sector and the emergence of very rapidly growing hotel chains is of particular importance. Although the 20 largest chains account for not much more than 10% of all hotel rooms in the Community (see Table 2), the advantages of chain operations — which include cooperation in the field of procurement of goods and services, wide and varied on-the-job and vocational training schemes, joint participation in computerized reservations and accounting networks, and shared marketing and sales operations — are such that hotel chains increasingly set the standards by which the public judges the entire hotel sector.

Table 2
Major European chains

Rank	Company	Country	Rooms	Units
1	Trusthouse Forte	UK	74 800	793
2	Accor	F	62 410	534
3	Club Méditerranée	F	53 733	212
4	Sols	E	29 450	110
5	Ladbroke	UK	26 379	208
6	Wagon Lits	F	24 540	187
7	Grupo Unidos	E	22 000	125
8	Méridien	F	18 000	53
9	Société du Louvre	F	15 876	164
10	Crest	UK	9 758	79
11	Iberotel	E	7 900	37
12	Queens Moat Houses	UK	7 749	87
13	Mount Charlotte	UK	6 935	58
14	Penta	UK	6 893	15
15	Lonrho	UK	6 120	12
16	Ciga	I	5 451	33
17	Melia	E	5 340	17
18	Climat de France	F	5 024	124
19	Steigenberger	D	5 000	30
20	Maritim	D	4 980	23
Total			396 338	2 901

Source: Dafsa.

Two distinct types of hotel groups or chains may be distinguished. The 'developer' chain specializes in the development of brand new hotels, particularly in areas of rapid growth in tourism and business travel. In the 'succursalist' type of chain, management establishes a portfolio of established hotels, usually specializing in one or more broadly consistent market segments.

Although practice varies from country to country, hotel groups often divide their portfolios among subsidiaries, franchises and management contracts. The division between these categories in France (subsi-

diary 33%, franchise 41% and management contract 19%) is probably fairly typical of the practice in the Community as a whole. In addition, there is a third type of 'voluntary chain' in which independently owned hotels join together in a cooperative organization providing some or all of the services associated with the more established type of hotel chain.

Travel services, travel agencies and technology

As with the distributive sector as a whole, the impact of the information technology revolution has already had a profound effect on the economics of the travel services business, but even greater chances seem likely over the next 20 years.

Occupancy rates of hotels, like load factors for transport systems, are crucial to profitability. Computerized booking and marketing systems have been fundamental to the economics of the airlines and to the development of the mass package holiday trade. Up to now, these techniques have largely been confined to large firms — airline and hotel groups. During the next 10 years, however, increasingly sophisticated and interactive systems for electronic data interchange (EDI) will be much more widely available, not only to large firms, but to independent travel agencies, hotels and other providers of travel services.

In the travel business, there is already sharp competition between the carriers themselves, and between travel agencies and tour operators. In the United States — where there is already a significantly higher degree of concentration in the travel and hotel business — there is a similar pattern of competition in the hotel trade and holiday business. Individual chains, on the one hand, seek to develop strong customer loyalty to individual chains by operating and carrying out marketing through their own central reservation systems. Travel agencies and tour operators, on the other hand, are improving their ability to produce attractive and increasingly flexible pack-

ages, tailored to individual consumer requirements, by sophisticated brokerage on an increasingly automated market.

The same type of competition seems likely to develop in Europe. While the market for middle-priced accommodation in the principal holiday and business destinations seems to offer little scope for expansion, there appears to be a wide measure of agreement within the travel business, and on the part of consumer organizations, that there is still substantial room for growth in the provision of sophisticated services, responsive to individual customer demand.

Outlook

An interesting feature of the hotel, restaurant and travel services business is that, although the pace is increasingly being set by large groups, the capacity of individual hotel and restaurant owners to deliver the very highest standards of service remains unchallenged. This phenomenon appears to be reflected by the generally high level of profitability in the independent sector. Small businesses will have to adapt, over the next 10 years, to increasingly sharp competition from hotel and restaurant chains, whose costs will fall in response to the adaptation of new technology. The survival of Europe's unique standards of hospitality and gastronomy will depend on the ability of the trade as a whole to develop methods of training and cooperation that sustain competition between personal service on the one hand, and economies of scale on the other.

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TRANSPORT

(NACE 71 to 76)

The economic importance of the industry in the EC economy

Transport services contribute an estimated 7% to GDP in the EC. It is difficult to determine the overall rate of growth in this industry over the last decade, given that the volume of traffic in each of its many components is often measured in different units, but it is clear that the mix of transport services has changed. Whereas in 1975 the number of passengers travelling by international air and rail transport services was split approximately evenly, by 1986 air traffic had grown to command a 62% share of passenger traffic compared to rail's 38%. The use of private cars has grown significantly and changed the dynamics of the transport sector. National and international road traffic (private cars and coaches) expanded from 1 700 billion passengers per kilometre in 1975 to 2 800 billion passengers per kilometre in 1986. Of this total, coaches account for approximately 10% (281 billion passengers per kilometre in 1987), slightly greater than the 218 billion passengers per kilometre travelling by rail in 1987.

In terms of freight, shipping goods by water accounts for most of the volume transported in the EC. According to the EC Commission's *European Economy*, March 1988, the share of the different means of merchandise transport in terms of tonnage were, in 1986, 32% for maritime transport, 31% for road transport, 28% for inland waterway transport and 9% for railways. Railways transported 748 million tonnes (168 billion tonnes per kilometre) in 1987, compared to the 696 billion tonnes per kilometre shipped by road.

Within the EC, the share of transport services in Belgium, Denmark, Greece, Portugal and Italy is higher than the EC average. Luxembourg, Denmark and Portugal are relatively more specialized in maritime or inland waterway and air transport services than in other modes of transport.

Description of the industry

This chapter covers:

- railroads (NACE 71);
- regional and local bus transport (NACE 721);
- road passenger transport (NACE 722);
- merchandise road transport (NACE 723);
- inland waterway transport (NACE 73); and
- air transport (NACE 75).

This last sector is covered by three different monographs: the first, air transport, presents the regulatory framework for air transportation; the second section deals with the airlines sector and provides a description of passenger traffic, market structure and the development of intra-Community air services; a third monograph deals with the infrastructure of the air transport industry, airports.

Industry structure

The structure of the transport services sector varies widely across the different modes of transport and also across the EC Member States. There is, however, a common theme of restructuring and a trend toward liberalization in an industry that has traditionally been controlled by the public sector. These themes are addressed briefly with respect to each of the transport sectors.

The European railway system has lost considerable market share to road traffic, in particular private cars (which are not considered in this chapter) and air transport over the last decade. It remains, however, a significant transport service for both long and short distances, passengers and merchandise. In the face of increased competition from other modes of transport, railway companies have restructured their operations over the last several years which has both reduced costs and the level of employment which now numbers 1.1 million people (compared to 1.3 million in 1980). Railways have made some progress in adapting rail services to changing market

needs by introducing synchronized traffic scheduling to facilitate connections and higher-speed trains. Competition from the other transport services, however, will continue to pressure the railways to undertake further improvements and has already led to projects such as the Channel Tunnel and plans for a high-speed European rail network.

The organization of regional and local public bus transport generally depends on the legal and administrative system of each Member State. In most European countries (Belgium, Denmark, France, Greece, Ireland, Luxembourg, Spain, the United Kingdom), this type of transport is provided by a mixture of public and private operators. In the Federal Republic of Germany, Italy, the Netherlands and Portugal, all operators are municipally or State-owned. Political decisions are thus an important factor in the level of funding and the provision of service but technological developments (such as transport road information, road safety) are gaining more and more importance.

The road passenger transport sector (buses and coaches) is characterized by small operators although large companies dominate work in the international market. The degree of regulation of coach services varies from State to State although the European Community regulates international coach services. Coach transport has experienced strong growth in recent years mainly as a result of technical improvements and lower prices. EC proposals to simplify administrative procedures and to reduce frontier bureaucracy and delays will increase liberalization and competition and provide a setting for further growth opportunities.

Merchandise road transport is organized by bilateral agreements between Member States and by Community measures. The sector is still highly fragmented and is composed of a large number of small companies. A movement towards a higher level of cooperation or concentration between enterprises has recently been observed but on a limited scale.

The inland waterway transport sector is dominated by a large number of private operators having in general only one vessel. There are however some big ship owner companies with 20 to 100 vessels, mainly operating on the Rhine. The restructuring of this sector which started some years ago, continues. Small, old boats have been replaced by bigger, more modern units which operate with short turnaround times with the result that the overall capacity of the fleet has improved. The sector is still experiencing an excess in capacity of about 20% because of a slowdown in demand and higher productivity levels. In

order to solve this problem of overcapacity, the EC has introduced measures to coordinate national scrapping schemes and to restrict the number of new vessels being brought into service.

Civil aviation functions in accordance with a set of international rules established by the Chicago Convention of 1944 (namely the fundamental principle of national sovereignty), but also with numerous other multilateral and bilateral agreements. Cooperation at the government level exists with such organizations as the ICAO (International Civil Aviation Organization), the ECAC (European Civil Aviation Conference) and Eurocontrol. The most important cooperation between scheduled airlines, however, takes place with IATA (International Air Transport Association), which covers 72 airlines in 80 countries. The majority of the airlines in the EC are owned either wholly or partially by the State. Six large scheduled carriers in the Community are among the 20 largest airlines in the world.

Throughout the 1980s, strong growth has been recorded in the volume of airport traffic in terms of both passengers and freight. This growth, however, has been directed towards hub airports and away from regional airports. The existing airport infrastructure, however, cannot support further growth and indeed, delays as a result of capacity constraints are already increasing airlines' costs and reducing the efficiency of airline traffic.

Risks and opportunities

The example of the deregulation in the US transport sector which began in the late 1970s shows that increased competition leads to higher capacity utilization rates, lower prices and better service. EC directives to reduce the level of protectionism in the transport sector coupled with reduced barriers in general to the flow of people, goods and services within the 12 Member States should produce similar results in Europe.

By 1992, all quantitative restrictions on land transport should be removed. These restrictions often take the form of licences, such as those imposed by the Federal Republic of Germany, the Netherlands, France and Italy, which permit companies to operate in a national market. The most important change to come is probably the authorization of cabotage which will enable non-resident hauliers to enter a Member State's national transport system under the same conditions as resident hauliers.

In the air transport sector, the Commission agreed in 1987 on a package of restrictions on inter-airline and government accords on price fixing, tariff and capacity sharing, for a three-year period ending in April 1990. The Commission's second phase of deregulation should then come into force. This will include a limitation of governments' power to block fares, a relaxation of traffic-sharing rules (the first stage was the fixation of a share of 40/60 of traffic between one country and the other Member States), the introduction of cabotage (the ability of a transport service from one Member State to offer services on routes between other countries), and increased competition. In April 1989, the European Court of Justice ruled that the Commission can use EC competition rules to challenge the fixing of tariffs on routes between Member States and airports outside the Community and to internal routes inside individual EC countries.

Outlook

Merchandise transport is forecast to grow by at least 50% from now until the end of the century. Prospects for both short and long-distance transport are good and the single market will offer new opportunities, not only for goods transport, but for passenger transport also. It is thus very likely that competition will intensify in the future between the different means of transport both on short and long distances. Reduced barriers to trade in goods and services within the Community and the deregulation of transport services will both play a fundamental role in the growth of this sector.

To take advantage of the opportunities in increased passenger and freight traffic, railways need to improve productivity, expand rail techniques, diversify transport options and generally improve the services offered. International cooperation will play an increasing role, especially in the development of a high-speed train network. The proposals of the EC Commission to harmonize and modernize the rail

network will certainly be of considerable importance.

For road passenger transport, the introduction of cabotage and the possibility for operators from any Member State to run services between any other Member States will intensify competition and offer new opportunities for the most efficient operators. Community proposals to introduce a star rating system of coach services will improve standards and increase the attractiveness of coach transport. Reduced delays at frontiers, more comfortable coaches and further technical improvements in the vehicles should lead to an increased growth in coach services in the Community.

Deregulation of the regional and local bus transport systems came into force in the United Kingdom in 1985 and has produced a better quality service in addition to reducing subsidies. Within the Community in general, there is a trend toward the freeing of constraints and the encouragement of more private financing of services.

In the air transport sector, the EC Council of Ministers adopted, in 1987, a first set of measures covering the access to the market, tariffs, capacity and application of the competition rules of the Civil Aviation Treaty. The second step should lead to a decrease in government intervention in the fixation of tariffs and flight authorization. A study published in *The Economist* in 1986 concluded that an increase in competition in the EC could mean tariff reductions of 15 to 20%. In general, prospects are good for airline companies, in particular in Ireland and Portugal. The creation of the Channel Tunnel will bring more competition for certain links with the United Kingdom. The traffic of passengers and volume of freight is, however, still limited by the capacity of the existing infrastructure of airports. Competition between airports will thus probably focus on the quality and flexibility of the services offered.

DRI Europe

RAILWAYS

(NACE 71)

Summary

Railways always provide significant transport services, both for long and short-distance travellers and for merchandise and goods. Because of heavy competition with road and air systems since the 1960s, railways have not maintained their volume of goods transport, despite appreciable efforts in productivity and rationalization. The volume of passenger traffic has on the other hand remained broadly stable. Thus, so far, railways have not been able to take advantage of growth in this sector over the past three decades.

A growing awareness of road hazards and concern for the environment may however constitute an opportunity for the railways, if the latter sector is able to

meet the challenge, in particular by continuing its modernization.

Current situation

Tables 1 and 2 show the development of goods and passenger traffic since 1979. Table 3 shows the length of the rail network. Even though the surface, population and transport relations structure in the United Kingdom and Italy are roughly equivalent to those of the Federal Republic of Germany track length, approximately 16 000 km in England and Italy, is about 70% greater in Germany (approximately 27 000 km). France has approximately 34 000 km of track.

Table 1
Railway goods traffic

(Million tonnes)	Network	1979	1980	1981	1982	1983	1984	1985	1986	1987
Belgium	SNCB/NMBS	74.3	71.5	70.0	62.7	63.6	84.3	72.7	63.3	64.2
Denmark	DSB	6.8	6.5	6.1	6.8	6.8	6.9	7.4	7.4	7.2
FR of Germany	DB	324.2	318.0	303.4	278.5	270.4	28.9	293.5	277.2	269.3
Greece	OSE	4.1	3.6	3.0	2.6	3.5	4.0	4.2	4.1	3.8
Spain	RENFE	34.5	34.8	33.1	30.8	29.9	39.4	30.1	29.4	28.7
France	SNCF	223.2	219.4	196.2	183.1	174.3	175.6	160.4	144.5	140.8
Ireland	CIE	3.8	3.6	3.7	3.6	3.3	3.4	3.4	3.1	3.0
Italy	FS	54.4	56.3	51.0	49.3	49.3	54.4	52.8	51.7	54.5
Luxembourg	CFL	18.7	17.4	15.1	13.8	13.0	15.6	15.9	14.6	13.0
Netherlands	NS	21.8	22.1	21.1	18.2	18.0	19.9	20.4	19.1	18.6
Portugal	CP	3.4	3.7	3.7	3.9	4.5	5.5	4.7	5.3	5.7
United Kingdom	BR	170.6	154.7	155.1	142.6	145.8	97.6	N/A	138.9	139.5

Source: UIC (Union Internationale des Chemins de fer), Paris.

Table 2
Railway passenger traffic

(1 000 passengers)	Network	1979	1980	1981	1982	1983	1984	1985	1986	1987
Belgium	SNCB/NMBS	163 041	163 710	166 827	162 575	155 521	149 902	150 308	139 113	142 242
Denmark	DSB	116 467	130 413	135 824	135 169	133 384	133 975	144 496	145 241	145 764
FR of Germany	DB	1 026 823	1 107 136	1 110 284	1 069 437	1 066 297	1 047 796	1 047 883	1 023 016	994 221
Greece	OSE	10 425	10 136	10 387	10 148	11 285	10 989	11 156	11 729	11 777
Spain	RENFE	156 600	167 200	176 300	181 700	186 600	192 500	197 500	194 000	190 300
France	SNCF	676 449	675 690	687 032	704 218	725 863	745 378	767 173	768 998	772 990
Ireland	CIE	17 886	16 654	15 374	12 813	13 027	15 560	20 090	21 735	24 895
Italy	FS	385 796	381 412	395 758	380 302	409 247	385 516	364 039	393 200	294 200
Luxembourg	CFL	11 091	11 269	11 633	11 817	11 274	10 863	10 852	10 638	10 457
Netherlands	NS	186 467	197 225	204 707	207 633	200 360	202 881	206 423	210 492	221 989
Portugal	CP	210 657	224 191	213 379	210 696	207 961	214 646	221 517	224 479	227 996
United Kingdom	BR	736 221	760 192	718 488	630 110	695 200	857 200	685 900	689 400	727 200

Source: UIC (Union Internationale des Chemins de fer), Paris.



The railways of Germany are first in transporting goods with approximately 270 million tonnes in 1987, followed by the SNCF (France) and BR (United Kingdom) with approximately 140 million tonnes, the SNCB (Belgium) with approximately 64 million tonnes, the Italian rail system (FS) with only 54 million tonnes, and Spain (RENFE) with approximately 30 million tonnes.

Table 3
Length of network's lines, 1987

(km)	Network	Length of lines
Belgium	SNCB/NMBS	3 568
Denmark	DSB	2 476
FR of Germany	DB	27 421
Greece	OSE	1 565
Spain	RENFE	12 667
France	SNCF	34 448
Ireland	CIE	914
Italy	FS	15 983
Luxembourg	CFL	270
Netherlands	NS	2 809
Portugal	CP	2 479
United Kingdom	BR	16 630
EC 12		121 230

Source: UIC (Union Internationale des Chemins de fer), Paris.

The Federal Republic of Germany's DB was also first in passenger traffic with almost 1 billion passengers in 1987, followed by the SNCF (0.77 billion) and BR (0.73 billion). The FS carried approximately 0.3 billion passengers, followed by the Portuguese, Dutch and Spanish railways with approximately 200 million passengers per network.

A growing awareness of road hazards and concern for the environment might be a chance for railways, enabling them to meet future challenges such as the single European market. Nevertheless, railways must pursue modernization, an aspect somewhat neglected in the past; new lines, only partly completed, must be constructed; and services must become better adapted to market needs. Likewise there is a need for greater concentration, especially of rail consignments, in large quantity long-distance haulage, and in combined road-rail traffic. Supplementary measures to harmonize competition with other means of transport are also needed, and the financial situation of railways must be put in order.

Technological developments

The railway of the future will be essentially computerized. The use of electronic means will be a decisive change in technical quality, but also in managing production and integrating logistical functions. Work currently under way in data transmission (Hermes, electronic data transmission network to anticipate train composition) and the Docimel (electronic goods transport document transmitted before the load's arrival) are just two examples.

Passenger transport

The passenger market should continue to grow in all directions: business trips, leisure activities, holidays.

It is also generally recognized that trains will play an important role in serving heavily urbanized areas. Borrowing an idea from the airlines, rail networks are organizing connections around major hubs and concentrating efforts on the quality of services provided to major destinations. Most railways have adopted synchronized traffic scheduling to facilitate connections.

The swift progression of deregulation in Europe has led rail networks to renew the range of services they offer international travellers.

In 1987 the railways decided to launch the Eurocity programme. This label now applies to 64 international passenger trains serving a total of 200 European cities. Thanks to Eurocity the number of passengers has increased by 20% on trans-European lines.

SNCF, for example, took an initiative in this direction when in 1988 it reached an agreement with neighbouring railways to extend reduced 'joker card' rates to 13 European destinations in a bid to compete with charter airlines.

New horizons are also opening up in the night-train market, thanks to high-speed trains and construction of the Channel tunnel, which will allow voyagers to cover long distances overnight.

Goods transport

The growth in long-distance traffic volumes will require reliable and complete services.

The European Community networks have focused efforts in four areas:

- increasing the speed of commercial transport between economic centres;
- controlling routing quality and reliability;
- information systems;
- flexibility in the choice of transport means.

1988 was favourable to the development of accelerated goods traffic. The SNCF extend its Chronofret connections to 160km/hr and the networks are aiming to reach conditions for 100km/hr minimum speed.

Railways are also aware of the importance of common management of international products. Plans by a group of railways to market the transport of new automobiles are now being implemented and should be finalized in 1989.

Combined transport

'Piggy back' (complete road vehicle, trailer or swap body)

In the past 10 years intra-Community piggy-back transport has quadrupled, thus showing that piggy-back transport offers a genuine alternative to road transport over long distances. Although international combined transport is expanding faster than domestic, it should not be forgotten that 60% of all piggy-back traffic is domestic, mainly in the Federal Republic of Germany, France, and Italy. With reference to all types of traffic, today 4 000 road units are transported by piggy-back every working day over an average distance of 900 km in international and 600 km in domestic traffic. In other words, more than a million consignments were recorded in 1988, compared to 0.4 million in 1979.

Containers

International container transport by rail showed only moderate growth over the period 1979-88. This is mainly due to a slight decline in the period 1980-83. A steady growth resumed from 1983 onwards.

In the same period container transport by inland waterway, in particular on the Rhine, expanded very rapidly. In 1979 68 000 TEU were transported by inland vessel on the Rhine. Ten years later the volume had roughly quadrupled and is currently estimated at more than 250 000 TEU.

Alpine transit

The total of north-south transport over the Alps increased from around 27 million tonnes in 1970 to around 56 million tonnes in 1985. The railways raised their volume from 21.6 million tonnes to 25.9 million tonnes but their market share fell from 81 to 46%, whereas road transport climbed from 5 to 30 million tonnes in the same period. Around 6 million tonnes are currently transported across the Alps by piggy-back transport, which is around 17% of road traffic. A further growth of combined transport would offer general social benefits. In particular, it would contribute to a solution of environmental spoilage. However, combined transport is a commercial transport activity in open competition with the other modes of transport. Nevertheless, state subsidies may be forthcoming with reference to investments in combined transport infrastructure and terminals and operating costs in the case of combined-

Figure 1

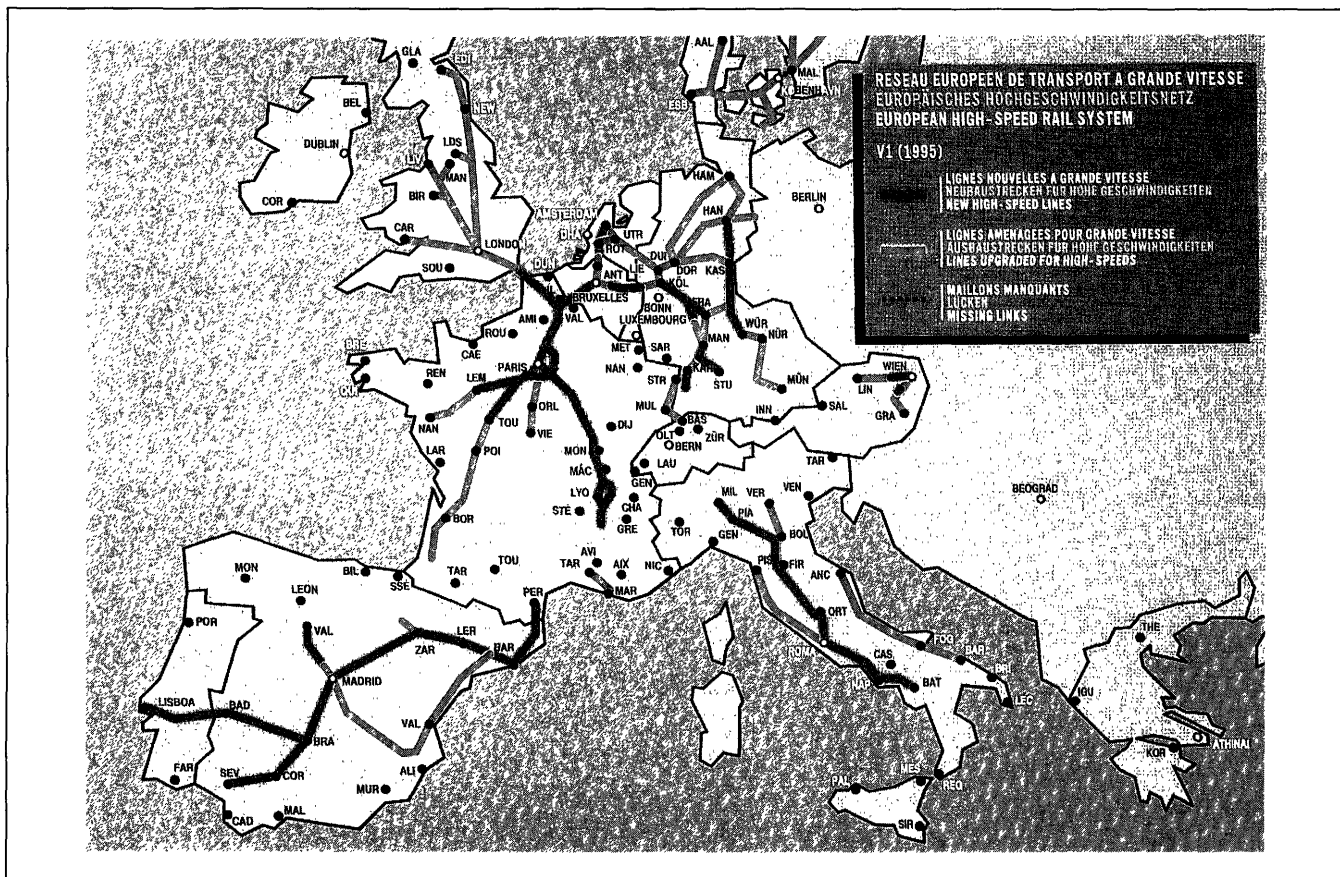


Figure 2

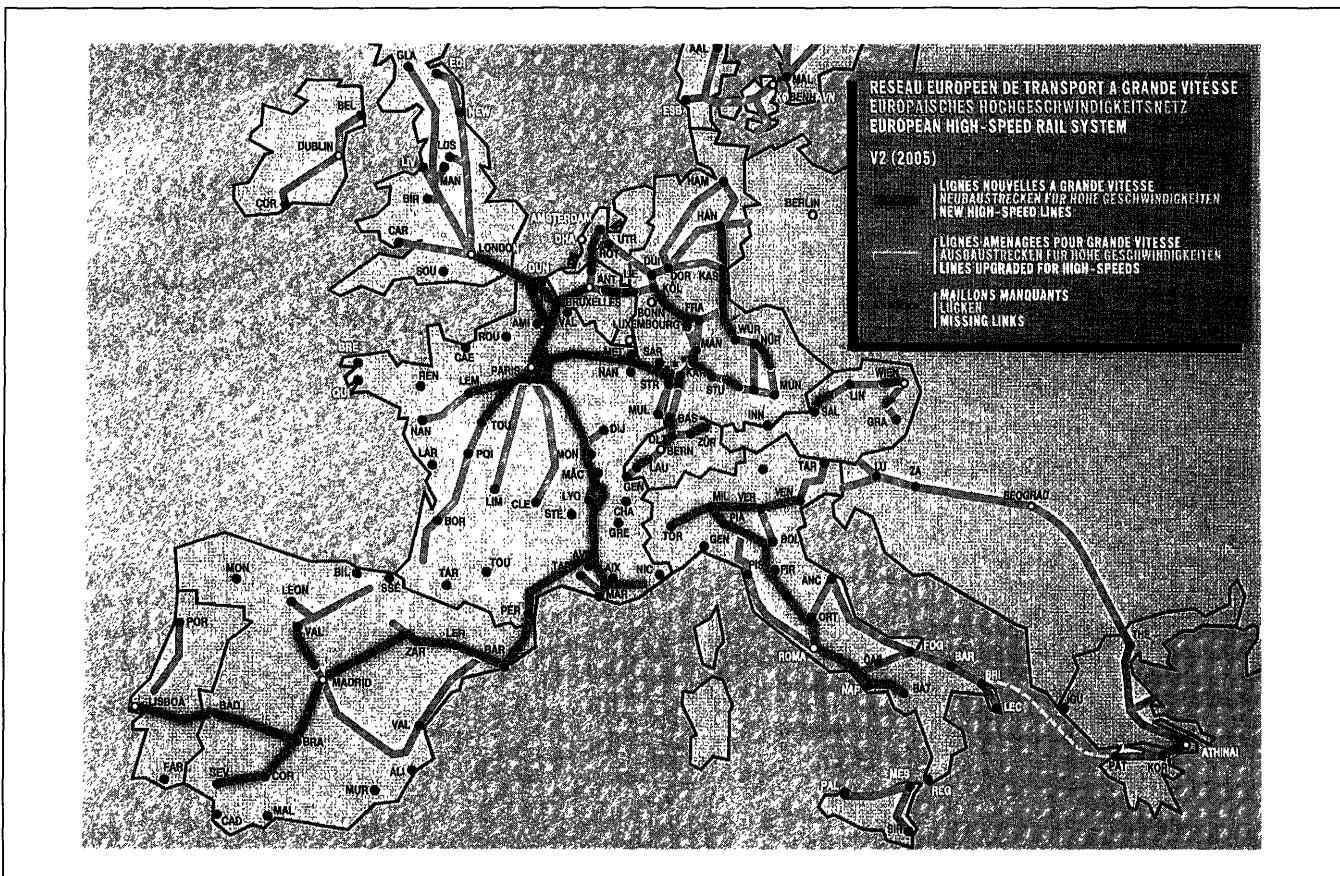


Table 4
Personnel: Annual average personnel

	Network	1979	1980	1981	1982	1983	1984	1985	1986	1987
Belgium	SNCB/NMBS	61 921	65 652	67 533	66 346	63 660	60 933	57 964	55 193	52 848
Denmark	DSB	21 200	22 110	22 726	22 832	22 541	22 154	21 635	21 437	21 736
FR of Germany	DB	336 923	328 980	324 871	317 475	307 246	295 554	283 356	272 790	262 414
Greece	CH	12 472	12 140	12 118	13 118	13 026	13 416	15 048	14 596	14 525
Spain	RENFE	72 156	71 547	71 787	73 498	75 322	72 076	66 440	66 509	60 745
France	SNCF	258 904	254 200	248 497	252 421	252 200	248 349	242 091	233 404	222 426
Ireland	CIE	17 925	18 052	18 040	17 809	16 930	16 285	15 628	15 000	14 016
Italy	FS	220 435	220 655	224 536	223 686	223 939	220 593	216 128	214 947	215 571
Luxembourg	CFL	4 165	4 216	4 158	4 031	3 928	3 827	38 000	3 785	3 710
Netherlands	NS	26 283	26 876	27 783	27 626	27 236	26 650	26 839	27 474	27 381
Portugal	CP	25 756	24 704	23 994	23 504	23 360	22 388	21 749	21 433	21 257
United Kingdom	BR	243 674	241 882	234 205	220 370	207 097	190 046	178 420	171 400	161 188
EC 12		1 301 814	1 291 014	1 280 248	1 262 716	1 236 485	1 192 271	1 183 298	1 117 968	1 077 817

Source: UIC (Union Internationale des Chemins de fer), Paris.

transport-transiting third countries, notably Austria and Switzerland.

order to achieve greater autonomy of management through sectorization of activities.

Employment and productivity

Measures taken by the railways to improve productivity have largely consisted in heavy redundancy of employees (see Table 4). In order to cope with new needs, the Community railways have decreased their staff by about 1.3 million, to about 1.08 million. The greatest reduction in personnel was made by British Railways (approximately 34%), followed by DB with 22%. Staff was slightly increased in the Greek, Dutch and Danish railways only. In addition to specific measures taken by each rail network to reduce costs, certain multilateral actions will improve the situation of international traffic. The freight sector centred around several orientations:

- developing methods for operational management;
- using computerized systems;
- setting up compatible installations.

The need to accelerate complete wagon transport led to a re-examination of the shunting networks used in international traffic. The objective is to achieve true rationalization in order to improve routing times, equipment rotation, and service reliability.

Organization of the sector

A railway is now assimilated more to an enterprise than to an administration. This evolution is demonstrated by changes in status and organization in

Compensation by Member States

The Member States grant financial aid to railways under Community legislation, drawn up on the basis of the harmonization decision of 13 May 1965 (65/271/EEC) with the aim of weaning the railways off Community funding. Financial aid can be granted for several motives: compensation for services provided by railways in their public service capacity (69/191/EEC); unfair competition, especially in view of the social benefits railways offer their employees (69/1192/EEC); compensation for costs of infrastructure which railways, unlike other transport systems, must maintain alone (10/1107/EEC and Council Decision 75/327/EEC on stabilizing the railways' finances). The amounts paid by Member States to the railways are given in Table 5.

Table 5
Subsidies allowed by Member States to railway companies, 1987

(Billion ECU)	Company	Offset
Belgium	SNCB	1.3
Denmark	DSB	0.4
FR of Germany	DB	6.6
Greece	OSE	0.1
Spain	RENFE	1.8
France	SNCF	5.1
Ireland	CIE	0.1
Italy	FS	7.5
Luxembourg	CFL	0.2
Netherlands	NS	0.8
Portugal	CP	0.1
United Kingdom	BRB	1.1

Source: Commission of the European Communities, DG VII.

The contributions of the Member States, including capital grants, are an important financial resource because of the services railways provide their States.

Developing the infrastructure

International cooperation

The current tendency of national economies to become integrated in an increasingly complex tissue of international relations of cooperation and competition points towards higher levels of traffic; transports of merchandise are forecast to grow at least 50% from now until the end of the century.

European railways are aware of the fact that their future largely depends on international traffic. If they are to participate in this expected growth, the railways will have to become more efficient and improve productivity, routing quality, and services offered to their clientele.

Unlike their road, sea, river or air competitors, there is little competition among railways themselves. They nevertheless do have the possibility of reaching agreement on all types of cooperation since they are free to set up the most appropriate structures catering to common interests.

The opening of the single market in 1993 will gradually generate an increased need for transport both of passengers and goods.

Furthermore, as certain road corridors become saturated and air space and air terminals become congested, there will be a greater need to diversify transport options by expanding rail techniques and improving their environmental protection.

Railways hope to offer concrete and efficient solutions; they are renovating their services in a vast programme that will unfold over the next 20 years.

European high-speed networks

Because of its geographical, human, and economic characteristics, Europe is the ideal terrain for high-speed trains. The major routes and destinations are clearly established and Germany, Italy, France, and the United Kingdom have installed purely national high-speed lines along these routes. Similar projects are under way in Denmark, Spain and Portugal. All these countries have corresponding multi-annual programmes to ensure they have equipment that is on schedule and that meets their internal needs. On this subject, it is worth mentioning the decision by

Spain and Portugal to adopt the standard track gauge (1.435 m) for their new lines.

In addition to adjacent national projects, the railways have also understood the advantage in completing a high-speed network with a European dimension, and expanding it into Switzerland and Austria. Some trans-European projects are already under construction, such as the Channel tunnel, the London-Paris-Brussels triangle by TGV Northern Europe. Others are clearly logical conclusions, such as extensions by the same TGV North to the north and east of Brussels, although these plans have been hampered by problems of financing due to insufficient profit rates. This is also the case for the Paris-eastern France to south-west Germany project. We should also mention the connections needed to integrate the Iberian network into the European network, Scandinavian links, the Lyons-Turin connection, and need for an efficient Alpine transit through Switzerland and Austria.

When completed, this network will be composed of 30 000 km of track. This will gain a considerable amount of travel time; passengers will be able to reach their destinations in less than half the time over the best-equipped corridors. Overnight routes over long distances will complete the network. This is also forecast to increase traffic fourfold over the next 25 years.

The combined transport network

This system will create a truly long-distance network for goods transport through the use of combined non-accompanied transport techniques, the only economically viable solution entailing large economies in road haulage.

The network will be composed of at least 30 routes. Investments will be made in infrastructures to offer uniform passage gauges, efficient terminal equipment cutting transfer time to a minimum and, lastly, rolling stock specialized in this type of traffic.

Peripheral networks

The Community effort to align the characteristics of Member State networks will stimulate particular activities to modernize some networks. Priority sectors concern electrification, signalling and telecommunication system installations, and renewing rolling stock.

Conclusion

The 22 May 1985 judgment by the European Court of Justice called for liberty in services rendered in the transport sector as well. This also implies opening rail infrastructures for use by any other authorized transporter, already existing or new, throughout all the Member States. The Community policy to separate infrastructure and exploitation, already justified in order to harmonize competition among the various means of transport, will then be

of even greater necessity. Lastly, there are plans to give railways autonomy and true commercial management, to allow them the freedom to operate under market conditions. There is no doubt that Community proposals to harmonize and modernize the rail network will place these companies in a privileged position to meet the challenges of the single European market in long-distance transport.

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ROAD PASSENGER TRANSPORT

(NACE 722)

Summary

The road passenger transport sector is highly diversified, varying greatly from one Member State to the other, and consisting of some very large operators but a majority of small ones. The medium and larger operators tend to work more in the international market due to the increased complexity of international operations.

In some Member States, governmental or semi-governmental organizations play a role in long-distance transport. Thus Deutsche Touring, a subsidiary of the German railways, has an important part of the market in Germany while in Spain Enatcar, which is a similar type of organization, has recently been established to take over, amongst others, services previously run by the railways.

Amongst all modes of inland passenger transport in the major industrialized countries of the world, coach and bus transport occupied some 10% of the market, as compared with 10% also for the railways and 80% for the private car. Proportionately, coach and bus transport has a larger market share than rail traffic within the European Community.

services are basically tourist services. International regular services are subject to similar rules to national regular services (timetables, set routes and prices). There is also a sub-category known as special regular services, which mainly consists of the carriage of employees to their place of work, and carriage of school children. Special regular services are principally cross-border ones in frontier areas. Only international occasional services are free from the requirement that prior authorization must be obtained to run the service, from the States of departure, destination and often the States in transit. In national coach transport, the categories of service vary from country to country and within certain States, e.g. in the United Kingdom there is no category of shuttle services.

The degree of regulation of coach services varies greatly between Member States. Certain Member States, such as the United Kingdom, have a very free system, where basically only qualitative controls govern whether a service should operate. The Netherlands also has a relatively liberal system. On the other hand, in Spain, the 1987 LOTT legislation (law governing land transport) lays down very detailed provisions governing all road passenger transport.

Community legislation

European Community legislation establishes three types of international coach services: occasional, shuttle and regular services. Occasional and shuttle

Current situation

Coach transport has seen a considerable growth over recent years, particularly in the long-distance and

Table 1
Stock of buses and coaches

	1970	1975	1980	1981	1982	1983	1984	1985	1986	1987
Belgium	16 169	19 553	19 560	18 948	18 744	17 866	17 170	16 817	16 449	16 095
Denmark	5 039	6 061	7 351	7 620	7 785	7 762	7 836	8 010	N/A	N/A
FR of Germany	47 253	59 967	70 458	71 152	71 331	71 259	70 279	69 388	69 345	70 214
Greece	10 546	13 352	18 011	18 493	17 701	17 591	17 841	18 237	18 485	18 748
Spain	N/A	N/A	42 631	43 303	42 996	43 759	41 161	41 593	41 874	43 002
France	41 000	52 000	65 000	66 000	69 000	68 000	71 000	71 000	72 000	N/A
Ireland	2 012	2 413	2 722	2 844	2 955	2 949	3 107	3 295	3 422	3 521
Italy	32 899	43 825	58 149	62 168	66 688	71 017	71 981	76 296	77 891	N/A
Luxembourg	580	682	647	670	696	687	704	695	693	701
Netherlands	9 500	9 800	11 200	11 400	11 500	11 600	11 500	11 550	11 530	11 480
Portugal	N/A	N/A	8 489	9 022	9 847	10 217	10 355	10 439	10 631	10 827
United Kingdom	79 240	82 190	78 291	76 593	74 963	74 928	74 992	74 743	76 268	78 200
EC 12	N/A	N/A	382 509	388 213	394 206	397 635	397 926	402 063	N/A	N/A

Source: Eurostat.

Table 2
Buses and coaches: passenger transport

(1 000 million passenger-km)	1975	1980	1986	1987	87/86 (%)
Belgium	3.2	3.1	2.8	2.7	-3
Denmark	5.7	7.4	9.0	8.7	-3
FR of Germany	58.7	65.6	53.1	52.9	0
Greece	4.8	5.8	5.0	4.8	-5
Spain	26.9	28.1	33.5	38.0	13
France	28.9	38.0	39.8	39.6	-1
Italy	42.3	57.8	70.5	73.4	4
Netherlands	10.3	12.2	12.1	11.9	-2
Portugal	5.2	7.8	8.3	8.3 (1)	
United Kingdom	55.0	45.0	41.0	41.0	0
EC 10	240.9	270.9	275.1	281.3	2

(1) 1986 data used again for 1987, since 1987 data are not available.

Source: European Conference of Ministers for Transport, 'Trends in the transport sector 1980-87'.

international sectors. This has been caused by technical improvements in design, providing a speedier and more comfortable means of transport, together with the generally lower price levels than alternative modes. In 1987, it is estimated that coach transport increased by 2.4% in Western Europe. Since this figure includes public transport which has not generally seen an increase, the real figure for long-distance and international coach transport alone is more likely of the order of 5%.

Overall in the Community the growth in the number of vehicles engaged in road passenger transport was some 5.1% between 1980 and 1985.

The usage of buses and coaches per Member State and the number of passenger kilometres run are shown in Tables 1 and 2.

Table 3 indicates the changes that have taken place in each Member State in the use of buses and coaches, the modal split and availability of type of bus and coach transport. It will be seen that in some countries there have been major increases in coach transport since 1975 (107% in Italy and 77% in France), whilst in other countries there have been decreases (United Kingdom 24%). These figures reflect the trends shown in Table 2. Major increases in some States and decreases in others are a reflection of the different national situations, especially as regards public transport.

Although the overall number of enterprises engaged in road passenger transport in the Community is not known, Table 4 gives indications for certain Member States.

Table 3
Modal split of passenger transport — train, car and bus
The share of buses and coaches, 1985 (1)

(%)	Share	Share variation 1975-85
Belgium	11	-8
Denmark	15	66
FR of Germany	11	-9
Spain	19	15
France (2)	9	77
Italy (3)	22	107
Netherlands	8	16
Portugal	12	N/A
United Kingdom	9	-24

(1) Calculated on passenger-km.

(2) Public and private bus transport.

(3) National vehicles only.

Source: United Kingdom Department of Transport Statistics Bulletin (88)38.

Tourist services

The principal users of tourist services by coach are students and senior citizens, who do not have time constraints and to whom the prices offered by coaches, which are generally lower than those on other transport modes, are particularly attractive.

Table 4
Number of road passenger transport companies

	1975	1985
Belgium	754	689
France	2 989	2 928
Luxembourg	76	36

Source: International Road Transport Union.

Table 5 indicates the numbers of companies and coaches for the principal European Community States engaged in tourism.

Table 5
Number of companies and coaches in Europe (1)

	Number of companies	Number of coaches	Average number of coaches per company
Belgium	600	3 000	5.0
FR of Germany (2)	5 000	20 000	4.0
Spain (3)	9 000	26 000	2.9
France (4)	3 200	8 900	2.8
Italy	2 400	11 000	4.6
Netherlands	287	3 638	12.6
United Kingdom	3 500	24 000	7.0

(1) These figures are estimates for the period 1985-87.

(2) In Germany, some 1 200-1 500 companies run both coach services and other tourist activities together, of which 1 000 are large companies. The other remaining companies occupy themselves principally with regular and occasional services. In Germany, coach services are very much regionally based, only perhaps 15 companies operating throughout the entire country.

(3) Some 10 400 of these 26 000 buses run on internal regular services. Another 6 000 vehicles are used by tour operators who often own the company as well.

(4) In France, one-third of these coaches are based in Paris and the surrounding area, as the major national tourist area.

Source: Paper by Jacob Hofstra of Nationale Hogeschool voor Toerisme en Verkeer, Breda, 12/88.

The types of coach trip offered include holidays, study tours, and the carriage of immigrant workers. Spain is the most popular holiday destination for persons going abroad by coach. Thus 30% of German tourists travel there, compared with 18% of Germans who go to Italy and 12% to Austria.

Table 6
Means of transport used to go on holiday, in %, 1985 (1)

(%)	Car	Train	Air	Boat	Coach	Other
Belgium	77	6	10	1	7	2
FR of Germany	61	16	17	3	7	1
Spain	70	16	5	2	12	-
France	81	15	6	2	7	2
Italy	73	15	5	5	11	2
Netherlands	70	8	14	5	14	6
United Kingdom	59	11	24	8	14	-

(1) The total percentage is over 100% in certain cases, since several answers were possible.

Source: EC 1986, *Europeans and their holidays*.

On a European level, some 36 operators of international regular services are members of Eurolines. Through this organization they cooperate in arranging and publicizing their services, comprising

some 160 lines which cover distances from the United Kingdom to Greece and from Spain to the Netherlands. Another such organization is Euro-pabus which in Germany, is the parent organization of many coach lines.

Outlook

The advent of the internal market will lead to an opening up of the coach sector and new opportunities for operators, more jobs and more consumer choice. Thus, the Commission has made two proposals — one to introduce cabotage in road passenger transport, namely to enable non-resident operators to carry out passenger services temporarily within another Member State — a possibility which does not exist at present. The second proposal would enable operators from any Member State to run services between any Member States.

In parallel to this opening of the Community market, the Commission has proposed changes to the Community legislation governing international coach services to introduce a certain liberalization, to simplify procedures for obtaining authorizations, and to reduce the complexity of the documentation required for running services not subject to authorization. Another Commission proposal aims to abolish checks on the papers carried on coaches at internal Community frontiers. These measures should make it easier to establish and organize coach services, to reduce frontier bureaucracy and frontier delays and generally to make coach travel more attractive to the public.

In order at the same time to maintain high professional standards, a new Directive will come into force on 1 January 1990 which will strengthen the existing provisions for becoming a passenger transport operator. In particular, it lays down precise minimum financial requirements to ensure the viability of existing and potential operators and it makes the passing of a written examination obligatory for new entrants.

Community norms have been laid down for the dimensions of articulated passenger vehicles so that it is to be expected that their use will now increase in the Community. On longer journeys they are an interesting alternative to double-decker buses. A parallel development to opening the Community market which will be of great assistance in raising standards of coaches and in ensuring the transparency of the market, is the introduction of a system of star rating

for coaches. The International Road Transport Union (IRU) has set up and run this system, which operates in some Community States on a voluntary basis, except in Belgium where it is compulsory. The number of stars awarded to a coach indicate to the tour operator and potential customer the quality of a coach. The system has also had the effect of raising standards of vehicles. Thus, in Belgium, since 1986 the number of coaches meriting three stars has risen from 11% to 22% of the coach fleet and for those with four stars from 0.5% to 3.3%.

To conclude, the overall outlook for long-distance and international coach transport is good. The open Community market, some liberalization of the sector, easier passage across frontiers, more comfortable, speedier coaches with extra amenities such as refrigerators and videos, and technical improvements to vehicles should lead to a continued healthy growth in the sector.

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REGIONAL AND LOCAL BUS TRANSPORT

(NACE 721)

Summary

There are at least 300 operators running fleets of more than 50 vehicles within the European Community. Demand for public transport has generally diminished throughout the western world with the exception of countries such as Denmark and Canada. The reasons for this reduction are greater car ownership, fewer persons of school age, the removal of urban populations to the suburbs and further out and the shorter journey time, plus the convenience of a car. It has been estimated that outside towns and cities the modal share that buses have of regional public transport is some 5%, with towns and cities included the share is 10%, and, if only transport in urban areas is taken into account, its share goes up to 20%. No increase is expected at present in these percentages.

Organization of the sector and regulatory environment

The organization of regional and local public transport by bus depends on the Member State and its legal and administrative system. Thus some systems are run by local government itself or by companies owned by them. Other systems are organized by companies in central government ownership, city councils or groups of city councils and by privately owned companies operating under franchise from local government, e.g. Spain, France, Ireland and the United Kingdom. In some cases, a service is operated partly by a private and partly by a public authority.

The purpose of regional and urban transport is firstly as a public service to aid the mobility of the public, in particular those persons without access to a car, the elderly, handicapped and children; to reduce traffic congestion and bring environmental benefits, as well as to reinforce regional economies. Public authorities thus are considered to have an obligation to provide and finance public transport as necessary. As a counterpart, they control routes, timetables and fares.

Position in individual Member States

Belgium

There are 11 bus and coach operators in Belgium with a fleet size of over 50 buses and coaches. Of these, seven are in public ownership under the overall control of the Ministry of Communications and the remaining four operators are in private ownership. The publicly owned operators provide services under franchises administered by the Ministry of Communications. The largest operator, SNCV/NMVB, which provides urban and inter-urban services within Belgium, both directly operates vehicles and also contracts private operators to run services on its behalf. These 'contractors' are small privately owned operators with an average fleet size of less than 10 vehicles.

Denmark

There are five publicly owned bus operators in Denmark with a fleet size above 50 buses and coaches. Other operators are small private companies who provide charter coach services and some bus services under contract. In the Greater Copenhagen area, bus services are provided directly by a department of the Greater Copenhagen Council which has 1 240 buses, or under contract to other operators, including Danish State Railways and small private enterprises. Licences to operate services within the region of Greater Copenhagen are granted by the Traffic Committee of Greater Copenhagen Council.

Outside Copenhagen, local authorities (county councils) have responsibility (in terms of planning, procurement and subsidy payment) for public transport provision. They can choose either to operate their own services (as a municipal department) or purchase services from private operators or Danish State Railways under contract.

France

There are some 46 bus and coach operators that have been identified in France with a fleet size of over 100 buses and coaches. Two operators are municipally owned (Marseilles and Metz), RATP in Paris is a State-controlled corporation, and the remainder are either private companies or under a mixture of

public and private ownership. Three large private groups (Transexel, Transcet and CGFTE) operate the franchise for public transport services in a number of large cities.

Specific authorities have been established, AO's (Autorités organisatives), with the powers of local government but limited to public transport. Public transport in France has one special characteristic, namely in urban areas the AO's have the power to raise funds by means of a transport tax (Le versement transport) paid by companies on the basis of their payroll, as has been done in the Paris region.

Bus and coach services are provided under a contract to the relevant AO and are in effect a form of franchise. The contract specifies the services to be provided and fare levels, and divides the responsibilities between the operator and the AO. As for intercity bus services, the majority of such services are provided by private operators.

Germany

There are some 44 operators in Germany with a fleet size of over 100 buses and coaches. The majority of urban bus operators are in various forms of municipal ownership, some being a municipal department and others a municipal company.

Public transport services are regulated by the 'Personenbeförderungsgesetz' — Public Transport Act. The Federal Government has delegated the administration of this Act to the *Länder*, who are therefore responsible for the regulation of services. There is a trend not to consider licences separately but as networks or part of networks. Licence holders are free to subcontract services to private operators.

In the highly populated urban areas (such as Frankfurt and Hamburg) transport authorities ('Verkehrsverbunde') have been established. These authorities have responsibility for setting fare levels and also undertake the planning of services.

Greece

There are two government-owned bus operations in Athens. Most bus services outside Athens are run by private owner/drivers operating through cooperative associations (KTEL) of which there are about 50 throughout Greece. In Athens the government controls fare levels. Outside Athens, bus service licensing is undertaken by the administration of the Prefecture. Greek law requires that licences be granted to the KTEL cooperative associations of which there is one for each Prefecture. KTEL asso-

ciations are responsible for both urban and inter-urban services. There is a separate licensing procedure for charter coach services, whereby licences are issued by the National Tourist Organization of Greece, with vehicle safety being the responsibility of the Ministry of Transport.

Ireland

The State-owned transport holding company Coras Iompair Eireann (CIE) was reorganized under the Transport (Reorganization of Coras Iompair Eireann) Act 1986 into three separate divisions, these being Irish Rail, Irish Bus and Dublin Bus. Irish Bus operate urban and inter-urban bus services outside Dublin. Dublin Bus provide bus services in the Dublin area. Irish Bus and Dublin Bus provide the vast majority of bus services in Eire, but there are also a number of small private operators. The Department of Tourism and Transport is responsible for the payment of subsidy, the setting of maximum fares to be charged, and the licensing of bus services. Bus service licensing is governed by the Road Transport Act 1932 (as amended). However, Irish Bus and Dublin Bus are exempted from the requirements of this Act. Private operators are required to apply for permission to operate a service.

Italy

A total of 31 operators have been identified in Italy with a fleet size of 100 or more buses and coaches. Most operators are in local authority ownership, in the form of city councils ('comune'), consortia of city councils, or provincial authorities ('provincia'). Communal and provincial authorities have had power since 1925 to 'municipalize' public transport in their areas. Municipal operators are exempt from service licensing and appear to operate on the basis of an exclusive concession. Where a service operates within one commune the relevant licensing authority is the local council, but the provincial government takes on this role where services connect two or more areas.

Luxembourg

There are three operators of bus services in Luxembourg, of which the largest operator is local authority owned; there are also inter-urban bus services operated by the State-owned railway company. It would appear that operators are provided with exclusive franchises. The conditions relating to the granting of permits and of authorizations for operating regular road passenger transport services are

governed by Grand Duchy regulations and Ministry Orders.

The Netherlands

There are 25 operators in the Netherlands with a fleet size of 50 or more buses and coaches. Of these, nine operators are municipally owned, operating urban bus services, and 14 are regional bus companies owned by the government, largely providing inter-urban bus services. The majority of municipal operators are run as a department of the local city council. A recent law provides for the possibility of competition between operators. An operator can now apply for a licence to operate a route that may or may not compete against an existing operator. A licence will be granted if the operator can demonstrate that the service can be run without subsidy.

Portugal

There are five major operators providing bus services in Portugal. Of these, three are municipally owned and two are government owned. Inter-urban services are provided by the government-owned Rodoviaria Nacional EP. Licensing of services is regulated by local government for urban services and by the Ministry of Public Works, Transport and Communications, which also regulates fares.

Spain

There are 16 major operators, of whom at least six are in municipal ownership. The municipal operators provide urban services, while private companies provide both urban and inter-urban services. Private bus and coach companies are required to operate on a commercial basis.

Bus services are authorized by exclusive concessions which are granted by local authorities (urban services) or central government (other services). Usually the concessions are awarded for a long period and, in cases where they come up for renewal, the resident operator has preference in reviewing the contract.

United Kingdom

In 1988 there were 84 operators with a fleet size of over 100 buses and coaches, of whom three were in government ownership and 26 in local authority ownership, with the remainder being either privately owned or in the course of transfer to private ownership. All 84 operators are limited companies. The

majority of local authority owned bus companies provide only urban bus services. Many private companies, particularly those which have recently been privatized from the former State-owned National Bus Company, provide both urban and inter-urban services.

Within the administrative area of Greater London, London Regional Transport, which is a State-owned public authority, acts as a holding company (owning London Buses Ltd, London Underground Ltd, and Docklands Light Railway Ltd) and is responsible for organizing public transport in London, other than services provided by British Rail. LRT provides subsidy directly to London Buses Ltd but, also on a number of routes within London, awards subsidy on the basis of competitive tendering. In Northern Ireland, Ulsterbus and Citybus, both publicly owned operators, provide the vast majority of bus services.

Recent trends — deregulation

An important and interesting development in the public transport sector has been its deregulation in the United Kingdom under the 1985 Transport Act, with the exception of Greater London where this is not envisaged until after 1991. This Act aimed to find a cure for the problems of ever increasing costs and subsidies to public bus transport, accompanied by a loss of passengers. Therefore, the Act restructured the industry by splitting up the large passenger operators in order to enable small companies to compete with them. The National Bus Company was also privatized and sold off as 71 companies. Subsidies for services came to an end and can only now be allowed on socially necessary lines, the running of which has to be the subject of competitive tender, and all operators can receive subsidies for carrying the elderly, children and handicapped persons.

The United Kingdom Government considered that opening up of the market in this way would boost the bus market, meet customer needs more closely and encourage innovation in the sector.

Deregulation came into force in October 1986. So far, the results seem to have been mixed. Operators have become more efficient and offer a better quality of service, whilst subsidies have been reduced. However, fares have been increased and services seem to be less frequent, except at peak periods, and often no longer form part of a coherent overall planned transport system with good connections to other routes. One incidental result has been major purchases of minibuses by operators as these are cheaper than full-size vehicles. Nevertheless, a

longer period is needed in order for the effects of deregulation in the United Kingdom to be adequately assessed.

It remains to be seen whether other Community Member States go any way along the path of deregulation taken by the United Kingdom Government, but there is a trend towards the freeing of constraints on these services and the encouragement of more private financing of services. In Denmark, France and the Netherlands, central government is becoming less involved in the operation of services; on the other hand, in Spain there has been a move towards greater central control.

Outlook

Regional and local transport has such major advantages over the private car, particularly for environment reasons, that it cannot be neglected. Nevertheless, in order to retain its customers and to attract new ones, a more imaginative and flexible approach is needed. Thus, routes which are not pre-programmed but which can be adapted to individual

passenger requirements, and 'dial a ride' bus services are two examples of more flexible systems which have been tried and whose use should be extended.

Research and new technologies also play their part in promoting regional and local transport. For example, within the European Community, research has been carried out into the value of a dual-mode trolleybus, which could function with or without overhead wires. The Commission's Drive programme (Dedicated road infrastructure for vehicle safety in Europe) is an important step in road transport informatics and road safety of direct relevance to public transport. There have also been other technological developments, notably in electronic ticketing machines which make life easier for both bus driver and passenger alike. Nevertheless, in the end, the future of regional and local bus transport must always depend on the political decisions of central and local government as regards its administration and funding.

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MERCHANDISE ROAD TRANSPORT

(NACE 723)

Summary

In 1987 the volume of goods transported by road reached 696 000 million tonnes/kilometre in the EC, and early indications for 1988 point towards a 10% increase in international traffic within the Community.

In general, sectorial employment is slightly rising in most Member States, especially in Greece, Spain and the Netherlands. In the Federal Republic of Germany, it has also increased over the past decade, but only 1.7% from 1981 to 1986.

Although the market for road goods transport between Member States is still often governed by bilateral agreements between Member States, the necessary steps are currently being taken towards Community level harmonization or rapprochement in fiscal, technical and social matters, as well as towards liberalizing the EC market. Some measures have already been adopted, others are well advanced.

Community legislation

The market for transport between Member States is organized by Community measures and bilateral agreements between Member States.

Under these regulations, certain types of transport (for example, cross-border transport, transport for own account, postal transport, etc.) as well as certain bilateral flows (such as among Benelux countries, between the UK and the Netherlands, etc.) are exempt from authorization. The other types of transport are submitted to bilateral and Community quota regimes.

In June 1988 the Council decided that volume restrictions on market access would be waived after 1 January 1993 and replaced by quality criteria that transporters must meet in order to enter the market for road goods transport between Member States. Until then, the Community quota will have to grow substantially to enable a smooth transition towards an open market in transport.

As concerns pricing, the last Community members to use the regime of compulsory bracket abandoned this system on 1 January 1989. Reference fees are also disappearing; they will most likely be replaced by free market pricing.

A Commission proposal to achieve an open market in national goods transport is under consideration by Council bodies. This should enable non-residential hauliers to enter a Member State's national transport system (cabotage), under the same conditions as resident hauliers.

The necessary steps are being taken to move towards greater harmonization of the conditions for competition among Community hauliers in fiscal, technical and social matters, as well as towards a true Community policy in infrastructure.

Current situation

The demand for road goods transport at both the national and intra-Community level increased by 3.6% per annum between 1970 and 1986. It reached 546 000 million tonne-kilometres (EC 10) in 1986. With Spain and Portugal, this total increased to

Table 1
Trend in demand for national and international intra-Community traffic

(1 000 million tonne-km)	1982 (1)	1983 (1)	1984 (1)	1985 (1)	1986 (1)	1986 (2)	1987 (2)
National	408	417	427	435	455	538	571
International intra-Community	75	80	85	88	91	114	125
Total	483	497	512	523	546	652	696

(1) Basis: EC 10.

(2) Basis: EC 12.

Source: Commission of the European Communities, DG VII.

651 000 million. The EC 12 total for 1987 was 696 000 million — a 7% increase on 1986.

Table 1 shows the development in demand (in billion tonne-kilometres) since 1982 for national and international intra-Community traffic separately.

Preliminary indications show that international intra-Community traffic increased by a further 10% in 1988.

Table 2 shows the share of the market held by the hauliers from different Member States in 1987.

Table 2
Shares of the market held by the hauliers, 1987

(1 000 million tonne-km)	National	International Intra-Community	Total
Belgium	11.0	15.5	26.5
Denmark	8.8	4.7	13.5
FR of Germany	104.9	20.7	125.6
Greece	13.1	2.0	15.1
Spain	84.8	14.7	99.5
France	88.3	20.5	108.8
Ireland	4.0	0.9	4.9
Italy	117.4	13.3	130.7
Luxembourg	0.3	1.2	1.5
Netherlands	19.9	22.9	42.8
Portugal	8.6	2.1 (1)	10.7 (1)
United Kingdom	109.9	6.9	116.8
EC 12	571.0	125.4	696.4

(1) Provisional data.

Source: Commission of European Communities, DG VII.

For national traffic, cabotage is not yet allowed so that the figures in Table 2 show the tonnes/kilometre covered by hauliers from each Member State in their own country.

For international intra-Community traffic the tonne-kilometres shown for hauliers from each Member State include 'bilateral' journeys with another Member State and 'cross-trade' journeys between two other Member States (where the latter are performed under Community quota authorizations); in both cases the tonne-kilometres executed in the Member State of the haulier, the Member State of loading, the Member State of unloading and in any intermediate Member State are aggregated.

Hauliers from Austria, Switzerland and Yugoslavia participate in the international intra-Community traffic between certain Member States in cases where their country's geographical position is on the natural transit route for the traffic concerned. Participation by hauliers from other non-Member States in international intra-Community traffic is negligible. Data on non-Member State hauliers is

only available in terms of tonnes. International intra-Community tonnage by Community hauliers in 1987 amounted to 230 million tonnes.

Austrian hauliers contributed 13% (or 1.8 million tonnes) of the traffic between Germany and Italy in 1987. Swiss and Yugoslavian hauliers each accounted for less than 1%.

Austrian hauliers carried 8% (or 63 000 tonnes) of the traffic between Germany and Greece in 1987, Yugoslavian hauliers carried 2% and Swiss hauliers carried less than 1%. Hungarian hauliers carried 1.5% but this only amounted to 11 000 tonnes.

International extra-Community traffic by road takes place principally with Scandinavia, the 'transit' countries (Austria, Switzerland and Yugoslavia) and Eastern Europe. Information on such traffic is not as complete as that for intra-Community traffic, especially where movements by non-Member State hauliers are concerned. Additionally, information is available in terms of tonnes but not in terms of tonne-kilometres.

In the case of Scandinavia, the largest flows in 1987 were with Sweden, with over 3 million tonnes in each direction. Swedish and Community hauliers have approximately equal shares except in relation to the Netherlands, where Dutch hauliers have 75% of the market. Traffic with Norway amounted to about 800 000 tonnes in each direction and Norwegian hauliers dominate the market except in relation to Denmark, where Danish hauliers have 75% of the market. Traffic with Finland was smaller, at about 500 000 tonnes in each direction. Finnish hauliers dominate the market except *vis-à-vis* Denmark. These figures exclude traffic between the United Kingdom and Scandinavia.

Bilateral traffic with the 'transit' countries Austria, Switzerland and Yugoslavia is considerable (18, 16 and 3.4 million tonnes respectively in 1986). Whereas Community hauliers account for over 55% of the traffic with Switzerland, they account for only about 35% of the traffic with Austria and Yugoslavia.

Traffic with Eastern Europe is very unbalanced, at 10 million tonnes westbound and less than 3 million tonnes eastbound (1986). Traffic with East Germany accounts for about 40% of the total. Community hauliers have 45% of the westbound market but only 30% of the smaller eastbound market. This result casts some doubt on the frequently held belief that 'it is difficult to obtain return loads from Eastern Europe'.

The sector's structure

The road goods transport is highly fragmented since it is composed of a large number of small companies (one-man-company, padroncini). The number of companies involved is slowly decreasing, which signifies a move towards a certain level of cooperation between enterprises or concentration in the sector. It should be pointed out however that this phenomenon is limited, even if it is not very well known.

In Germany small enterprises with one to three long-distance authorizations represented 71.7% of the total number of enterprises in 1974. In 1986 this figure had dropped to 66.4%. Elsewhere over the same period the percentage of enterprises holding more than 11 authorizations increased from 4.5% to 5.9%. A corresponding structural evolution has not been observed however in short-distance transport, which is still characterized by a large number of small enterprises.

In the Netherlands, the proportion of small enterprises with one to five vehicles dropped from 24.1% (in 1981) to 21.4% (in 1986), and the proportion of medium enterprises with six to 14 vehicles dropped from 31.9% (1981) to 29.5% (1986). On the other hand, the market share of large enterprises with 15 to 100 or more vehicles rose from 44% (1981) to 49% (1986).

In Spain, 82.7% of the enterprises had only one vehicle in 1986, and 98.2% had from one to five vehicles. This last percentage has slightly increased, for in 1981 it was only 97.4%.

It is therefore not possible to detect any real signs of company regrouping in the Spanish market.

In Greece, one-man haulage enterprises owned 90% of the vehicles involved in national transport (compared to 99.6% in 1975) and 30% of international transport vehicles.

In the UK, statistical data for 1977 show that 50% of British hauliers owned just one vehicle, and that 85% owned five or less.

In France, two large transporters hold 20% of the market, medium enterprises share another 20%, and small enterprises share the remaining 60% of the market.

Concerning hauliers with more than 200 vehicles:

- in France there are approximately 90 (0.3% of total hauliers)
- in Germany approximately 500
- in the Netherlands, approximately 40.

The number of enterprises

There are major differences among Member States in the number of hauliers, the evolution of this number, the distinction made between haulage for own account and haulage for hire and reward, as well as between long- and short-distance hauliers.

In Germany the number of professional hauliers in long-distance traffic decreased by 3.5% from 1974 to 1986; in 1986 there were 8 829. The number of short-distance hauliers (42 525) remained practically stable, whereas transport for own account increased from 27 951 (1974) to 32 777 (1986), a 17.3% increase.

In the Netherlands, however, the biggest drop was in hauliers for own account, 9.8% between 1981 (47 625) and 1986 (42 982), whereas the number of professional hauliers decreased by only 3.2% over the same period (7 654 in 1981 compared to 7 411 in 1986).

In Spain the number of hired hauliers rose 2.2% between 1980 (157 613) and 1986 (161 027).

In Greece the number of professional hauliers evolved as follows: in 1975, 22 719 (of which 206 were involved in international transport) and in 1985, 26 994 (1 484 of which in international transport).

Between 1975 and 1985 the number of enterprises grew in France from 27 824 to 28 895, and decreased in Belgium from 10 623 to 7 812.

In the United Kingdom there were approximately 40 000 hauliers in 1985.

Structure of the fleet

In the 12 Member States the number of vehicles has risen 3% per annum since 1970, reaching 11.4 million units in 1985. Supply actually rose higher than this, for average load capacity also increased; the number of large lorries with over 10 tonnes carrying load, increased approximately 4.5% per annum since 1970, and in 1985 more than one million of these large vehicles were on the road.



In Germany, the number of vehicles evolved as follows:

- + 6.6% for professional short-distance hauliers — from 116 769 (in 1977) to 124 494 (1984)
- + 31.1% for professional-distance traffic — from 45 215 (in 1974) to 59 257 (1986)
- + 29.9% in traffic of one's own goods — from 90 011 (in 1974) to 116 942 (in 1982).

In the Netherlands the total number of vehicles has hardly evolved (from 179 805 in 1981 to 179 818 in 1986), although the portion of transport for hire rose from 33.6 to 36.6% (60 404 in 1981 and 65 856 in 1986), with the proportion for own account dropping correspondingly.

In Spain the number of professional haulage vehicles dropped 16.5% between 1980 (284 964 units) and 1986 (237 965 units). Over the same period the number of own account transport rose 16% (from 520 802 to 604 484 units).

In Greece the number of professional traffic vehicles (not counting tricars) rose from 25 960 in 1977 to 32 050 in 1982, an increase of 23.5%.

Employment

As a general rule employment in the Member States also rose slightly.

In Germany the number of workers reached 298 000 units in 1986, a 1.7% increase over 1981 (1.3% of the total work-force). The Netherlands recorded an increase of 3.5%: from 65 670 in 1981 to 68 000 in 1985 (2.5% of the total work-force).

In Spain the number of workers rose from 186 700 to 217 000 from 1984 to 1986 (+ 12.6%).

In Greece employment in the road transport sector rose from 48 533 in 1965, to 106 330 in 1985, on the 125 000 units in 1985.

From 1980 to 1985 the share of employment in the professional road transport sector in the total employment structure (1%) remained stable in Belgium, and rose from 1.3 to 1.4% in France. In 1980 the sector's employment share was 0.5% in Portugal and 2.1% in the United Kingdom.

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INLAND WATERWAY TRANSPORT

(NACE 73)

Summary

About 40% of all transport between EC Member States is transported by inland waterway (measured in tonnes). The economic crisis in the early 1980s brought about a stagnation, and even a decline in some years, of demand for inland waterway transport. Recent restructuring of the industry has led to the replacement of a large number of small old boats by big modern units which operate with shorter turnaround times. Thus, even though the loading capacity went down, the total transport capacity has increased in recent years and generated an excess capacity which is currently estimated at about 20%. In order to abolish the structural over-capacity, a Community scrapping scheme will come into force on 1 January 1990; also because of improved demand prospects, prices are expected to go up and the sector's profitability is expected to improve.

Thus, a coherent network has been created of waterways navigable for units with a loading capacity from 1 350 to 10 000 tonnes (pushed convoys on the Rhine and certain other sections) which covers most of the Federal Republic of Germany, the Netherlands, Belgium, Luxembourg and the northern and eastern frontier zones of France.

In the French hinterland, the rivers Seine and Rhône, being navigable for pushed convoys of 5 000 tonnes, play an important role. However, to date, these rivers are only connected with the main European network by means of narrow canals with a capacity of 350 tonnes only.

Apart from local transport operations on certain rivers in the UK, Italy and Portugal, inland waterway transport does not play a significant role in any of the other Member States.

Description of the inland waterway network

The Rhine, being navigable over a distance of 1 000 km — from Basel in Switzerland to the North Sea, is clearly the backbone of the EC waterway system. Other rivers like the Meuse, the Schelde and the Elbe are interconnected with the Rhine by means of canals navigable for vessels of at least 350 tonnes, the so-called Europe, class IV, standard vessel.

Current situation

In 1980 and the following years the effects of the economic crisis hit almost all sectors of the economy and in particular those sectors that generate massive bulk transport, such as the building industry (sand and gravel transports), the steel and chemical industry (ore, coal and chemicals) and the energy sector (oil products, coal). These commodities account for more than 70% of total inland waterway traffic.

Table 1
Total traffic on Community network, 1983-87
Volume transported by network (1)

(1 000 tonnes)	1983	1984	1985	1986	1987	Growth rate 1987/1983 (%)	Growth rate 1987/1986 (%)
Belgium	87 105	94 227	89 439	91 288	90 956	4.4	-0.4
FR of Germany	212 353	223 966	210 401	215 246	207 548	-2.3	-3.6
France	66 085	63 255	59 353	58 486	56 560	-14.5	-3.3
Luxembourg	1 997	2 128	1 761	2 021	1 913	-4.2	-5.3
Netherlands	214 347	221 298	221 479	238 116	240 671 (2)	12.3	1.1
EC 5	384 550	396 637	380 443	397 230	395 061 (2)	2.7	-0.5
Growth rate (%)		3.1	-4.1	4.4	-0.5		

(1) For each country, the figures are: import + export + national transport. For EC 5, the figures are: total national transport + total export.

(2) Provisional figures.

Source: Commission of EC, DG VII; Europa Transport, 1987 Annual Report.

Table 2
EC fleet in number of vessels and carrying capacity

(1 000 tonnes)		Fleet	1979 (1)	1988 (1)	Growth rate 1988/1979 (%)	Fleet share 1988 (%)
Belgium	Vessels		3 321	2 214	-33.3	14.0
	Carrying capacity		1 955	1 648	-15.7	13.0
FR of Germany	Vessels		4 230	3 063	-27.6	19.4
	Carrying capacity		3 859	3 249	-19.8	25.7
France	Vessels		5 525	4 296	-22.2	27.2
	Carrying capacity		2 618	2 092	-20.1	16.6
Netherlands	Vessels		6 631	6 216	-6.3	39.4
	Carrying capacity		4 840	5 649	16.7	44.7
EC 4	Vessels		19 707	15 789	-19.9	100.0
	Carrying capacity		13 272	12 638	-4.8	100.0

(1) At 1/1.

Source: Commission of EC, DG VII; Europa Transport, 1987 Annual Report.

Since 1983 demand has recovered slightly. Over the last years the total volume transported stabilized around the figure of 400 million tonnes per annum.

In 1987 international transport represented 47% (186 million tonnes) of the total volume carried by inland waterways in the Community. The remainder (209 million tonnes) represents the sum of domestic transport in Belgium, Germany, France and the Netherlands. Of the national markets, the Dutch and the German markets are by far the most important, with volumes of roughly 90 and 70 million tonnes transported per annum on average.

Measured in tonnes transported, inland waterways carry 38.6% of all international transport between EC Member States. The figure for road and rail is 48% and 13.4% respectively (EC 12).

Trends in capacity

The Community inland waterway fleet has a carrying capacity of 12.6 million tonnes. The Dutch fleet accounts for 44.7% of the total capacity, while the German fleet holds the second position (25.7%).

In the recent past a large number of small old boats have been replaced by big modern units. This trend still continues. Between January 1979 and January 1988 the total number of vessels went down by almost 20% whilst the carrying capacity was reduced by almost 5%. It should be noted that modern vessels are more productive in the sense that they operate with shorter turnaround times, which has boosted the total transport capacity of the fleet even though the loading capacity went down.

Structure of inland waterway companies

The inland waterway sector is characterized by the existence of a large number of private owner operators having in general only one vessel, with the owner's family living on board.

Table 3
Share of private owner operators in the national fleets, 1988 (1)

(%)	Share in number of ships	Share in carrying capacity
Belgium	52	86
FR of Germany	50	38
France	61	63
Netherlands	71	67

(1) At 1/1/88.

Source: Commission of EC, DG VII.

Big shipowner companies exploiting fleets of 20 to 100 vessels mainly operate on the Rhine and its branches. On this market there are also cooperatives of private owner operators working together in order to compete with the shipowner companies for large-scale contracts.

Market organization

The international Rhine market, which covers 75% of total international transport, has a completely free market regime. That means: free pricing, free access to the market for all companies registered in Rhine and EC States, no authorizations required.

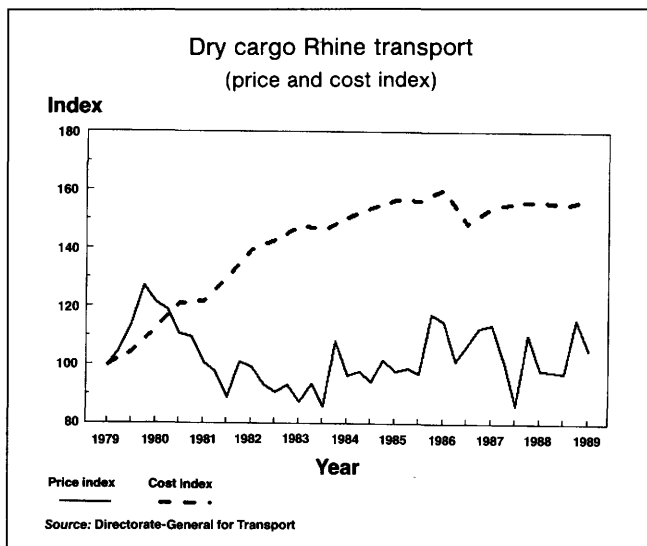
The domestic markets and a part of international transport other than the Rhine, are subject to obligatory tariff regulations and traffic sharing systems.

Over-capacity

Since 1980 a structural imbalance between supply and demand has been causing serious problems in the inland waterway sector. The most important reasons for this phenomenon are the downward trend in demand in the period 1980-83 and the ongoing productivity increases due to modernization of the fleet.

The surplus capacity is now generally estimated at about 20% of the Community fleet.

Figure 1



The over-capacity has a negative effect on the evolution of prices on the free market. For example: in dry cargo Rhine transport prices in 1988 were still at the level of 1979, whilst costs have gone up in the same period by more than 50% (see Figure 1).

EC rehabilitation programme

In order to remedy the situation the Council, on a proposal of the Commission, established in May 1989 an EEC capacity regulation system entailing:

- measures to set up and to coordinate the functioning of national scrapping schemes by harmonizing the basic principles and procedures throughout the Community;
- arrangements to prevent the impact of a coordinated scrapping action from being cancelled out by putting limitations on the bringing into service of new vessels.

The scheme is intended to eliminate 10% of the dry cargo fleets and 15% of the tanker fleets within the course of 1990. Restrictions on the bringing into service of new boats are to be applied from 1 May 1989 until 1 May 1994. The Swiss authorities have simultaneously introduced similar measures for its fleet.

Outlook

Under the influence of the improved economic situation, demand for inland waterway transport has shown an upward trend after 1988 (precise statistics are not yet available), in particular in international traffic. However, from the Commission's market observation system it appears that the evolution of demand so far has had no significant influence on the price level and hence on the profitability of the sector.

It is generally expected that the EC scrapping system in combination with the present trend in demand will lead to a new equilibrium between demand and supply in the near future. This should lead to a better utilization of the vessels that will stay on the market and also to a higher revenue level per tonne.

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SHIPPING INDUSTRY

(NACE 74)

Summary

In 1981 the EC registered fleet had a share of 29% in world tonnage; in 1989 this had decreased to 15%. High cost EC shipowners have had difficulty in competing on the world market during the 1980s. A large surplus of tonnage persisted throughout these years due to low growth in world seaborne trade, whilst ordering of new tonnage continued. This led to much lower freight rates, putting a damper on the market. Some EC shipowners went bankrupt, others reduced their stake in shipping or stopped altogether. Many succeeded in surviving by transferring vessels to cheaper registers. Other owners have found niches in the market with better survival prospects, such as intra-EC shipping or specialized trades such as liquid gas, chemicals and reefer cargoes. Freight markets began to recover for major dry bulk, liquid cargo and container trades so the outlook for the future is encouraging: seaborne trade once more registers stronger growth whilst orders for new vessels have remained at a low level during 1987/88.

Description of the sector

EC shipping is a widely fragmented industry: there are major diversified liner companies but also one vessel captain/owners. Next to the large producers who carry their own cargoes there are important owners specialized in bulk shipping. Traditionally, there was a clear division between the deep-sea and

short-sea trades, but this division is becoming rather blurred. Most companies have a strong national base. However, transnational cooperation has always flourished with the establishment of conferences, freight pools and consortia. Still, a lively competition exists and it is the EC's policy to preserve open access to the industry. In the deep-sea liner trades, this has enabled many outsiders and forwarding companies, acting as NVOCCs (non-vessel owning common carriers), to challenge the established conference lines.

Table 1 shows the principal shipping companies of the EC, of which P&O of the United Kingdom is by far the largest, with a turnover of about USD 7.2 billion; however, only 21% of that is made in the shipping division. In Denmark, the privately owned Maersk line controls about 73 000 TEU (over 5% of the world fleet) making it the second largest operator of container tonnage after Evergreen.

EC involvement in world trade

Table 2 gives the shares of country groups in the main types of vessels in the world fleet. At the end of 1988 the EC had a 15% share of the world fleet of oil tankers and bulk carriers. Of these, many are engaged in cross trades. In the general cargo trade with multi-deck and container vessels, EC companies no longer have their once dominant position but still maintain a strong presence (having a 27% share in the carrying capacity of the world container

Table 1
Major EC liner companies, 1988

Company, country	Container capacity (Twenty-foot equivalent unit (TEU))			Total number of employees
	Owned	Chartered	Ordered ⁽¹⁾	
CMB, B	23 500	11 500	—	4 100
EAC, DK	10 000	—	—	14 425
Maersk, DK	57 000	About 16 000	46 500	N/A
CGM, F	30 000	—	5 400	9 500
SNCDV, F	15 000	N/A	—	5 700
Hapag Lloyd, D	40 000	About 20 000	28 300	2 700
Hamburg Sud, D	13 000	N/A	8 000	2 250
Lloyd Triestino, I	7 000	4 500	14 500	N/A
Nedlloyd, NL	44 000	24 000	—	20 340
P&O, UK	43 000	—	7 200	55 000

(1) 6/89.

Source: European Ship Owner Association, Annual Report 1988.

fleet) and an even larger share in the European short-sea trade.

The reduction in the Community fleet has been compensated to some extent by an increase in the tonnage registered in open registers, owned by EC nationals, from 38.5 to 64.2 million dwt during the period 1981-87 (see Figure 1).

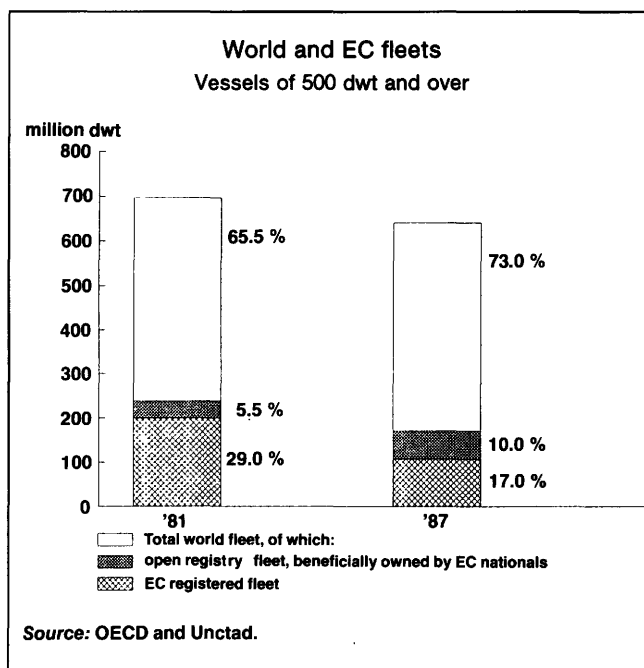
As well as being reduced, the EC fleet is also becoming older; nonetheless, most EC shipowners have an excellent safety record. Stringent regulations by Member States and port state inspection, as initiated by the EC, contribute to the low level of accidents in which EC vessels are involved.

Looking at the main fleet of other OECD countries: in early 1989 Japan had with 43.9 million dwt a larger fleet than Greece. The American and Norwegian fleets of 27 and 19 million dwt respectively were together not much less than the combined fleet of over 52 million dwt of the other EC countries.

Total general cargo trade amounts to approximately 410 million tonnes, of which about 225 million tonnes was shipped in containers in 1985. Of this quantity, about 155 million tonnes was carried in fully cellular container vessels. Due to the slow growth of world trade in the mid-1980s, combined with a considerable build-up of the container fleet by such companies as Evergreen from Taiwan and USLines, many trade routes were overtonnaged with the resulting downward pressure on freight rates. EC

shipowners survived this period but lost market share. They are hardly represented in the trans-Pacific trade, but have succeeded in maintaining a fair share in the general cargo trades to and from Europe.

Figure 1



About half of the 22.8 million TEU (TEU is the capacity unit in the container trade, being equivalent to a 20-foot-long standard container) shipped in deep-sea container trades in 1987, was carried on

Table 2
World fleet by type and area shares, 1988 (1) (2)

Type of vessel	Total fleet (million dead weight ton (dwt))	Percentage shares				
		EC	Other OECD	Open registry	State trading	Others
Oil tankers	240.6	17.9	18.4	41.4	3.6	18.7
Chemical carriers	6.1	15.2	15.8	47.0	1.6	20.4
Liquid gas tankers	14.6	13.9	37.5	27.9	1.9	18.8
Bulk carriers	184.4	15.4	13.5	33.0	6.2	32.0
Oil/bulk/ore	37.8	13.7	11.2	48.7	3.8	22.6
General cargo						
Multi-deck	70.0	12.9	13.2	20.9	18.3	34.7
Single-deck	34.7	9.4	17.7	31.4	12.0	29.4
Cellular container (3)	22.1	26.7	23.0	20.0	3.1	27.2
Ferries	7.7 (4)	31.2	34.4	7.5	8.9	18.1
Passenger vessels	2.2 (4)	32.2	15.0	42.1	6.9	3.8
Cruise vessels	2.4 (4) (5)	25.1	10.2	50.1	12.4	2.2

(1) At 1 January 1988.

(2) Vessels of 300 gross registered ton (GRT) and over.

(3) Percentages derived from total capacity of 1.3 million twenty-foot equivalent unit (TEU).

(4) Expressed in million GRT.

(5) 1987 data.

Source: ISL Bremen.

trade routes to/from Europe (including non-EC countries). The short-sea trade within Europe generated a further 3.8 million TEU of container traffic, equivalent to 41% of the combined short-sea trade of Europe, North America and the Far East.

The EC has a share of 32% in the world passenger and ferry fleets. Most passenger vessels are of the car/passenger ferry type. Non-European competition is almost non-existent in the ferry services with the result that there is less pressure to flag out vessels. The United Kingdom with its many ferry services to Ireland and the Continent had the largest fleet with a share of 23% in the GRT of the EC ferry and passenger fleet. It is followed by Greece and Italy, each having a share of 19 to 20%, but consisting predominantly of older vessels. North America offers the largest market for cruise vessels. The UK has with 45% by far the largest share of the EC tonnage, again followed by Greece and Italy. The Mediterranean is an important secondary market for cruise vessels, but the operators in this market have met with strong Soviet competition for a number of years.

Although the EC has a share of only 16% in the tanker fleet and of 14.5% in the bulk carrier fleet,

Table 3
European dry cargo fleets of 100 to 6 000 gross registered ton (GRT), 1987

(Dead weight ton (dwt))	Single and multi-deck	Container and RoRo	Others	Total
Belgium	6	57	24	87
Denmark	202	49	199	450
FR of Germany	1 045	265	262	1 572
Greece	483	43	292	818
Spain	641	187	113	941
France	55	83	14	152
Ireland	75	26	—	101
Italy	396	160	108	664
Netherlands (1)	803	66	326	1 195
Portugal	19	—	18	37
United Kingdom	258	92	39	389
EC 11	3 983	1 028	1 395	6 406
Scandinavia (2)	450	253	348	1 051
East Europe (3)	3 515	275	1 152	4 942
Cyprus	1 054	144	615	1 813
West Europe	9 002	1 700	3 510	14 212

(1) Includes Netherlands Antilles.

(2) Finland, Sweden, Norway and Iceland.

(3) USSR, Poland and East Germany.

Source: MERC Rotterdam.

London continues to be the world centre for the affreightment of these vessels. In the liner trades, cooperation between companies has always been



well organized, initially in conferences which divide the trade covered between their members. The EC has recognized the value and the necessity of these conferences. Following the introduction of containerization in the early 1970s, groups of conference members have also combined in consortia with the aim of achieving economies of scale and improved services.

European short-sea trades have still the characteristics of regional markets. Mediterranean trade consists mostly of national traffic which is reserved for the national flags and international traffic across the Mediterranean to North African countries which is subject to bilateral agreements, is therefore a lack of competition. In contrast in and around the North Sea there is fierce competition between short-sea fleets, due to the UK's national trade being open to all flags and large quantities moving between the UK, Scandinavia and Continental countries. The Federal Republic of Germany, the Netherlands and Denmark dominate the international short-sea trades.

The quantity of cargo moving within Europe is immense. Including traffic with Eastern Europe and North Africa, it amounts to about 300 million tonnes of dry bulk and 490 million tonnes of liquid bulk cargoes in international trade. The latter figure includes 140 million tonnes of crude oil shipped to Western Europe ex-Middle East pipelines which terminate in east Mediterranean ports. Additionally, about 60 million tonnes of cargo is trans-shipped at European ports to or from smaller vessels, while about 300 million tonnes is carried in West European national trades, of which 210 million tonnes is trade between Member States. In 1983 EC vessels had a share of 69% in trade between Member States against 40% in trade with developing countries. These percentages amounted to 65% and 40% respectively in 1986 (The Federal Republic of Germany, the UK, Belgium and the Netherlands only). Dry cargo in the European trade generally moves in vessels of less than 6 000 GRT (equivalent to about 10 000 dwt) of which there are about 14.2 million dwt under European flags with a 45% share of the Community (see Table 3). Cyprus with 13% is mentioned separately because its fleet is predominantly owned by EC nationals.

The short-sea freight market tends to follow the market for larger vessels, albeit usually with a time-lag of several months, therefore a gradual increase in freight rates are expected and an improvement in the volume of short-sea trades.

Short-sea owners dominate the specialized trades under European flags, many owners of larger vessels having opted out of the trade under these flags. Specialized trades include chemical vessels, liquid gas tankers, reefer trade, car carriers, the carriage of heavy lifts and chartered containers. Markets for liquid gas and reefer trades are much less volatile than those for tankers and bulk carriers since owners either charter their vessels to the traders or join the freight pools of the large operators. The freight market for these specialized trades started to recover in 1986, although the heavy lift shipping only started slowly recovering in 1989.

In Germany, Denmark, the UK, Greece and the Netherlands, the contribution of shipping to the balance of payments amounted to about ECU 5.6 billion in 1987.

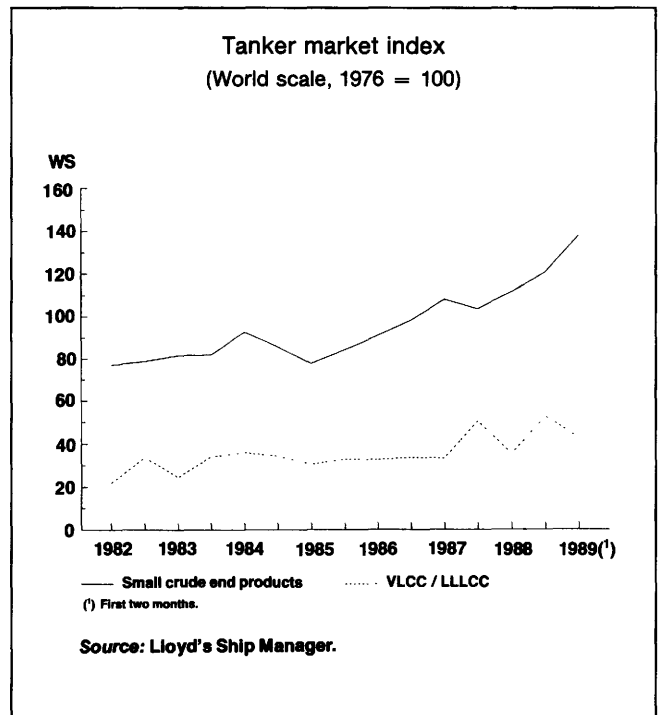
Seaborne trade between the EC and developing countries amounted to approximately 1 000 million tonnes in 1983, equivalent to 30% of the estimated international seaborne trade of 3 300 million tonnes in that year. As regards major bulk commodities, the Community had in 1987 a share of 39% in world seaborne imports of iron ore, 34% of coal, 8% of grain, 31% of bauxite, alumina and phosphate and of about 34% in the seaborne crude oil trade of 970 million tonnes.

In the important Europe/Far East trade route, outsiders (non-conference liners) (including the Trans-Siberian Railway) carry about 40% of the liner trade; EC conference members about one half of the remaining 60%. Larger shares of up to 50% are obtained by outsiders in the trade with the USA, which country imposes more restrictions on conference lines than the EC.

The State-trading economies of Eastern Europe generally apply a 50/50 division to their foreign trades, but often carry a larger share because shipowners in the market economies may find the applicable level of freight rates too low. Some Eastern European companies participate in EC trades as outsiders and have been accused of being able to quote lower rates on account of their different cost structure. *Perestroika* may result in a more market-oriented approach to shipping in these countries.

In the general cargo trades with many developing countries, particularly those in Africa and Latin America, conference trade is often divided in accordance with the 40:40:20 formula of the Unctad Code, whereby the national carriers in the trade between two countries each have a share of 40% with 20% to be divided between cross traders. The Unctad

Figure 2



Code applies to conference carryings only, but some developing countries want to bring their whole liner trade within the scope of the Code, thus enabling them to regulate the share of non-conference lines, generally referred to as outsiders. The European Commission is trying to resolve this problem on behalf of the Community through negotiations with the countries involved.

Employment

National governments and the European Commission not only want to maintain a Community fleet for strategic and commercial reasons, but also because of its contribution to employment, the balance of payments, etc. Employment of nationals has decreased from about 250 000 crew members in 1980 to about 110 000 in 1988. The reason for this decrease is due to movement away from Community flags to open registers where manning costs also tend to be low. The movement from the Greek flag was accelerated when Greek crews obtained much increased wages after strike action. A similar development occurred in Germany after a successful strike increased manning costs substantially. In addition to those employed directly in the shipping industry, there are of course many more people employed in associated activities, such as insurance, shipbuilding, ports, etc.

Investment and cost saving

The EC fleet has suffered in recent years from a lack of investment and difficulties in remaining competitive on world markets. The proportion of new tonnage in the EC fleet is now lower than in most of its competitors. The difference in age is particularly striking when comparing the EC fleet with those of other OECD countries.

The reason for the lack of capital investment is partly attributable to the low freight rates for most types of trades. Freight rates for dry and liquid bulk cargoes have been extremely poor since 1981. Tanker rates started a slow recovery in 1986, those for bulkers started to improve towards the end of 1987. During 1988 and the first half of 1989 the improvement has continued, albeit with ups and downs, partly of a seasonal nature. However, freight rates are not yet sufficiently attractive to warrant the speculative ordering of new tonnage at much increased shipyard prices. Figures 3 and 4 illustrate the movement of freight rates since 1982. Tanker freight rates in Figure 2 are expressed in 'world scale', whereby WS 100 is a calculated break-even

Table 4
Fleet by major type and area, including share of 0 to 9 year-old-vessels, 1988 (1)

(Million dead weight ton (dwt))	Oil tankers total fleet	Share of 0-9 years (%)	Bulk carriers total fleet	Share of 0-9 years (%)	Containers total fleet (2)	Share of 0-9 years (%)
EC	43.0	19.8	28.3	42.3	344	47.4
Other OECD	44.2	36.5	25.0	73.3	297	64.8
State-trading	8.6	34.4	11.5	43.6	40	69.8
Open registry	99.7	18.7	60.8	44.3	257	70.4
Others	45.1	19.6	58.9	50.2	351	65.7
World	240.6	22.9	184.5	49.8	1 289	61.7

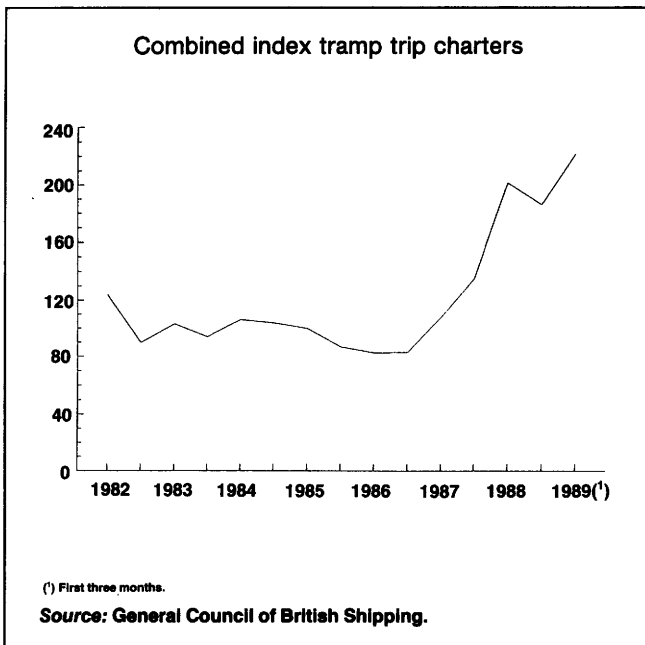
(1) At 1 January 1988.

(2) Expressed in 1 000 twenty-foot equivalent unit (TEU).

Source: ISL Bremen.

freight for a notional tanker. Trip time charters are on an index basis, with 1976 being 100.

Figure 3

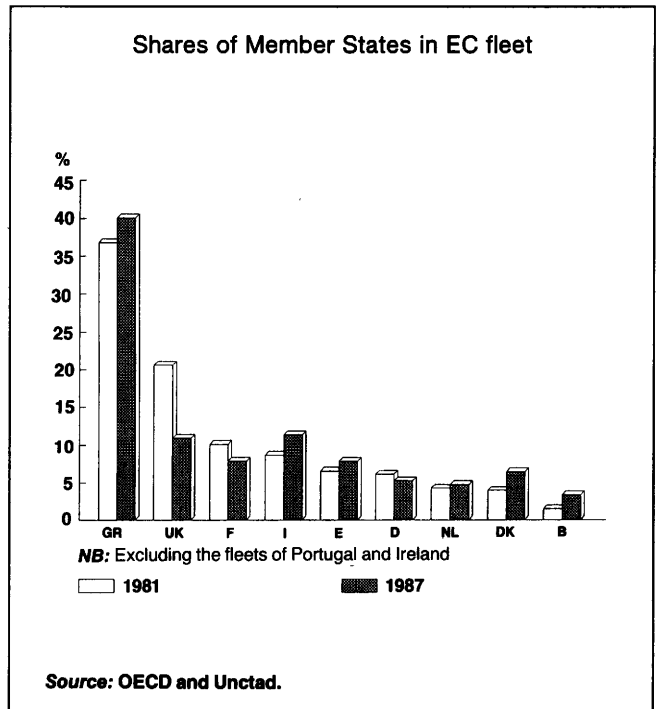


The story is similar for the major container trades. The slowing of US import growth kept the trans-Pacific and trans-Atlantic trades overtonnaged, larger US exports giving only partial compensation. Nevertheless, many EC owners have already, or are about to order, new container tonnage in anticipation of further improvements, particularly in traffic to and from Western Europe.

Due to the very long duration of the recession in shipping, which commenced in 1975, soon after the first oil crisis, and lasted until 1987, with only a brief respite in 1979-80, EC owners, with their high manning costs under national flags, would have been forced out of most trade, if national governments had not come to their assistance with cost-saving measures, such as investment allowances and government-supported research to advance automation and innovation. Some countries have tried to mitigate the plight of owners further by creating offshore registers or similar schemes which allow the employment of foreigners with lower wages and of nationals at reduced levels of taxation, often in conjunction with permission to reduce crew levels. France has such an offshore register in Kerguelen, the Netherlands in the Dutch Antilles and the UK in Bermuda and the Isle of Man. In 1988 Denmark introduced a separate international register for Danish vessels, while the German government authorized a similar scheme in 1989. These initiatives have now been followed with a proposal from the European Com-

mission to introduce Euros as a European register. Vessels already entered in national registers would also be registered in Euros, in which case they may also become entitled to participate in the national trades of Member States and in the shipments of EC food aid to developing countries.

Figure 4



The UK was probably the only member which reduced the level of aid to shipowners, by discounting the 100% free depreciation allowance. The UK Government has a policy of promoting UK-controlled shipping which can use the available offshore registers, since it is anxious to maintain London as a world centre for the financing, insurance, management and brokerage of vessels.

Geographic features

There are variations between Member States as regards their approach to shipping; the Mediterranean countries are generally large in bulk shipping and have (with the exception of Greece) a strong reliance on State ownership, particularly in the liner trades. The northern Member States have a long tradition of privately owned liner companies which have often developed into diversified groups. Many of these companies have reduced their stake in the bulk trades. There are, particularly in the UK, still many independent or oil company controlled tanker and dry bulk shipping companies, but most of their deep-sea tonnage is registered abroad. Governments

have offered throughout the years incentives to owners to keep their vessels under national flags. Nevertheless an increasing number of vessels owned by EC nationals have been transferred to open registers. Initially these registers were used to avoid tax liability, but during the last few years cost reduction (particularly of manning costs) has been the main motive. The main open registers are those of Liberia, Panama and Cyprus.

In terms of tonnage, Greece has the largest fleet amongst EC members. Although it decreased from 73.5 to 42.8 million dwt during the period 1981-87, its share of the EC fleet increased from 37% to 40% (see Figure 4). Moreover, Greek nationals owned in 1987 45.2 million dwt or 70% of the EC-owned fleet which is registered under flags of convenience.

Outlook

European shipowners are becoming more confident not only on account of the gradual market recovery, but also because they expect that 'Europe 1992' will stimulate economic growth in the EC with the resulting increase in the Community's share in the world trade. The four regulations adopted by the Council of Ministers at the end of 1986 regarding freedom to provide services, exemption of the anti-cartel rules for conferences, unfair pricing practices and free access to cargo may contribute to less protectionism and to fairer pricing in the liner trades. Finally, the clearly expressed aim of the European Parliament, the Council of Ministers and the Euro-

pean Commission of working towards an efficient and competitive Community shipping industry should also enable EC shipowners to play again a major role in world shipping using ships registered in the Community. The proposed Euros register should contribute to this.

The container trade will see major changes in the coming years on account of the trend towards integrated transport companies, offering total distribution services from manufacturers to final customers. This will be possible by using the latest communication and information technologies, particularly electronic data interchange. Some European companies are actively engaged in extending European distribution networks to meet the new requirements for intermodal transport. A large part of the tanker and bulker fleets will have to be renewed in the 1990s and doubts have already been expressed as to whether banks will be prepared to finance the huge investments involved. The availability of both finance and reputable shipowners may enable the EC to play again a larger role in bulk transport. The vessels involved will be of proven design (there being no new technology under consideration) but there may again be a tendency towards larger vessels.

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AIR TRANSPORT

(NACE 75)

The international framework for air transport

The Chicago Convention

Civil aviation functions at present in accordance with a set of international rules established by the Chicago Convention of 1944 and ensuing multilateral and bilateral agreements.

A fundamental principle of these agreements is that of national sovereignty. It is made clear in the Convention that each State has exclusive and complete sovereignty for the airspace over its territory and decides on permissions to give rights for carrying traffic originating in or destined for its territory or even crossing it.

Each country is responsible for the technical standards, the operational and safety standards, etc. in respect of its aircraft and crews.

At the multilateral level an important step was agreed in Chicago for non-commercial rights such as the freedom to overfly and the possibility to make technical landings (e.g. to take on fuel). For non-scheduled flights, such as charters and own account flights, all States which signed the Chicago Convention, and those which have since adhered, have extended to each other these rights. For scheduled flights, these rights exist for the 92 States (the EEC Member States included with the exception of Italy) which have adhered to the 'International Air Transit Agreement'. For other States the transit and overflying rights for scheduled services are regulated by bilateral agreements or dependent on unilateral authorizations.

By contrast there is no multilateral agreement aimed at obtaining commercial traffic rights. These rights continue to be derived from the competence of States which accordingly have concluded a large number of bilateral agreements between them dealing essentially with scheduled air services.

These agreements normally remain faithful to the general principles of the Chicago Convention, in particular with respect to the sovereignty of national States and national responsibility for safety and aircraft.

They also extend to the airlines of the two countries equal treatment with respect to operations, handling, customs, health, services, etc.

The bilateral agreements define the different routes which are authorized and the gateways, not only in the two countries concerned but also in countries situated between or beyond those two countries. They specify whether each country can designate more than one airline to carry out the traffic rights agreed upon. Further, these bilateral agreements establish in general criteria and procedures to fix the level of tariffs and in certain cases also the transport capacity.

Cooperation at government level

The Chicago Convention also established the 'International Civil Aviation Organization', ICAO. This specialized agency of the United Nations exercises a very important role with respect to standards and rules, especially concerning technical matters for safety and operations. These rules are normally applied by the Member States. It distributes information and statistics and has established technical assistance programmes and organizes diplomatic conferences for adaptation and development of air law, e.g. with respect to air piracy and sabotage.

The European Civil Aviation Conference, ECAC, is an organization without regulatory power, which nevertheless plays an important role for the development of air transport in Europe. It works by recommendations and resolutions which it addresses to its members. These are often implemented by the countries concerned in the same way as regulations, since they are agreed by the directors-general of the national civil aviation administrations. A large part of the work is carried out by four permanent specialized committees for scheduled and non-scheduled air transport, technical matters and facilitation under the guidance of a coordination committee. The ECAC has at present 22 members, including all the Community Member States.

For air traffic control it is necessary to mention Eurocontrol. Its role is to strengthen cooperation and to organize jointly the air traffic control for the upper air space (above 6 000 m) for the contracting States. This organization was established by a convention signed in 1960 by Belgium, the Federal

Republic of Germany, France, Luxembourg, the Netherlands, and the United Kingdom; Ireland, Portugal and Greece have subsequently joined and Spain has applied to join. Moves are afoot to strengthen Eurocontrol at present.

Cooperation between airlines

The most important cooperation between scheduled airlines takes place in the International Air Transport Association (IATA). It covers at present 172 airlines (142 active members operating international networks and 30 associated members operating domestic networks). The airlines represent about 80 countries including all Community Member States except Luxembourg. IATA was created by government intervention in order to create a multilateral airlines framework alongside the intergovernmental bilateral agreements.

It covers a multitude of activities dealing with all aspects of air transportation. It provides specialized services such as the clearing house for tickets, which is closely related to the interchangeability of tickets permitting the user to travel on one ticket (paid in one currency) on several stages of a trip.

One of the possibilities it offers its airlines is to organize traffic conferences for coordination of tariffs. The airlines thereafter file a set of tariffs resulting from these conferences with governments which must approve them before they become applicable. Other regulations and procedures of IATA must also be approved by governments before they become applicable.

The need for the European scheduled airlines to strengthen their cooperation in all fields was the reason for creation of the Association of European Airlines (AEA). The association represents 21 of these carriers. It publishes economic and financial studies on air transport in Europe. All Community flag carriers are members of the AEA.

The International Air Carriers Association (IACA) is a worldwide body representing the interests of independent non-scheduled carriers. Under its umbrella exist both Euraca (the European Air Carriers Association) which looks after the interests of non-scheduled carriers throughout Europe and ACE (l'Association des Compagnies aeriennes de la Communauté européenne) which specifically represents the non-scheduled carriers established in the Member States. The majority of charter carriers affiliated to the European scheduled carriers belong to ACCA — the Air Charter Carriers Association.

The situation of air transport inside the Community

Enterprises and their fleets

The majority, but not all of the scheduled European carriers are owned either wholly or partially by States. The non-scheduled services are assured either by scheduled carriers directly, or by affiliated charter carriers, or by private carriers of which some are linked with tour operators.

The important air carriers in the Community amount to about 30 of which about 15 are larger scheduled carriers and about the same number larger non-scheduled carriers. The other airlines fly second and third-level services. Six large scheduled Community airlines are among the 20 largest airlines in the world.

Policy and influence of the Member States

General policy

Each Member State has in the past carried out a protectionist policy for its national air carriers, aimed to preserve its political prerogatives and to profit itself from its advantages. These may be its geographical location, the importance and composition of its national market and its special relations with this or that part of the world.

Most of the links between the Member States are covered by bilateral agreements as modified by Community legislation as set out below. These bilateral agreements do not always state precisely the real content of the decisions. They are often supplemented by confidential letters of understanding exchanged between the aeronautical authorities of the States concerned. These letters interpret, specify or even modify the provisions of the agreements. These letters may concern the creation of commercial pools or call for the creation of such pools.

The services and routes thus negotiated are closely interrelated at the bilateral level, where rights may be exchanged against rights somewhere else in the world.

However, American deregulation at the beginning of the 1980s has had worldwide repercussions. The open skies policy within the United States translates into the total deregulation of traffic rights, tariffs and capacity constraints. The success of this policy in the eyes of the travelling public with the development of innovative and competitive pricing was the touch paper for increased pressure to undo the strait-

jacket that had been tightened over the years on air transport within the European Community.

The first development in terms of Community-wide legislation was the adoption of the Interregional air services directive in 1983. The Commission's original proposal was considerably watered down during the discussion period but all the same a limited area of the air transport market was lifted out of the scope of the bilateral structure enabling smaller independent airlines a niche.

On the other hand, adoption of the liberalization package of air transport measures at the Transport Ministers' Council in December 1987 and which entered into force on 1 January 1988 was a significant stride forward. The essence of these measures which applied to air fares, capacity, access to the market and competition is set out briefly below.

Airfares

The provisions in the package relating to air fares introduced three main innovations:

- first, a series of criteria for approving fares; where fares reasonably reflect the costs of an individual airline, the Member States concerned are obliged to approve them;
- second, a swift and decisive arbitration procedure in cases where the interpretation of the criteria is disputed. This means that, where an airline can genuinely justify its proposed fares in terms of its own costs, the authorities are obliged to give their consent. This differs from the previous system under which the authorities approved the fares while taking into account a number of criteria including the costs of all airlines. It is obvious that some fares in Europe greatly exceed those represented by the new criteria;
- third, the creation of zones for discount and deep discount fares within which airlines would be free to set fares meeting certain specific conditions.

Capacity

As regards capacity, the main feature is that the Member States are no longer able to insist that capacity on individual routes be shared on an equal footing by the carriers operating between their respective countries. During 1990 a Member State is entitled to only 40% of bilateral capacity. This means that traditionally restrictive countries have lost their rigid control of capacities.

Access to the market

As regards access to the market, the main elements of the package are:

- the creation of traffic rights between main airports and regional airports: this enables airlines to open up intra-Community routes between main and regional airports even if those routes are not included in the existing bilateral agreement between the Member States concerned;
- traffic rights between main airports already existed under bilateral agreements and, pursuant to the Community Directive on interregional service, also between regional airports. This means that traffic rights now exist between practically all the international airports of one Member State and all the international airports of the other Member States. Even when allowance is made for some temporary exemptions, this principle remains valid;
- multiple designation: a Member State can designate more than one of its carriers to operate the same route when specified traffic thresholds have been passed;
- combination of points: this provision enables airlines which operate scheduled services to one or more points in other Member States to combine such services, on condition that no commercial traffic right is exercised between the points in the foreign countries;
- the creation of fifth-freedom traffic rights: this enables, on certain conditions, airlines established in a Member State to operate fifth-freedom traffic on certain routes between two other Member States for up to 30% of the seats on the route.

Competition

The package contains two Commission Regulations on competition, one relating to procedures and the other granting group exemptions for certain types of agreement between airlines in order to safeguard useful cooperation. The result of these two regulations is that the competition rules can now effectively be applied by the Commission.

The air transport package agreed in December 1987 is only a first step towards creating an internal air transport market and further measures of liberalization are under discussion and anticipated to be adopted at the Transport Ministers' Council in June 1990.

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AIRLINES

(NACE 75)

Summary

Passengers carried on world-wide scheduled air services in 1988 totalled 1 068 billion with 1 586 billion passenger-kilometres flown: of this total passenger-kilometres the Association of European Airlines (AEA; the club of national flag carriers) flew 13.8%. Average annual growth rate of passengers carried during the period 1983-88 at the world level was 5.7% and the EC airline members of the AEA recorded 6.1%.

Industry structure

Air transport breaks down into several distinct sectors which have varying degrees of information available. Schematically the following breakdown can be discerned:

Scheduled airlines

All the flag carriers of the Member States (Member States flag carriers in alphabetical order are Aer Lingus, Air France, Alitalia, British Airways, Iberia,

Table 1
AEA total scheduled traffic by carrier, 1988 (1)

	Total passengers carried (million)	Of which Intra-Europe (million)	Passenger load factor (%)	Passenger revenue (million ECU)	Freight (million tonne-km)	Freight revenue (million ECU)	Total revenue (million ECU)	Employees	Fleet	Aircraft on order
Aer Lingus	3.0	2.4	71.9	337.3	102.0	37.3	374.6	5 945	26	14
Air France	14.8	7.0	70.2	3 007.6	3 154.4	656.8	3 664.4	37 122	105	51
Alitalia	9.2	3.8	63.9	1 566.9	1 018.8	281.4	1 848.3	18 977	72	32
British Airways	22.5	10.7	68.7	4 978.0	2 027.5	413.6	5 391.5	48 656	199	78
Iberia	14.5	5.3	70.8	1 805.1	589.4	184.7	1 989.8	28 003	84	32
KLM	6.2	3.3	69.1	1 680.5	1 872.6	588.1	2 268.6	23 307	49	21
Lufthansa	17.8	8.1	66.0	3 624.6	3 478.8	1 039.0	4 663.6	41 212	131	22
Luxair	0.3	0.3	53.3	32.2	0.5	0.8	33.1	910	7	7
Olympic Airways	6.7	1.6	68.1	559.3	101.9	30.5	589.8	12 133	35	6
Sabena	2.6	1.6	66.4	624.6	650.5	178.0	802.5	6 657	26	2
SAS	13.3	6.1	67.0	1 867.8	396.8	179.7	2 047.5	19 834	105	68
TAP Air Portugal	2.6	1.3	69.0	420.3	141.1	50.8	471.2	9 612	25	10
UTA	0.8	0.0	68.6	424.6	503.0	155.9	580.5	6 480	11	2
Total	114.3	51.4		20 928.8	14 037.3	3 796.6	24 725.4	258 848	875	345

(1) The data refer to both domestic and world-wide international traffic.

Source: AEA Statistical Yearbook 1988.

Table 2
Number of passengers by Member State flown on AEA airlines, 1988 (1)

From	To	B	DK	D	GR	E	F	IRL	I	L	NL	P	UK	Total
Belgium			77	230	65	174	215	45	198	3	79	64	449	1 599
Denmark		76		316	79	88	153	16	108	0	123	28	277	1 264
FR of Germany		233	314		269	478	854	42	746	0	374	127	1 519	4 956
Greece		71	42	300		56	134	0	260	0	107	6	222	1 198
Spain		179	94	497	57		618	12	479	4	207	163	813	3 123
France		212	166	891	132	605		79	893	4	353	201	867	5 403
Ireland		21	16	45	0	12	79		16	0	43	3	1 253	1 488
Italy		197	99	746	242	478	906	16		2	203	77	742	3 708
Luxembourg		5	0	0	0	5	3	0	2		0	10	22	47
Netherlands		78	125	374	102	206	345	42	208	0		67	742	2 289
Portugal		65	29	135	6	164	196	2	78	8	67		231	981
United Kingdom		425	285	1 552	221	807	1 782	1 256	760	26	751	227		7 341
Total		1 562	1 247	5 086	1 173	3 073	5 285	1 510	3 748	47	1 556	973	8 137	33 397

(1) 1 000 passengers carried.

Source: Association of European Airlines, Intra-European country-to-country traffic, 1988.

Table 3
Airlines operating scheduled Intra-Community services by Member State, 1989

Member States	Carrier	Code	Services to Member State
Belgium	Sabena	SN	All
Denmark	Scandinavian Airline Systems	SK	Not L
	Midtfly	NI	UK
	Cimber Air	QI	UK, D, F
	Maersk Air	DM	UK, D
FR of Germany	Lufthansa	LH	Not L
	Sudavia	FV	F, I
	Hanse Express	HX	B, NL, UK
	Nuernberger Flugdienst	NS	B, I, NL
	Naske Air	HC	F, I
	Air Bremen	HR	B, DK, UK
	RFG-Regionalflyg	VG	F, UK
	Delta Air	DI	E
Greece	Olympic Airways	OA	B, DK, D, F, I, NL, E, UK
Spain	Iberia	IB	All
France	Air France	AF	All
	Flandre Air	IX	D
	Air Vendée	VM	B, UK
	Air Littoral	FU	I, E
	Brit Air	DB	UK, IRL
	TAT-Export	IO	UK
	Aigle-Azur	ZI	UK
	Ireland	Aer Lingus	EI
	Ryanair	FR	D, UK
Italy	Alitalia	AZ	Not IRL
	Alisarda	IG	D, F
	Aliblu Airways	BQ	F
	Avianova	RD	D, E
Luxembourg	Luxair	LG	DK, D, GR, F, I, NL, P, E, UK
Netherlands	KLM	KL	Not IRL & L
	NLM Dutch Airlines	HN	B, D, UK
	Netherlines bv	WU	F, L, UK
	Transavia	HV	UK
	Dynamic Air	QG	UK
Portugal	TAP Air Portugal	TP	All
United Kingdom	British Airways	BA	All
	Air UK	UK	B, F, NL
	Birmingham Executive Airways	VB	DK, D, I, NL, F
	Dan-Air Services	DA	F, IRL, NL, P, E
	British Midland	BD	F, NL, IRL
	Brymon Airways	BC	IRL
	Virgin Atlantic	VS	IRL, NL
	Suckling Airways	CB	NL
	Britannia Airways	BY	P, E
	Monarch Airlines	ZB	E
	Orion Airways	KG	E, GR, I
	Air Europe	AE	B, D, F, P, E, DK, I, NL
	Eurocity Express	II	F, NL
	GB Air	GT	P
	Scottish European Airways	WW	D, B
	Capital Airlines	BZ	IRL
	Loganair	LC	IRL
British Island Airways	IV	I	
Region Airways	JA	NL	

Source: OAG (Official Airlines Guide)

KLM, Lufthansa, Luxair, Olympic Airways, Sabena, SAS, TAP and UTA) belong to the AEA. This body is not organized on a European Communities basis and members include a further eight European air-

lines. According to their latest yearbook for 1988 the members of the AEA carried more than 90% of all international scheduled passengers within Europe as well as most of the domestic traffic.

Table 4
Ownership of European Community airlines, 1988

Airline	Member State	Stakes in the company	(%)	Participation in other airlines	(%)
Aer Lingus	IRL	Government	100.0	Aer Turas Teoranta	Maj.
Air France	F	Government	99.4	Air Charter	80.0
				Air Inter	36.0
				Air Guadeloupe	45.0
				Euskal Air (via Air Charter)	20.0
Alitalia	I	Government	77.6	ATI	100.0
British Airways	UK	Private	100.0	Caledonian A/W	100.0
				Cal Air International	100.0
				Brymon Airways	40.0
Iberia	E	Government	99.8		
KLM	NL	Government	36.7	Martinair	25.0
		Private	63.3	Transavia	40.0
				NLM Cityhopper	100.0
				Netherlines	100.0
				Air UK	14.9
Lufthansa	D	Government	65.0	Condor	100.0
				DLT	40.0
				Cargolux	24.5
Luxair	L	Government	20.9	Luxair Commuter	100.0
		Private	79.1	Cargolux	33.0
Olympic Airways	GR	Government	100.0		
Sabena	B	Government	54.7	Sobelair	71.1
		Private	45.3		
SAS (+ Sweden & Norway)	DK	Government (ratio 2:3:2)	50.0	Linjeflyg	50.0
		Private	50.0	Groenlandair	25.0
				Wideroe	22.0
				Scanair	Maj.
TAP Air Portugal	P	Government	100.0	Air Atlantis	100.0
UTA	F	Private	100.0	Air Inter	30.0
				Aeromaritime	51.0

Source: Various, including Interavia, 10/88; Airlines, Flight World Aviation Directory; ABC World Airways Guide.

Data on AEA airlines is presented in Tables 1 and 2.

Table 3 lists all the airlines of the Community that were operating intra-Community scheduled services during summer 1989. There are 54 airlines on this list of which 19 are British. Perhaps more significantly there are five Member States where the intra-Community services are operated only by the flag carriers.

Table 4 shows ownership of the flag carriers i.e. who has stakes in these carriers as a percentage between government and private interests as well as further interests that these carriers have. Five flag carriers, Aer Lingus, Air France, Olympic Airways, TAP and Iberia, are 100% government owned. With regard to other airlines in which the flag carriers have a stake

they are, with the exception of KLM, mostly charter companies. Three of the carriers that are 100% government owned, namely Olympic Airways, TAP and Iberia, also have a monopoly out of their country on scheduled intra-Community services.

Table 5 gives an indication of the market structure in terms of number and size of firms by Member States.

Table 6 shows development of the number of bilateral intra-Community routes by Member States of origin for the summer schedules of 1987, 1988 and 1989. Thus the total number of intra-Community scheduled routes were 988, 1 040 and 1 118 for 1987, 1988 and 1989 respectively. Not only has there been an expansion in the number of routes but also in multiple-designated city-pairs and fifth-freedom ser-

Table 5
Structure and diversity of Community airlines, 1989

Member State	National airlines	Subsidiary or association of	Other airlines (> 250 employees)	Small airlines (< 250 employees)
Belgium	Sabena	Sobelair		Air Belgium Trans European A/W
Denmark	(SAS)	Danair	Conair Maersk Air Sterling A/W	Cimber Air Air Business Midtfly Int. A/W
FR of Germany	Lufthansa	Condor German Cargo	DLT Hapag-Lloyd LTU Aero-Lloyd NFD	Germania LTS Delta Air Regional
Greece	Olympic A/W			
Spain	Iberia	Aviaco	Air Europa Hispania Spanair	LTE Euskal Air
France	Air France UTA	Air Charter Aeromaritime	Air Inter Minerve TAT	Air Jet Air Limousin Air Littoral Air Vendee Brit Air Corse Air Int. Euralair Flandre Air
Ireland	Aer Lingus	Aer Turas		Ryan Air
Italy	Alitalia	ATI Aermediterranea	Alisarda	Avianova Aliblu Transavio
Luxembourg	Luxair	Cargolux		
The Netherlands	KLM	NLM Marinair Transavia Netherlines		Air Holland Dynamic Air
Portugal	TAP		SATA	
United Kingdom	British A/W	Caledonian A/W Cal Air Int.	Air Europe Air UK Britannia A/W British Midland Dan-Air Monarch AL Orion A/W Virgin At. A/W Air 2 000 British Island Brymon A/W Loganair	Air Bridge British Air Ferries Birmingham Executive London City A/W Scottish European Suckling A/W

Source: Various, including Interavia, 10/88; Airlines, Flight World Aviation Directory; ABC World Airways Guide.

vices operated by Community carriers. The development of multiple-designated city-pairs and fifth-freedom services gives a new dimension to competitiveness on routes and greater access to the market.

Table 7 situates the major Community flag carriers in the world rankings of IATA members in terms of

scheduled passenger-km flown and scheduled freight tonnes carried.

After the airlines of the AEA the remainder of the European scheduled market is shared between international carriers with fifth-freedom rights, regional airlines and a handful of European non-members of AEA who operate jet equipment. This latter group,

Table 6
Synoptic view of development of Intra-Community air services operated by Community airlines:
Number of bilateral Intra-Community routes, 1987-89

From	Routes			With multiple designation			With Community fifth freedom		
	1989	1988	1987	1989	1988	1987	1989	1988	1987
Belgium	54	44	45	2	1	1	2	1	0
Denmark	42	38	37	2	0	0	1	1	0
FR of Germany	189	184	173	9	7	7	4	3	0
Greece	37	36	39	1	0	0	0	0	0
Spain	126	118	108	5	4	2	0	0	0
France	168	154	153	3	3	2	3	0	1
Italy	131	110	99	2	1	1	1	0	0
Ireland	44	42	43	5	3	2	2	0	0
Luxembourg	20	17	15	0	0	0	2	2	1
The Netherlands	64	69	65	6	7	7	1	1	0
Portugal	48	42	33	1	2	2	0	0	0
United Kingdom	195	86	178	28	24	24	6	2	0
Total	1 118	1 040	988	64	52	48	22	10	2

Source: OAG (Official Airlines Guide).

which for the most part have established scheduled services after success in the charter market, is no longer confined almost exclusively to the United Kingdom. Indeed, besides the 12 AEA members from the EC (UTA does not operate services within the Community) there are a further 42 airlines operating international scheduled services.

Data on EC non-AEA airlines offering international scheduled services and charter mode flights are more difficult to obtain. Table 8 gives some data on a non-exhaustive list of these airlines including the 18 members of ACE (l'Association des Compagnies aériennes de la Communauté européenne) relating to 1987.

According to the ACE, 66% of passenger-km flown in Europe are carried by non-scheduled operators. In putting this statistic in perspective it should be pointed out that by its nature normal charter flights within the Community are much longer distance than the bread-and-butter scheduled traffic between the principal business centres.

Regional airlines

Regional airlines within the EC have been experiencing remarkable growth in recent years; special factors which have played a role in this growth have been the EC interregional air services Directive which has enabled greater market access and freedom from capacity constraints for operators, an acceptance of interregional flights as a means of transport by the travelling public and a reputation for reliability, safety and service standards. Members of the European Regional Airlines accordingly

achieved a 24% increase in passenger-kilometres flown.

Table 7
IATA members' ranking: top 20, 1988
Scheduled passenger-km flown (total)

Rank	Airline	Passenger-km (million)
1	United Airlines	111 081
2	American Airlines	104 207
3	Continental Airlines	65 154
4	British Airways	56 939
5	TWA	56 399
6	Japan Air Lines	49 328
7	Pan American	47 166
8	Eastern Air Lines	46 336
9	Air France	34 333
10	Lufthansa	34 033
11	Qantas Airways	26 209
12	KLM	23 270
13	Air Canada	22 812
14	Iberia	20 495
15	Alitalia	18 542
16	Canadian Airlines International	18 017
17	Saudi Arabian Airlines	14 935
18	Swissair	14 325
19	SAS	14 027
20	VARIG	13 664

Source: IATA Yearbook 1988.

Outlook

According to the Association of European Airlines, traffic prospects in (geographical) Europe for the coming five years are good, in particular for Ireland and Portugal.

Table 8
Non-scheduled operators, 1987

Airline	Member State	Passengers carried (1 000)	Total revenue passenger-km (million ECU)	Fleet	Personnel	Member of ACE	Report year
Aero-Lloyd	D	901	N/A	N/A	353		1987
Air 2 000	UK	860	2 314	4	275	X	1988
Air Europe	UK	2 585	7 248	25	1 200	X	1988
Air Europa	E	1 953	3 125	9	702	X	1988
Air UK (leisure)	UK	226	440	3	N/A	X	1988
Britannia A/W	UK	6 100	11 800	42	3 150	X	1988
British Midland	UK	N/A	981	N/A	N/A		1987
Caledonian A/W	UK	2 320	N/A	N/A	450		1987
Conair	DK	731	2 117	3	415	X	1988
Condor	D	3 134	8 350	26	1 427		1988
Dan-Air	UK	5 804	8 731	53	3 320	X	1988
DLT	D	551	239	24	486		1988
Euralair	F	404	453	4	N/A	X	1988
Germania	D	504	128	N/A	150		1987
Hapag-Lloyd	D	2 295	4 828	13	1 115	X	1988
Hispania	E	N/A	1 170	N/A	250		1987
LTE	E	351	826	2	171	X	1988
LTU	D	3 555	9 863	14	1 611	X	1988
LTU-Sud	D	424	1 903	3	N/A	X	1988
Maersk Air	DK	1 291	1 408	13	N/A	X	1988
Martinair	NL	1 183	4 072	9	1 270		1988
Minerve	F	750	2 500	11	615	X	1988
Monarch Airlines	UK	2 468	5 265	14	900	X	1988
Orion Airways	UK	N/A	3 075	N/A	687		1987
Sobelair	B	701	1 168	5	110		1988
Spanair	E	455	913	4	N/A	X	1988
Sterling	DK	1 981	5 197	18	1 384	X	1988
TEA	B	N/A	939	N/A	115		1988
Transavia	NL	1 100	2 315	13	607	X	1988
Virgin Atlantic	UK	N/A	2 208	N/A	N/A		1987

Source: *Air Transport World*, 6/89; ICAO.

The creation of the internal market within the Community and the emphasis on the free movement of goods, people and services will have a major impact on the demand for airline services. Linked with the development of the internal market is the liberalization of air traffic in the EC. Discussions on the second phase of liberalization are well advanced and their implementation with the resultant increased competition and ending of market access barriers

will add another impetus to air traffic growth in the 1990s.

The opening of the Channel Tunnel in 1993 could bring competition for airlines from surface mode traffic on certain links with the United Kingdom.

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AIRPORTS

(NACE 764)

Summary

Airports are an integral part of the air transport network. Their principal role is to provide the services that passengers and aircraft require at their point of departure and arrival and as collection points for the charges that will be used to pay for these services. In addition to their primary aeronautical functions, airports often engage in commercial activities, lease property, provide airport assistance, rent equipment or facilities, or provide industrial or other services.

Throughout the 1980s but in particular since 1983 strong growth has been recorded in the volume of airport traffic in terms of flight, passengers and freight.

The impact of 1992 on airport facilities will be important the more so because of the development of freight flows without frontiers and the segregation of Community passengers in the terminals, leading to lower revenue from the duty-free shops.

Airport authorities

In Europe, the legal structure of airport authorities varies widely from one Member State to another. There are six main types of airport statutes:

Publicly owned establishments

The ADP of the Paris airport manages a total of 14 airports in the Paris region — three major commercial airports (Roissy, Orly, Le Bourget) and 11 airfields.

Copenhagen Airport Authority manages the commercial airport of Kastrup and the airfield of Roskilde.

Airports owned and managed by joint stock companies

The Frankfurt airport is managed by a joint stock company whose capital is held 42.5% by the State of Hesse, 25.8% by the city of Frankfurt, and 31.7% by the Federal Government.

The Schiphol Airport Authority is a joint stock company whose capital is held 76% by the State, 20% by the city of Amsterdam, and 4% by the city of Rot-

terdam; it owns the Amsterdam airport and is responsible for its management.

Publicly owned airports managed as concessions by public institutions

The commercial airport of Marseille-Marignane and the airfield of Aix-les-Mille in France are managed as public utility concessions by the Chamber of Commerce and Industry of Marseille.

The commercial airport of Nice-Cote d'Azur and the airfield of Cannes-Mandelieu are managed as public utility concessions by the Chamber of Commerce and Industry of Nice.

Publicly owned airports managed as concessions by private companies

The Rome airports of Leonardo da Vinci, Fumicino and Ciampino are managed as concessions by a private company whose major shareholder is Alitalia with a 46% equity interest; the other shareholders are Italsat, with 43%, IRI, with 10%, and the Chamber of Commerce and Industry of Rome, with 1% interests.

Airports owned or managed by a private company

The BAA plc (British Airport Authority public limited company) manages London's three commercial airports (Heathrow, Gatwick, Stansted) and four airports in Scotland (Glasgow, Edinburgh, Aberdeen, Prestwick). The BAA was a publicly owned establishment until 1987, when it entered the private sector.

The Milan airports of Malpensa and Linate are owned and managed by a private company, SEA.

The Manchester airport is owned and managed by a private company, the Manchester International Airport Authority, whose shareholders are the city of Manchester and the nine districts that make up the County of Greater Manchester.

State-operated airports

Spanish airports are managed by a national airport authority, which is under the direct control of the

Table 1
Top 20 ranked Community airports, 1983-88 (1)

Rank	Airport	Member State	1988	1988/87 (%)	1987	1983	Average annual growth 1983-88
1	London total	UK	59.8	8.0	55.4	39.6	10.2
	London Heathrow	UK	37.9	7.9	35.1	26.7	8.3
	London Gatwick	UK	20.9	6.6	19.6	12.5	13.4
	London Stansted	UK	1.1	48.0	0.7	0.4	43.1
2	Paris total	F	40.7	9.9	37.0	29.7	7.4
	Paris Orly	F	22.4	8.7	20.6	16.3	7.6
	Paris CDG	F	18.3	11.3	16.4	13.4	7.3
3	Frankfurt	D	25.2	8.3	23.3	17.0	9.7
4	Amsterdam	NL	15.0	10.0	13.6	9.7	11.0
5	Rome	I	14.9	1.5	14.7	11.4	6.2
6	Madrid	E	13.7	12.1	12.2	10.2	6.9
7	Palma Majorca	E	11.8	4.3	11.3	8.7	6.9
8	Copenhagen	DK	11.6	4.4	11.2	8.3	8.1
9	Athens (2)	GR	10.7		10.7	9.1	3.7
10	Düsseldorf	D	10.4	5.0	9.9	7.1	9.1
11	Milan total	I	10.2	5.4	9.7	7.4	7.8
	Milan Unate	I	8.3	3.2	8.1	6.1	7.4
	Milan Malpensa	I	1.9	16.2	1.6	1.3	9.3
12	Manchester	UK	10.0	15.2	8.7	5.1	19.4
13	Munich	D	10.0	4.0	9.6	6.1	12.8
14	Barcelona	E	7.5	8.5	6.9	5.6	6.8
15	Brussels (2)	B	6.4		6.4	5.0	5.8
16	Las Palmas	E	6.3	8.8	5.8	4.2	10.0
17	Hamburg	D	6.0	10.7	5.4	4.3	7.9
18	Tenerife	E	5.7	6.7	5.3	3.8	10.0
19	Malaga	E	5.4	5.3	5.2	4.1	6.3
20	Nice	F	5.0	7.4	4.7	3.8	6.4
22	Dublin	IRL	4.4	39.1	3.2	2.6	14.5
23	Lisbon	P	4.3	10.4	3.9	3.3	6.0
59	Luxembourg	L	1.0	7.7	0.9	0.7	10.2
	Total		296.3	7.7	275.1	206.6	8.7

(1) Million passengers.

(2) 1987 figures used again for 1988.

Source: Airports of Paris.

Ministry of Transport, Tourism and Communications.

Greek airports are managed by the Civil Aviation Authority, which is under the direct control of the Ministry of Transport and Communications.

The eight Belgian airports — including Brussels-National, which handled over 90% of the traffic in Belgium in 1986 — are managed directly by the Regie des Voies Aeriennes.

The Lisbon airport and the six other airports in Portugal are managed by the ANA.

The Irish airports of Dublin, Cork, and Shannon are managed by Aer Rianta, an organism under the direct authority of the Ministry of Communications.

Current situation

The importance of an airport can be measured on the basis of the number of passengers checked in and the volume of freight forwarded.

Tables 1 and 2 provide recent data on the top 20 ranked Community airports for passengers and freight respectively. In the case of the passenger figures, data for Member State capitals Dublin, Lisbon and Luxembourg are also shown. These statistics show substantial growth in recent years averaging 8.68 and 8.16 for passengers and freight, respectively. The top four ranked Community airports, London, Paris, Frankfurt and Amsterdam also have a very high percentage of international traffic. Given their geographical proximity these airports are in competition with each other for certain important sectors of their passenger traffic.



Table 2
Major Community airport freight movements, 1983-88 (1)

Rank	Airport	Member State	1988	1988/1987 (%)	1987	1983	Average annual growth 1983-88
1	Frankfurt	D	1 007	10.8	909	628	12.1
2	London total	UK	863	9.7	787	598	8.9
	London Heathrow	UK	645	11.9	576	470	7.4
	London Gatwick	UK	194	1.1	192	110	15.2
	London Stansted	UK	24	29.3	19	18	6.8
3	Paris total	F	814	6.6	764	662	4.6
	Paris CDG	F	577	5.7	546	498	3.2
	Paris Orly	F	237	8.9	218	164	8.9
4	Amsterdam	NL	575	12.0	514	370	11.1
5	Brussels (2)	B	234		234	122	18.3
6	Rome	I	202	0.6	201	162	5.0
7	Madrid	E	179	8.8	164	154	3.2
8	Copenhagen	DK	155	7.2	144	141	1.9
9	Milan total	I	142	19.3	119	96	9.6
	Milan Malpensa	I	75	39.9	54	45	13.5
	Milan Unate	I	67	2.3	65	51	6.2
10	Luxembourg	L	114	18.2	97	62	16.9
11	Cologne	D	108	-3.1	111	54	19.9
12	Athens (2)	GR	93		93	75	4.8
13	Manchester	UK	77	19.6	65	24	44.5
14	Lisbon	P	65	7.6	60	49	6.4
15	Barcelona	E	56	26.3	44	51	1.8
16	Munich	D	47	11.9	42	30	11.0
17	Dublin	IRL	43	19.5	36	40	1.5
18	Düsseldorf	D	42	6.5	40	31	7.3
19	Las Palmas	E	38	5.2	36	32	3.9
20	Hamburg	D	35	12.9	31	26	6.9
	Total		4 889	8.9	4 491	3 407	8.2

(1) 1000 tonnes.

(2) 1987 figures used again for 1988.

Source: ICAA.

Table 3
Major Community airports indicating scheduled, charter and transit passengers, 1988 (1)

Rank	Airport	Member State	Scheduled	Charter	Transit	Total	% charter
	London total	UK	47.3	12.9	0.5	59.8	21.6
1	London Heathrow	UK	37.5	0.1	0.3	37.9	0.2
2	London Gatwick	UK	9.6	11.2	0.1	20.9	53.7
3	London Stansted	UK	0.3	0.8	0.1	1.1	69.4
	Paris total	F	37.8	2.3	0.6	40.7	5.7
4	Paris Orly	F	20.4	1.8	0.2	22.4	7.9
5	Paris CDG	F	17.3	0.6	0.4	18.3	3.0
6	Frankfurt	D	21.7	2.7	0.8	25.2	10.7
7	Amsterdam	NL	11.9	2.7	0.4	15.0	17.9
8	Rome	I	N/A	N/A	N/A	14.9	N/A
9	Madrid	E	12.6	0.6	0.4	13.7	4.4
10	Palma Majorca	E	2.7	9.0	0.1	11.8	76.8
11	Copenhagen	DK	9.8	1.5	0.4	11.6	12.7
12	Athens (2)	GR	N/A	N/A	N/A	10.7	N/A
13	Düsseldorf	D	5.0	5.0	0.4	10.4	48.1
	Milan total	I	9.0	0.9	0.4	10.2	8.3
14	Milan Unate	I	8.1	0.2	0.1	8.3	2.0
15	Milan Malpensa	I	0.9	0.7	0.3	1.9	36.1
16	Manchester	UK	N/A	N/A	N/A	10.0	N/A
17	Munich	D	6.8	2.8	0.4	10.0	27.8
18	Barcelona	E	6.8	0.4	0.3	7.5	5.6
19	Brussels (2)	B	N/A	N/A	N/A	6.4	N/A
20	Las Palmas	E	2.2	4.0	0.1	6.3	62.5
26	Dublin	IRL	4.1	0.3	0.0	4.4	6.6
27	Lisbon	P	3.6	0.4	0.3	4.3	8.2
62	Luxembourg	L	N/A	N/A	N/A	1.0	N/A

(1) Million passengers.

(2) 1987 figures used again for 1988.

Source: ICAA.

Eleven airports handle more than 100 000 tonnes of freight a year: Brussels ranks fifth in freight whereas in passenger terms it stands at only 15th. Further, all 12 Member State capitals are ranked in the first 17 for freight whereas for passengers Luxembourg only managed 59th spot.

Congestion

On the one hand there is limited competition between airports to increase their share of the market and the other airports are in many cases knocking against their particular capacity limit with the additional problem of air traffic control constraints.

The capacity limit of individual airports is determined by a number of factors. It cannot be fixed at a set upper limit on the number of passengers or the volume of freight but can only be approximately determined. The number of flights is limited by the layout of runways as well as by the number of gates

in the terminal and positions on the apron (excluded are general aviation movements which further reduce the possible number of commercial flights). Further reduction in capacity occurs at many airports as a result of restrictions applying to night flights. The number of passengers is limited by the connection between the airport and the traffic network (roads and railways), the number of check-in counters and the check-in capacity of each counter (electronic data-processing infrastructure). The volume of freight that can be forwarded, besides being limited purely by the relevant infrastructure, is restricted by the frequency and duration of closures due to bad weather and the extent to which night use of the airport is possible. Installation of a freight hub, which is essential if high volume is to be achieved, is only possible if these major requirements can be largely met.

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FINANCIAL SECTOR

(NACE 81/82/831)

The economic importance of the sector in the EC economy

The share of the financial service sector in the EC economy is increasing continuously, both in terms of value added (6.4% of total value added in 1985) and in terms of employment (3% of total employment). This share however varies widely across countries, ranging from 4.3% in France to 14.9% in Luxembourg.

Value added

The high share of value added in total GDP in Luxembourg mainly reflects the international character

of its financial markets. In 1987, 99.8% of all bonds listed on the stock exchange were foreign, while the market share of foreign banks was 91%. A similar explanation can be given to the high share of financial services in the United Kingdom, with London still considered to be the financial centre of Europe. Figure 1 shows the share of value added in the financial services' sector in each Member State.

Employment

Within the financial services sector, banking accounts for the largest share of employment (65%). The relatively high employment figure in Belgium

Figure 1

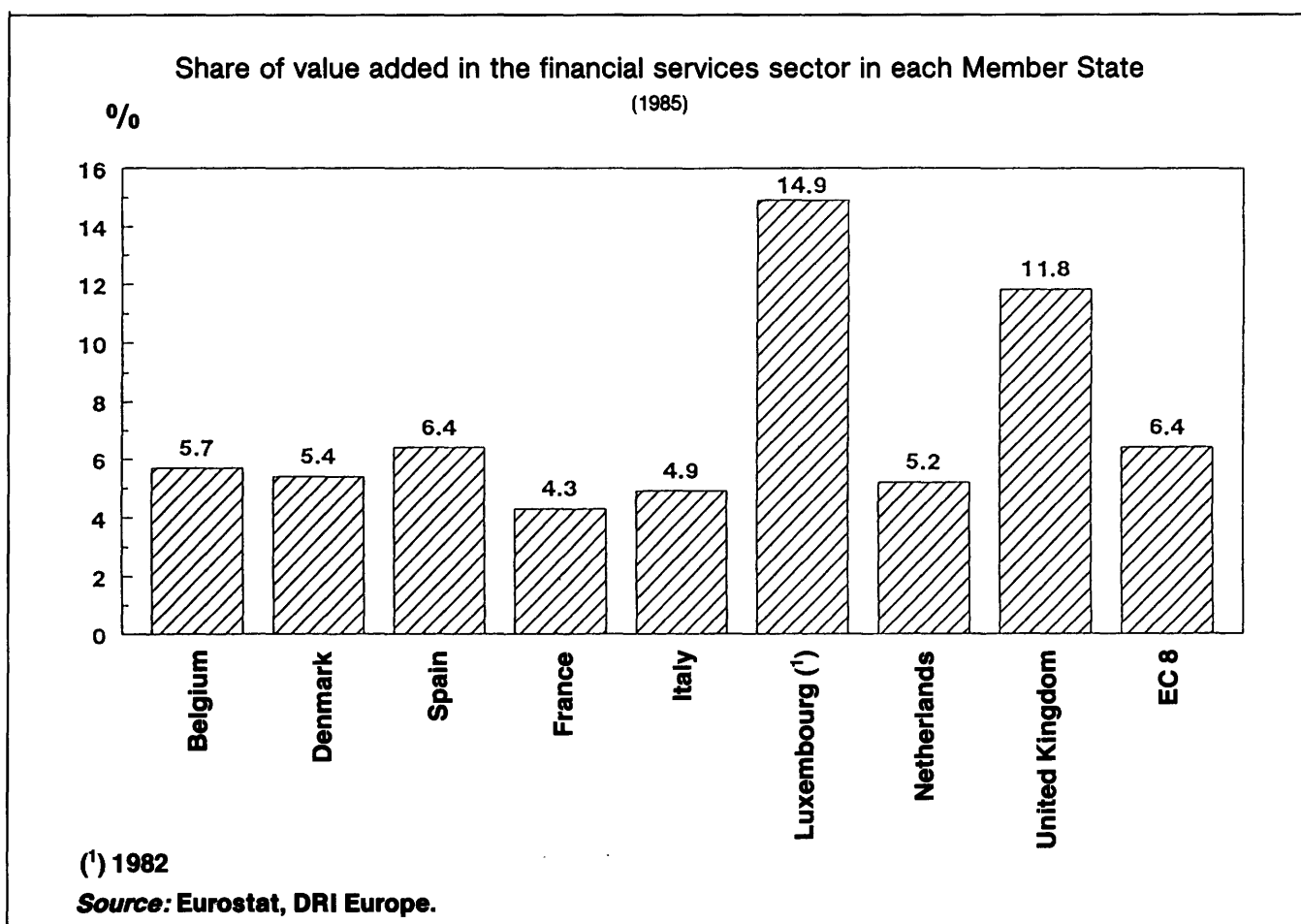
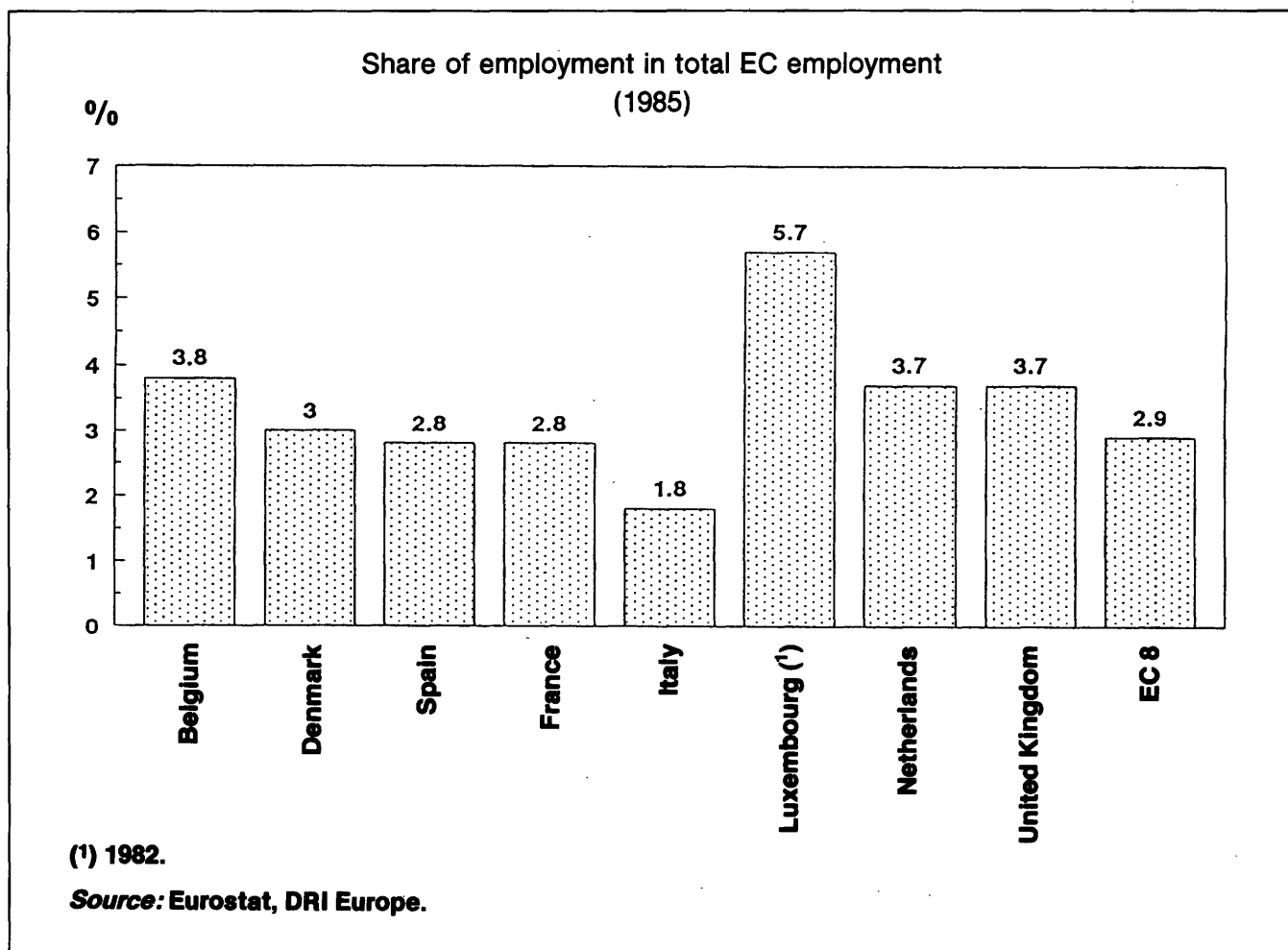


Figure 2



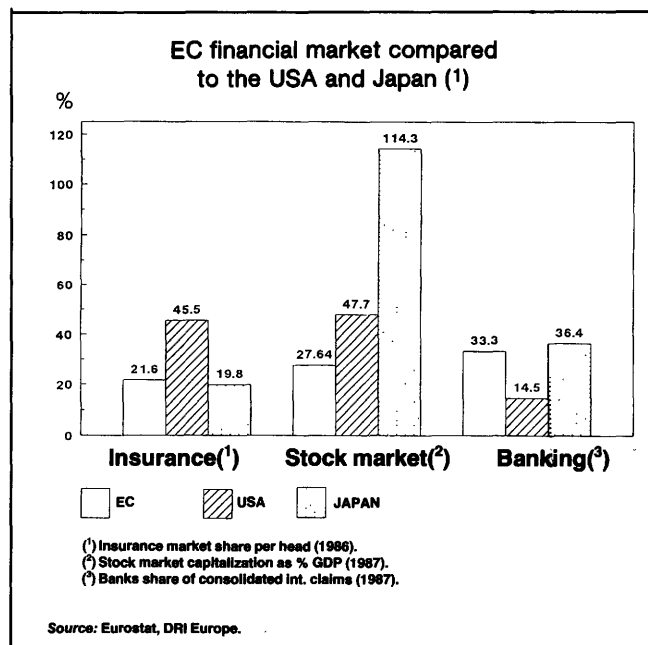
(3.8% of total employment) can be explained by the exceptionally high number of bank branches in that country: the average number of inhabitants per bank branch is equal to 403, compared to an EC average of 3 380. The correlation between employment and the number of inhabitants per bank branch is also obvious in the other Member States.

With an average rate of growth of employment of 1.3% over the period 1980-87, the financial sector ranks third after 'other market services' (2.9%) and 'lodging and catering services' (1.5%).

International comparison

Despite the rapid expansion of financial services in Europe, the sector is still somewhat less developed than in the other industrialized countries. In 1987, the share of stock market capitalization in the EC was 21%, compared to 33% in the USA and 42% in Japan. Figure 3 shows the stock market capitalization as a percentage of GDP, along with the insurance market share per head, and the banks' share of consolidated international claims.

Figure 3



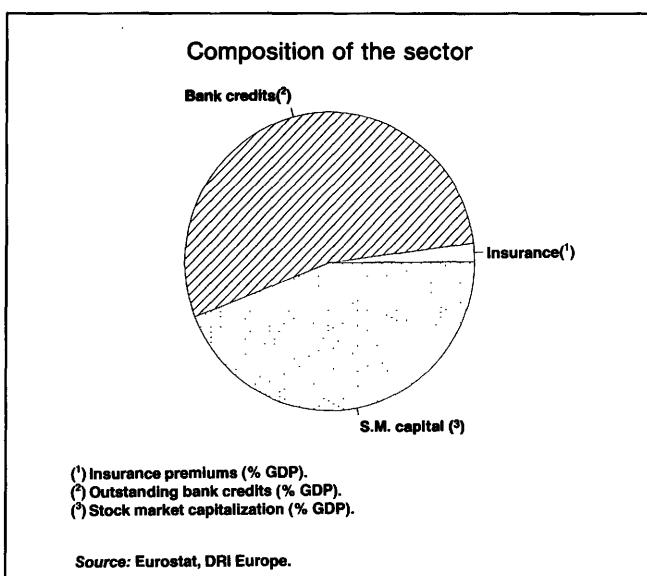
International banking in Member States accounted for one-third of total banking business in 1987. The

Japanese share was 36.4% whereas the American share accounted for only 14.5%.

All the steps made by the financial institutions in the EC towards diversification, modernization or structural change should be considered in the context of capital market liberalization (mid-1990), and the integration of financial markets by 1992. These trends will be discussed in the section on 'Risks and opportunities'.

Nevertheless, increased competition and concentration are likely to result in personnel reductions. After a growth period of 20 years, the share of the EC insurance market fell during the 1980s, along with increases in the American and Japanese shares. For the EC, insurance premiums to GDP stood at 6%, the USA at 9.2% and Japan at 7.9%. The insurance market share per head was, however, lowest in Japan (19.8%) compared to 21.6% in the EC and 45.5% in the USA.

Figure 4



Description of the industry

Since it is difficult to compare the volume of trading in the subsectors considered (banking, insurance and stock markets) the composition of the sector is given in terms of GDP share.

Bank credits represented 142% of GDP in 1985. Insurance premiums represented 5.2% of GDP with the highest insurance rate in the UK (8.1%) and the lowest in Ireland (2.2%). Stock market capitalization accounted for 116% of GDP in 1985. Here again, the lowest rate was observed in Ireland (75%). Luxembourg accounted for an 11 125% capitalization ratio,

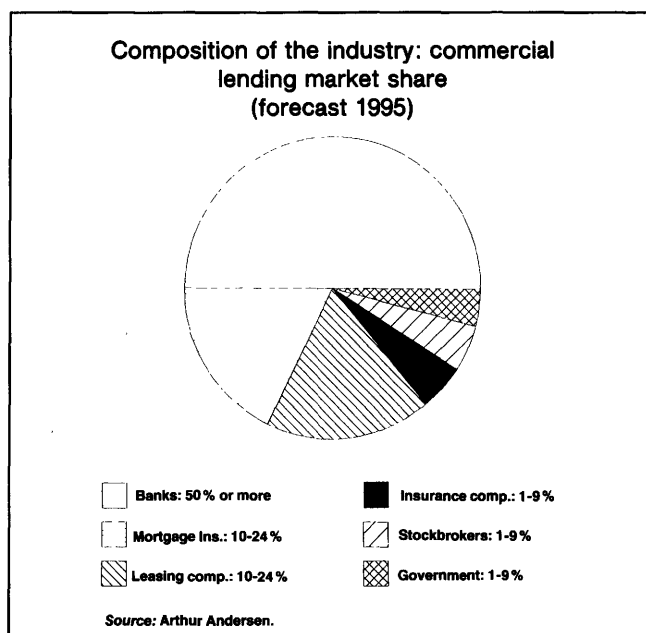
but this again results from the exceptionally high degree of internationalization of the Luxembourg stock market.

Industry structure

The structure of the industry is changing: the deregulation of financial markets will lead to increased competition, only because existing monopolies (for instance: broker agents) will progressively be abolished. Mergers and acquisitions, especially among banks, are part of the general policy in view of 1992.

In the coming years, a concentration of activity within the largest institutions is likely, both for banks and for insurance companies. Major financial institutions are increasingly seeking to diversify their portfolios across a wide range of banking services. For instance, banks are selling insurance policies of their affiliate insurance companies, while insurance companies are dealing with pension funds. The frontier between insurance and banking is sometimes unclear and, as new activities will develop, this trend will be accentuated although banks are expected to use technology to create barriers against non-banks.

Figure 5



Savings/mortgage institutions are increasing their market presence. Figure 5 gives an idea of the share of commercial lending by 1995.

A list of major financial institutions in each sub-sector is provided within the relevant sub-chapters.

The degree of market concentration can be measured by looking at the share of the market that is held by the four largest banks. According to these figures, the highest concentration is observed in Ireland, where the largest four banks account for 74% of the market. The Federal Republic of Germany has the lowest concentration, with a rate of only 15%. The European average is 42%.

In life insurance, the 10 leading companies account for 27.9% of the market; for non-life insurance they only account for 17.8% of the market, a much lower concentration ratio than in banking.

Risks and opportunities

Technology

Expenditure on technology will rise sharply, especially for the banking sector. Securities markets are already highly developed technologically, but more efforts are still needed to meet future requirements. The recent event on the Brussels stock market proved that some aspects of the existing infrastructure were insufficient to meet sharp increases in the trading volume: as on 13 October 1989, the computer system, better known as CATS, could not deal with 10 000 orders simultaneously for one listed bond (Petrofina) and broke down.

As a consequence, the stock market values could not be calculated at all until Monday 16 and Tuesday 17 October. In order to avoid such situations, the system's capacity should be upgraded, and its efficiency improved, for instance by automating the execution of small orders.

Within the banking sector, a significant rise in expenditure on technology implementation is expected to take place as financial institutions attempt to improve productivity and reduce costs. Banks will tend towards improved automation through more sophisticated distribution processing systems, or through automation of a wide range of clerical branch functions. They will also invest in communication technology to improve their businesses. If banks want to extend their activity towards securities markets, again, technology (especially underlying transaction processing systems) will be a key determinant in the possibilities to participate.

The development of Eftpos (Electronic funds transfer at the point of sale) will be dominated by the banking sector. Retailing organizations expect to hold a share of about 25% of POS networks by 1995. Hire-purchase companies, credit card companies

and savings/mortgage institutions are expected to be involved. The major threats to the use of POS are additional responsibilities and risks, loss of commission for banks and loss of credit balances for customers. Finally, by 1995, more than half of the personal customers are expected to use Eftpos.

Competition from non-EC countries

The second banking Directive, designed to allow banks to operate throughout the Community on a single banking licence from another Member State could be supplemented with simplified mechanisms for giving authorization to third country banks who wish to set up in the EC. These mechanisms are better known as 'reciprocity rules'. This could imply fierce competition from new low-cost competitors from South-East Asia and an increase in international strategic alliances.

The Impact of 1992

Harmonization measures

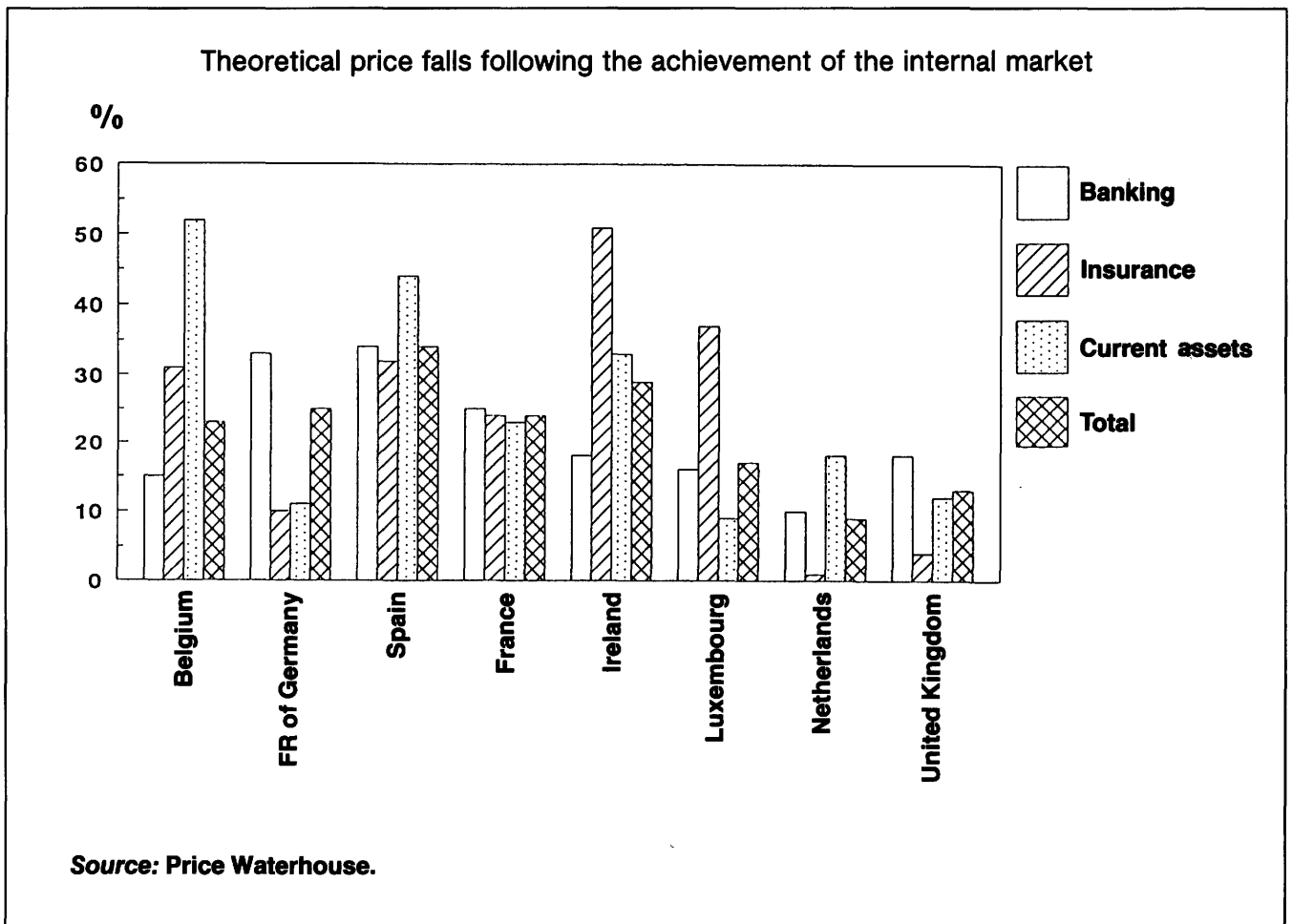
With the Directive on liberalization of capital movements coming into force in 1990, the financial sector is going through an important period of structural change.

The European regulation seeks to open financial markets without neglecting the protection of depositors, investors and insured. The main target is the mutual recognition of control regulations among Member States. This means that a single procedure for authorization in one of the Member States is sufficient to set up a subsidiary with the same financial activity anywhere in the EC.

The most important texts in the field of financial institutions are:

- **Stock markets:** the Directive 85/611/EEC which came into force on 1 October 1989 on institutions of collective placement of securities and the proposition (Directive COM/88/778) on investment services.
- **Banking:** the second Directive COM/87/715, handling the entry barriers of credit institutions and the cross-border financial activity. It was finally adopted in December 1989.
- **Insurance:** the Directive 88/357/EEC on direct insurance excluding life insurance, which introduces free implementation of services, especially concerning high risks.

Figure 6



Legislation and regulation barriers

As settlement costs vary a lot within the EC, some foreign banks have difficulty in competing with the local established bank branches, especially in some countries (for instance Italy and Spain) who limit the participation of non-residents in resident banks. Although the commercial activity of merchant banks is more or less free, the transfrontier banking services will still be restricted at least in some Member States, even once exchange controls are abolished. For instance, banks can be restricted from collecting savings of extra-national depositors. These restrictions will be abolished as soon as the second banking Directive is adopted. The final target is a coherent European banking law, at least as far as institutional problems are concerned.

Insurance companies are allowed to operate in all Member States although regulations differ considerably within the EC. In general, transfrontier insurance services and especially imposed insurances are not allowed, the argument being the protection of consumers. The second Directive should open the insurance market completely.

Stock markets have already been subject to various harmonization measures, such as admission to different EC stock markets thanks to mutual recognition, and admission to place shares in all Member States for placement funds.

Exchange controls

The achievement of the internal market for financial services is highly dependent on the total abolition of exchange controls between Member States. The liberation of capital movements for residents of the United Kingdom, the Federal Republic of Germany and the Netherlands has already been adopted. Belgium and Luxembourg still have a double exchange market which makes a difference between capital transactions and ordinary transactions. France and Italy are currently liberating exchange controls while Spain and Greece continue to apply a system of exchange control.

Once capital movements are fully liberalized, it will nevertheless still be possible to set up exchange controls in order to help solve the balance-of-payments

problems, though only with the agreement of the other Member States.

Potential price reductions

Price Waterhouse has estimated the potential change in the price of several representative financial products after technical barriers (regulations) and exchange controls are abolished. According to these calculations, the average price reduction for EC 8 excluding Portugal, Greece, Ireland and Denmark would be approximately 10%, or 0.7% of GDP.

Spain is expected to experience the strongest price reductions (34%), Italy, France, Belgium and the Federal Republic of Germany would be in the middle, while the lowest price reductions would take place in Luxembourg, the United Kingdom and the Netherlands. The detailed potential price falls are shown in Figure 6.

Conclusion

The achievement of financial integration is a main objective of the single European market programme,

since its effects will spill over to the rest of the European economy as a whole.

Investors will be able to access a broader range of financial instruments, and will be able to diversify their portfolios. Lenders will reach similar advantages since they will be able to attend different financial sources in order to limit risks.

Finally, the liberalization of financial markets and especially the abolition of exchange controls will result in net profits since investment will be driven towards the most profitable offers regardless of the country in which they are made. The resulting capital flows will level-off interest rates, real profit margins and thus raise the marginal efficiency of capital in the whole Community.

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STOCK EXCHANGE

(NACE 831)

Summary

The securities market consists of a primary market where securities are issued and a secondary market where brokerage, dealing and market-making are the main activities.

The institutions active in the securities markets are various and, as 1992 comes nearer, they tend to concentrate. Banks and big integrated securities firms will play a big role. The major change in view of the single market is the total liberation of capital movements.

The increasing trading volume of stock exchanges, which came to a peak in October 1987, makes investments for technology, training and modernization necessary to face the challenges of the future.

Definition of securities markets

Securities markets are a series of mechanisms or places in and through which the financial products, called securities, are traded. Their economic function is to collect the excesses or surpluses of the economy (savings) and to channel them to those units which need them; this function is accomplished by financial intermediaries.

There are many possible classifications of securities markets; the most relevant here are:

- capital (medium and long-term instruments) and money (short-term instruments) markets;
- primary markets (issues of securities) and secondary markets (where securities issues are traded);
- organized and non-organized markets; the typical example of the first kind are the stock exchanges, which are subject to specific rules of negotiation;
- spot markets in which deliveries are made and paid for on the spot (immediately) and forward (future) markets, in which deals are arranged for future deliveries, to be paid for as agreed or on delivery.

The activities

In the primary market, the activities consist of the underwriting and distribution of securities issues; they are arranged by the institutions allowed to do so (the merchant or investment banks, or the commercial banks in universal banking systems).

As for the secondary market, the activities consist of trading in existing securities; different kinds may be distinguished:

- brokerage: acceptance and/or execution of investors' orders relating to securities on an agency basis against the payment of a commission;
- dealing as principal: execution of transactions in securities for own account and at own risk with a view to profiting from the margin between bid and offer prices;
- market-making: maintenance of a market in certain securities by dealing in such securities at prices reflecting the state of the market;
- dealing or brokerage in futures and options.

A particular activity is that performed by the collective investment institutions; they permit investment by private investors in securities by spreading the risk between a great number of different securities ('portfolio theory'), and by entrusting the management of the portfolio to professionals.

A final group of activities is constituted by portfolio and investment management, and investment advice.

The institutions

The function of institutions active in the securities markets is to be the contact point between those who have surpluses and those who need financing. One of their tasks is to transform the financial assets and liabilities, to make them more suitable to the needs and desires of both savers and those seeking financing.

There are many different kinds of institutions and undertakings, and their nature, legal status and functions vary according to the regulations in force in the different Member States.

As a general rule, it can be affirmed that in the Community there is not a strict specialization of institu-



tions performing the activities mentioned in 'The activities' section above, and that the institutional classifications in this sector tend to blur together. On one side, a trend towards deregulation and elimination of institutional barriers, aimed at spurring competition, can be observed; on the other hand, the proposed Community legislation (mainly the proposal for a Second Banking Directive of 16 February 1988, and the proposal for an investment services Directive of 16 December 1988) tends to the establishment of a universal banking system, in which securities activities are considered as business integral to banking, and thus toward the development of global securities firms which can engage in a broad range of securities business.

As a consequence, even though specialized institutions will probably continue to exist, it seems that banks and big integrated securities firms will (and already do in most markets) dominate in the securities markets, performing all kinds of securities activities.

Other institutions are active in the securities markets as investors: banks, mortgage credit institutions, pension funds, institutions for collective investment

in securities, insurance companies and also the investment departments of large companies play a very important role in the securities markets, since they represent major shares of the holding and trading of securities.

Current situation

The representatives of the stock exchanges presented an analysis of the October 1987 market events and economic background. Although the stock price indices of the majority of markets were once again close to, in some cases even exceeding their pre-crash levels, it was obvious that investor confidence had been severely tried by the sudden price dislocation and was not yet entirely restored.

The world-average of price/earnings ratio which rose from 19 in the beginning of 1987 to 25 after the crash, has now stabilized around the pre-crash level of 19.5 again. The USA even recorded a P/E ratio of 13.6 in the third quarter of 1989. On the Tokyo Stock Exchange, the average P/E ratio has retreated somewhat from its pre-crash high of about 65, but it is still very high (at about 55) by world standards. An explanation of this gap between Japan and other markets could be the differences in accounting rules.

The assembly noted that, beyond short-term mechanisms and decisions, greater monetary stability and better coordination of economic policies are the fundamental conditions for the markets to return to a better balanced state.

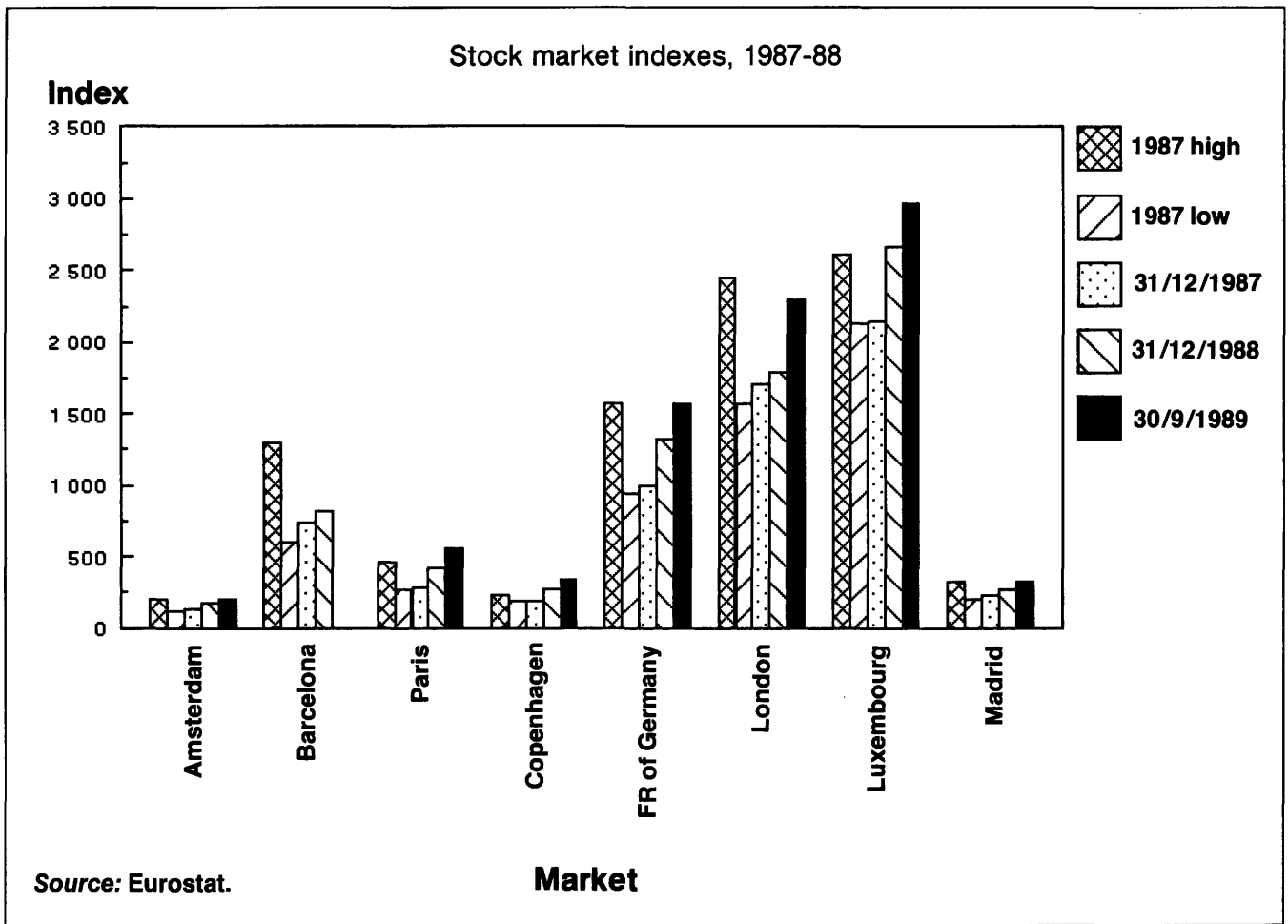
The financial sector is going through a period of structural change since the Directive on the complete liberation of capital movements (88/361/EEC) will come into force on 1 January 1990. This Directive seeks to obtain a single market for capital and financial services in the EC.

The most important text is Directive 85/611/EEC which came into force on 1 October 1989. It handles the institutions of collective placements of securities and the proposition (Directive COM/88/778) on investment services. The latter could be accepted in 1989.

Regulatory environment

Securities activities are highly regulated in all Member States, in order to ensure an appropriate level of investor protection and a proper functioning of the capital markets. Regulations extend to the public issues of securities, the persons or institutions

Figure 1



able to act as intermediaries in securities operations, and the structure and functioning of investment funds; similarly, there are bodies in charge of the supervision of securities business and of the control of the respecting of prudential and publicity regulations.

A very important factor is the presence or absence of regulations on the movement of capital, which, in several Member States, still hinders the development of securities markets.

Perhaps the most common characteristic of securities markets regulations among Member States is their diversity; in fact, each market has developed to meet local needs and this has shaped their particular characteristics; consequently, one cannot speak of a European securities industry, but rather of 12 different markets, which makes the comparison between them also with regard to third countries' markets difficult.

The kind of institutions acting as intermediaries in securities issues differ according to Member State; there is not a strict legal separation between commercial banking and securities businesses, and com-

mercial and investment banks are the main players in these markets managing or underwriting new issues of securities.

Primary markets

The proposal for an EC Directive coordinating the requirements for the drawing up, scrutiny and distribution of the prospectuses to be published when securities are offered for subscription or sale to the public has now reached the stage of a common position in the Council and is likely to be formally adopted in 1989.

Secondary markets

The regulations relating to securities trading are complex and differ significantly between Member States. In order to harmonize stock-exchange regulations, the EC has adopted several directives coordinating the conditions for admission of securities to official stock-exchange listing (79/279/EEC), the prospectuses to be published for the admission of securities to official stock-exchange listing

(80/390/EEC), and harmonizing the information to be published half-yearly by companies whose shares have been admitted to official stock-exchange listing (82/121/EEC).

Persons or institutions wishing to deal in securities have generally to be authorized by the securities markets' supervisor in the Member State; but the rules as to the conditions to be authorized, let alone those concerning contract and price regulations, vary considerably from one Member State to another; as an example, in several Member States (Belgium, Portugal and, until recent reforms, France, Greece and Spain) only individuals can be licensed as stockbrokers, who may even have to be in some cases nationals of those Member States, while in others, companies can be licensed; in one Member State (the Federal Republic of Germany) a bank licence is required to be member of a stock exchange.

On the stock exchanges there are usually 'junior markets' for securities issued by small and medium-sized enterprises, for which there are fewer legal requirements; these junior markets may or may not be organized. Securities quoted on a stock exchange may also usually be traded out of the stock exchange, in a parallel market, with or without the intervention of a stockbroker; the volume of securities traded off the stock exchange is in some Member States even greater than that of securities traded on it.

Institutions for collective investment

The types of institutions for collective investment in securities also differ amongst Member States; the Ucits (Undertakings for collective investment in transferable securities) Directive (85/611/ECC), however, has established common basic rules for the authorization, supervision, structure and activities of collective investment undertakings other than those of the closed-end type, and the information they must publish, which will facilitate the free circulation of their units inside the Community.

Market structure

It can be affirmed that banks dominate in a number of the Member States' securities markets, either as advisers or underwriters in the primary market, or intermediaries in the secondary, or as owners of merchant banks and brokerage firms; this is especially the case in the British securities market where they are mostly investment or merchant

banks, either as subsidiaries of overseas securities firms (mostly Japanese and US), or subsidiaries of banks, or independent.

For the coming years, a concentration of the business within the biggest institutions will probably take place. This perception will be different according to the Member States and to the various kinds of activities.

Size of the market

Outstanding value of securities in circulation

There are no homogeneous data on the outstanding value of securities in the Member States; comparable data exist only on the value of securities listed on the stock exchanges. The tables below show the par value of bonds and debentures listed in the main stock exchanges of the EC. The strength of the London, Luxembourg and German stock exchanges is noticeable; the high values of Luxembourg are due to the fact that it is a centre for the Eurobond market.

Table 1
Par value of bonds and debentures listed on FIBV exchanges, 1988

	Million ECU
Amsterdam	106 856
Barcelona	54 349
Brussels	79 774
Copenhagen	134 060
Federation of German stock exchanges	633 228
Italy	351 236
London (1)	430 908
Luxembourg (2)	703 913
Madrid	56 912
Paris	277 342
EC 10	2 828 577
New York	1 364 669
Tokyo	888 380

(1) Domestic private sector includes Eurobonds of UK companies. International bonds include foreign Eurobonds, Irish gilts and overseas company fixed interest.

(2) Value of bonds issued in Luxembourg francs.

Source: FIBV: Fédération Internationale des Bourses de Valeurs.

As for the value of equity shares listed, Table 3 shows the market value of equity shares listed in the main EC stock exchanges.

Table 2
New listings of bonds and debentures at par value

Million ECU	1987			1988				
	Total Domestic private sector	Domestic governmental sector	Inter-national	Total Domestic private sector	Domestic governmental sector	Inter-national		
Amsterdam	13 446	1 989	10 445	1 013	15 879	2 241	13 287	351
Barcelona	12 953	4 164	8 790	—	13 756	2 776	9 911	1 068
Brussels	16 573	280	15 834	459	12 458	397	11 928	133
Federation of German stock exchanges	148 707	82 646	52 267	13 794	118 671	62 110	37 356	19 206
Italy	245 703	1 457	243 577	669	103 295	2 125	101 171	0
London (1)	57 299	12 554	31 782	12 963	N/A	N/A	14 228	N/A
Luxembourg	108 682	184	13	108 485	109 021	252	23	108 746
Madrid	16 126	6 573	9 553	N/A	15 816	3 694	12 121	N/A
Paris	51 836	8 111	43 724	N/A	46 861	11 137	35 724	N/A
EC 9	671 326	117 958	415 985	137 383	493 056	97 286	235 749	N/A
Tokyo	145 002	38 989	102 813	3 200	213 088	44 552	167 324	1 212

(1) Domestic private sector includes Eurobonds of UK companies. International bonds include foreign Eurobonds, Irish gilts and overseas fixed interest.

Source: FIBV.

Table 3
Market value of equity shares of domestic companies, 1988

	Million ECU
Amsterdam	89 189
Barcelona	71 861
Brussels	50 564
Copenhagen (1)	23 117
Federation of German stock exchanges	215 758
Italy	116 465
London (2)	611 942
Luxembourg (3)	39 688
Madrid	78 182
Paris	178 658
EC 10	1 475 423
New York	2 034 976
Tokyo	3 258 753

(1) Excluding unit trusts.

(2) Excludes Ireland.

(3) Data include investment funds in amounts of ECU 31 931 million.

Source: FIBV.

Volume of trading in securities

The volume of trading is an important indicator of the activity on the stock exchanges; the figures in Table 4 show that the most active stock exchanges are those in the Federal Republic of Germany and in the UK.

However, data need to be compiled on the volume of trading out of the stock exchanges; this volume of trading may even be more important than that on the stock exchanges; to give an example, estimations

made by Hall and Duncan, point out the following percentages of volume of trading off the floors:

- in Denmark, about 80 to 90% of the total dealing is in bonds and equities;
- in Italy, almost all transactions of bonds and more than 50% of share trading;
- in Luxembourg, about 95% of total dealing in securities.

Number of companies with equity shares

Degree of Internationalization of EC securities markets

The degree of openness of securities markets varies according to the Member State; it depends on several factors such as:

- the influence of exchange controls where they still exist (Ireland, Spain, Portugal, Greece), which impedes the negotiation of foreign stock, and also implies a lesser interest for foreign securities firms to be active in domestic markets, where they are always at a disadvantage;
- the degree of regulation of the market, especially the rules for negotiation of securities (for instance, fixed commissions), the structural and operational rules concerning securities firms and those who can deal in securities, and in some cases the legal requirement for stockbrokers to be individuals.

Table 4
Volume of trading in equity shares

(million ECU)	1987			1988		
	Total	Domestic companies	Foreign companies	Total	Domestic companies	Foreign companies
Amsterdam	34 193	33 988	205	26 007	25 860	147
Barcelona	5 338	5 338	—	4 029	4 029	—
Brussels	9 194	6 216	2 979	9 118	7 091	2 027
Copenhagen (1)	1 663	1 663	N/A	4 327	4 327	N/A
Federation of German stock exchanges (2)	410 690	324 720	27 963	345 700	296 866	18 723
Italy	28 156	28 156	0	26 869	26 869	0
London (3)	449 462	371 349	78 120	305 917	245 789	60 127
Luxembourg (4)	136	97	39	255	220	36
Madrid	26 028	26 028	—	17 653	17 653	—
Paris	75 527	69 071	6 456	58 711	55 543	3 169
EC 10	1 040 386	866 625	115 762	798 588	684 247	84 229
New York	1 629 215	N/A	N/A	1 149 195	N/A	N/A
Tokyo	1 528 269	1 507 413	20 857	1 893 415	1 888 156	5 259

(1) In 1987 shares were not traded in number.

(2) Including aggregate turnover figures for all domestic and foreign warrants; they were worth ECU 58 million in 1987 and ECU 30 million in 1988.

(3) Customer and intra-market business.

(4) Data include investment funds as follows:

(million ECU)	1987	1988
Domestic companies	42	159
Foreign companies	13	11
Total	54	70

Source: FIBV.

Table 5
Number of companies with equity shares listed on FIBV exchanges

(million ECU)	1987			% change in total 1987-88	1988		
	Total	Domestic companies	Foreign companies		Total	Domestic companies	Foreign companies
Amsterdam	453	226	227	1.5	460	232	228
Barcelona	314	314	—	2.6	322	322	—
Brussels	337	192	145	0.0	337	186	151
Copenhagen (1)	277	269	8	-3.6	267	260	7
Federation of German stock exchanges (2)	983	574	409	10.2	1 083	609	474
Italy (3)	204	204	0	3.4	211	211	0
London (4)	2 658	2 061	597	-2.9	2 580	1 993	587
Luxembourg (5)	518	347	171	14.7	594	422	172
Madrid	328	328	—	12.5	369	369	—
Paris	683	481	202	-1.0	676	459	217
EC 10	6 755	4 996	1 759	2.1	6 899	5 063	1 836
New York	1 647	1 580	67	2.1	1 681	1 604	77
Tokyo	1 620	1 532	88	3.9	1 683	1 571	112

(1) Excluding unit trusts.

(2) *Freiverkehr* companies are included in domestic and foreign companies.

(3) Excludes the shares of 20 suspended companies in 1987.

(4) Data include some companies that only have fixed interest securities listed. Irish companies are included in foreign category.

(5) Data include investment funds as follows:

(million ECU)	1987	1988
Total	326	397
Domestic funds	296	370
Foreign funds	30	27

Source: FIBV.

Outlook

In October 1987 it appeared that the trading volume of stock exchanges during the peak days was generally twice, in some cases even three to four times greater than the pre-break average. If system capacity is to be upgraded to cope with such extreme situations, the cost of implementing and operating such systems will be a real challenge for stock exchanges.

As far as market performance is concerned, possible areas of action are identified:

- to upgrade the capacity of existing systems;
- to enhance the efficiency of systems and reduce inherent systemic risks;
- to improve the efficiency of settlement procedures;
- to automate small order execution.

Following the report drawn up in the light of a seminar on European capital markets on the threshold of the 1990s, it is recommended that financial market players:

- adopt a long-term strategic stance. Profits from existing market inefficiencies and competitive barriers will be short-lived. Fix longer-term objectives, prepare a strategic plan and implement it;
- invest in quality personnel through recruitment, training and retention strategies;

- invest selectively in technology for competitive advantage;
- review marketing plans. Market aggressively to the areas of potential in Europe.

It is recommended that stock exchanges:

- continue the process of modernization;
- cooperate aggressively. Investing in differentiation among the European exchanges will be expensive and unlikely to last. The way forward is to develop common standards. Fight competition from foreign exchanges and 'activities off exchanges' (for example, price information disseminators) by presenting a common front.

It is recommended that regulators:

- be firm in establishing adequate regulation but sensitive to the cost of compliance for players. Bear in mind the cost/benefit equation and be sure that regulation remains a means to an end and not an end in itself;
- continue to strive for orderly and competitive markets through effective and harmonized regulations. Pressure groups may demand the maintenance of competitive barriers, but to bow to such pressure would not be in the long-term interest of the capital markets.

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Table 6
Number of companies newly authorized to list equity shares on FIBV exchanges, 1987-88

	1987			1988		
	Total	Domestic companies	Foreign companies	Total	Domestic companies	Foreign companies
Amsterdam	31	19	12	23	14	9
Barcelona	25	25	—	25	25	—
Brussels	13	5	8	11	2	9
Copenhagen	5	4	1	5	5	—
Federation of German stock exchanges	46	19	27	88	14	74
Italy	23	23	0	14	14	0
London (1)	189	155	34	163	129	34
Luxembourg (2)	112	96	16	90	81	9
Madrid	32	32	—	46	46	—
Paris	22	12	10	21	5	16
EC 10	498	390	108	486	335	151
New York	152	136	16	153	141	12
Tokyo	73	37	36	66	40	26

(1) Certain of these issues are in substitution.

(2) Data include new listings of investment funds:

— 94 were listed in 1987: 92 domestic and 2 foreign;

— 77 were listed in 1988: 77 domestic and no foreign.

Source: FIBV.

BANKING AND FINANCE

(NACE 81)

Summary

The following text describes the role of credit institutions, and the institutional structure of banking and finance in the European Community. Harmonization of banking and finance regulations will have wide-ranging and profound effects on the sector, some of which have already started to be felt.

Banks take deposits and lend or invest these borrowed funds. This definition of the basic activities of banking is contained in the Council's first banking Directive (77/780/EEC). Credit institutions (the term used in the Directive), which undertake such activities must be authorized by the supervisory authorities of Member States. As the Directive requires the annual publication of a list of credit institutions, this list constitutes an institutional definition of the sector. Certain credit institutions that are excluded from the scope of the Directive are not in the list, nor are others which, although subject to the Directive, are exempt from some of its provisions.

Current situation

While the essential intermediary role of channelling surplus funds (savings) to finance investment and consumption is a common feature of banking in the Community, the actual business of individual credit institutions varies considerably. They may raise funds by attracting deposits from the general public, by bidding for large-scale deposits from corporations, or by buying surplus deposits from other banks. The sources of funds may be domestic, that is located in the country in which the bank operates, or foreign; funds may be denominated in domestic or foreign currencies. The banks may lend to individuals, to large corporations, to governments, or to other banks; they may increasingly engage not in direct lending or in the purchase of securities, but in the provision of stand-by finance. Again, customers may be domestic or foreign and the business may be conducted in domestic or foreign currencies. In the search for greater profitability in relation to capital, the banks may additionally undertake fee-generating activities not traditionally associated with banking; for example, the provision of management advice, insurance broking, or estate agency services.

The size of banks and their range of activities varies widely. In general, those with more varied sources of funding and with international business are larger than those relying exclusively on retail deposits as a source of funds and confining their activities to their national market. However, many savings banks, particularly those in the Federal Republic of Germany and Italy, are amongst the largest banks in the world.

It is possible to group the institutions into broad categories. Separate trade associations exist, reflecting the distinctions between these categories, but the trend is towards a blurring of the differences between the type of services offered, and greater competition between the institutions.

These broad categories are the following:

- commercial, registered or universal banks: varied funding base; wide-ranging lending and off-balance-sheet activities; often having international business; represented at Community level by the European Banking Federation;
- savings banks or institutions: funding base almost exclusively private savings; in general less wide-ranging than commercial banks in lending activity; international business limited but growing; often having more local or regional identity than commercial banks; regional and federal group structures is usual; represented at Community level by the Savings Banks Group of the EC;
- mutual or cooperative banks: distinguished by mutuality characteristic; otherwise rather similar to savings banks in sources and uses of funds and organizational structure; rural and agricultural links strong; small and medium-sized enterprises are important customers; the institutions at the head of cooperative bank groups can be very large (Credit Agricole for instance, was the largest bank in Europe at the end of 1986); represented at Community level by the Association of Cooperative Banks of the EC;
- specialized institutions: this category includes mortgage credit institutions (including building societies, 'Bausparkassen') and finance companies (with varying areas of specialization); represented at Community level by the European Community

change



Mortgage Federation, European Federation of Building Societies, European Federation of Finance House Associations.

These categories are broad divisions only; there are also sub-specializations. For example, in the commercial bank category, investment or merchant banks concentrate on industrial finance, the trading of stocks and shares, portfolio management, bond issuance, and advice on mergers and acquisitions rather than the provision of services to the general public.

From an analytical perspective, it is not clear whether it is necessarily useful to distinguish between the types of institutions listed above, especially where they are subject to the same regulatory framework (as in the case of commercial and savings banks in Denmark).

A common drive towards efficiency, diversification and size appears to dominate bankers' attitudes in the wake of the integration of European banking markets. Mergers, takeovers and, to a lesser extent

cooperative agreements with suitable partners seem to represent the preferred ways to achieve these goals, while the need to carry out purely internal recasting of banks' organizational structures, both geographical and sectorial, appear, for the time being, to attract less attention. There is, in other words, the feeling that only major and well-publicized actions will prove sufficient to match the challenges posed by the extensive overhaul of European banking regulations around the year 1992.

Private and public sector involvement

Taking the Community as a whole, private-sector involvement clearly dominates. The trend is for State-owned or State-controlled banks to pass into private ownership; this is the case in France, where the nationalization process carried out as recently as 1982 is now being reversed, and in other countries in which State-control of banks has a somewhat longer history. Where public ownership exists, it tends to focus on the specialist sector, and particularly on institutions supplying longer-term investment finance.

Regulatory environment

Government influence over the sector takes three distinct forms:

- control of entry to sector (authorization requirement);
- ongoing prudential supervision of business of authorized credit institutions (including powers to remove authorization);
- monetary, credit, and exchange-control policy.

Authorization requirements are set by all Member States following the provisions of the first banking Directive; further requirements are contained in the proposal for a second banking coordination Directive (Doc. COM(87)715).

One of these, which imposes an identical solvability ratio to all banks in all Member States, has been adopted on 19 June 1989; the ratio was set at 8%. This means that own resources have to represent at least 8% of the risks, to limit the losses in case of insolvability of the debtor. Other measures that have been adopted so far include:

- the initial capital endowment has to be at least ECU 5 million;
- own resources cannot fall below the initial capital endowment and must be at least equal to it before 31 December 1996;
- the shareholders and the direct and indirect associates have to be apparent. Any change among the shareholders has to be approved by the national authorities who can oppose it within three months;
- participations in a non-financial enterprise are limited to 15% of own resources. Total participations may not exceed 60%;
- subsidiaries specialized in certain activities (credit-mail, affacturage) that the parent company is not allowed to handle in certain Member States may benefit from the Single European Act under three conditions:
 - (i) the subsidiary has to be at least 90% owned by the parent company;
 - (ii) the parent company must be a warrant;
 - (iii) the results of the two companies must be totally consolidated.

The main restrictions to a free banking service market that remain on the list of directives not yet accepted are:

- automatic reporting to the tax authorities in certain countries (for instance, in Denmark and the Netherlands);
- the controlling activity of both the Commission and the Comité Consultatif Bancaire Européen.

Effective ongoing prudential supervision of the activities of credit institutions is considered essential by all Member States and is actively pursued on an increasingly harmonized basis under Community legislation. The basic aims are to protect individual depositors and investors and the soundness of the banking system as a whole. Prudential rules affect decisions in most areas of banking business.

In most Member States, the exercise of monetary, credit and exchange-control policy has a less direct effect on banks but clearly affects the environment within which banks operate. The banks devote considerable resources to analysing the likely direction of policy; only in specific circumstances, for example, where there are credit ceilings, restrictions on net foreign borrowing, are their commercial judgments directly constrained by government policy.

Economic significance

The importance of the banking sector cannot be fully captured through statistics. The concepts of product and value-added are awkward ones in the service sector as a whole and *a fortiori* in the case of financial institutions. The role of banking intermediaries, as described earlier, is to channel funds from savers to borrowers. If this is not done efficiently, the productivity of the rest of the economy will be adversely affected. Faulty risk analysis resulting in losses may reduce confidence in the financial system, and also create unfavourable economic effects. The system of banking supervision and regulation referred to above reflects the appreciation of the banks' central importance in the economy.

Again, improvement in the quality of banking services cannot be picked up from statistical measures. Several such improvements have taken place recently. European and other banks increasingly offer their customers financial products specifically tailored to their requirements. Examples of these are loans denominated in several currencies and the possibility of converting floating loans into fixed-rate loans. At the same time, banks increasingly provide services which do not enter their balance sheets

(off-balance-sheet business) but which enable their customers to reduce their borrowing costs or offset the interest or exchange-rate risks incurred.

Banking structure and structural changes

The data published at the end of this chapter and showing the number of credit institutions reveal much about the institutional structure of banking in the Member States. France and the Federal Republic of Germany account for around two-thirds of the total credit institutions in the Community as a result of their large non-commercial bank sectors. Cooperative banks predominate numerically in the Federal Republic of Germany, while finance companies are most common in France. Italy also has a large number of cooperative banks and, as a result, has considerably more credit institutions than the United Kingdom, an economy of similar size.

In the United Kingdom, 60% of the market is accounted for by foreign institutions. Bank assets amount to nearly 20% of the EC total.

Banking in Europe is expected to undergo significant structural changes in the next 10 years. Further industry concentration is likely to take place, with a marked decrease in the number of smaller banks through merger or acquisition. Savings institutions will be prime targets for acquisition because of their ability to gather retail deposits. Merchant and investment banks will also prove attractive to potential buyers, because of their capital markets expertise.

A first attempt at cross-border fusion within the Community was negotiated between the Belgian Generale Bank (GB) and the Dutch Amro Bank (AB). Finally, it resulted in an agreement for cooperation since neither the GB nor the AB were prepared to change nationality.

The largest banks will attempt to become 'European' banks and the very largest will attempt to become 'global' banks. The means through which they seek to achieve that are diverse: takeovers, foreign establishment and cooperative agreements with foreign banks. A major motivation is one of industrial strategy: the German market is, by its size and profitability, attractive for foreign banks which have not acquired a secure foothold so far. Certain small private banks have already been taken over by foreign banks who are trying to establish a base in the Federal Republic of Germany. This is likely to continue or even increase. There is fierce competition to be expected, for example, from British banks. On the other hand, an efficient way for German banks to counter aggressive market penetration is to compete

in the home market of the foreign competitors. In the Mediterranean area, it is the growth prospects of these economies which attracts German establishments, as well as the lower efficiency of intermediation which holds the promise of substantial productivity gains once acquisitions are carried out.

Table 1
Market concentration and share of foreign institutions, (1) end of 1987

(% of the total assets)	Market share absorbed by the largest four banks (2)	Market share absorbed by foreign institutions (3)
Belgium	42	46
Denmark	47	1
FR of Germany	15	4
Spain	21	11
France	42	16
Greece	64	N/A
Ireland	74	11
Italy	25	3
Luxembourg	24	91
Netherlands	69	10
Portugal	57	3
United Kingdom	27	60

(1) 'Foreign institutions' include branches of foreign banks, and establishments totally or majority owned by foreign banks.

(2) End of 1986 for Belgium, Denmark, France, FR of Germany and Spain. Figures based on unconsolidated balance sheets.

(3) End of 1986 for Ireland. Including the largest banks.

Source: OECD; European central banks and national banking associations.

The smaller European countries (Spain, Greece, Ireland), whose financial markets are still strangled by extensive regulations, will find the adjustment process most difficult. They should, however, be able to realize the largest potential gains, which will tend to attract foreign institutions. So far, these countries have restricted the access of foreign banks to their markets, and ownership of domestic financial establishments is often predominantly public. Efficiency is low and foreign banks will be able to gain market shares through the introduction of more performing management techniques, through limited but profitable activities and experience with operational techniques and financial products new to the country. Of course, by the time foreign banks have access to these countries, domestic institutions should hopefully have made some progress through accelerated rationalization and restructuring.

Banks will diversify into new product areas, including securities dealing, commodities and financial futures, and insurance and house broking. Banks will continue to invest heavily in new technology, even though there are serious doubts about whether such investment provides competitive advantage.

Table 2
Banks' assets

(billion ECU)	1981	1982	1983	1984	1985	1986	1987	1988
Belgium								
Commercial banks	110.9	116.1	134.7	162.7	172.5	187.5	200.0	214.8 (5)
Other financial institutions	3.4	3.1	3.1	3.3	3.3	3.6	3.7	4.1 (5)
General savings funds (deposits)	10.4	9.7	10.1	11.0	12.5	13.1	13.2	N/A
Denmark								
Commercial banks	17.8	20.3	25.1	33.4	42.1	49.5	53.1	53.2 (5)
Other monetary institutions	8.3	9.0	11.0	13.7	15.7	19.2	18.6	19.1 (5)
Other credit institutions (1)	48.0	50.1	55.2	63.4	73.0	N/A	N/A	N/A
FR of Germany								
Credit institutions (including building societies)	787.8 (52.1)	888.1 (58.1)	961.6 (61.9)	1 038.8 (65.3)	1 092.6 (67.1)	1 265.5 (69.2)	1 327.3 (68.0)	1 397.0 (64.4)
Greece								
Commercial banks	16.6	18.4	19.6	22.4	20.2	21.2	20.9	24.4 (5)
Specialized credit institutions	11.3	13.9	14.6	15.3	12.7	13.5	14.1	15.0 (5)
Spain								
Commercial banks	152.6	162.5	159.3	203.6	204.3	224.4	246.9	300.2
Other credit institutions	N/A	18.5	20.9	26.4	26.6	26.3	27.8	32.4
France								
Credit institutions	555.2	626.0	674.6	727.9	N/A	N/A	N/A	N/A
Ireland								
Commercial banks	12.9 (2)	9.2	10.6	11.6	11.9	13.2	13.8	15.7
Other credit and financial institutions	4.8	6.6	7.2	8.2	8.8	8.3	9.1	9.2
Italy								
Commercial banks (3)	236.4	270.2	308.5	352.7	356.4	391.3	391.7	N/A
Specialized credit institutions	82.0	96.8	105.9	119.2	117.3	121.3 (4)	N/A	N/A
Luxembourg								
Credit institutions	108.2	116.8	127.7	146.7	151.6	165.4	179.3	205.0
Netherlands								
Credit institutions	168.0	185.1	195.9	212.2	224.2	247.1	259.0	282.0
Portugal								
Credit institutions	N/A	22.3	21.8	26.0	28.0	29.2	29.9	32.9 (5)
United Kingdom								
Banks in the financial sector	581.2	674.6	835.7	983.7	951.0	964.5	1 040.5	1 251.1
EC 12	2 954.0 (6)	3 317.3	3 703.1	4 182.2	4 290.5 (6)	4 740.6 (6)	4 992.7 (6)	5 618.3 (6)
USA								
Commercial banks	N/A	N/A	N/A	N/A	2 797.6	2 628.0	2 184.3	2 549.0 (6)
Savings institutions	N/A	N/A	N/A	N/A	1 448.4	1 309.8	1 156.2	1 382.4 (6)
Total	N/A	N/A	N/A	N/A	4 246.0	3 937.8	3 340.5	3 931.4 (6)
Japan								
Commercial banks	N/A	N/A	N/A	1 983.0	2 210.7	2 569.1	3 124.2	3 413.1 (5)
Other credit institutions	N/A	N/A	N/A	1 670.4	1 812.0	2 114.4	2 523.3	2 715.2 (5)
Total	N/A	N/A	N/A	3 653.4	4 022.7	4 683.5	5 647.5	6 128.3 (5)

(1) Principally outstanding bonds of mortgage credit institutions.

(2) Estimated and almost certainly over-stated.

(3) Excludes business of foreign bank branches.

(4) 3/86.

(5) 6/88.

(6) Estimates.

Source: IMF, International Financial Statistics, 1/88, 2/89, country pages; US Industrial Outlook 1989.

Balance sheet size

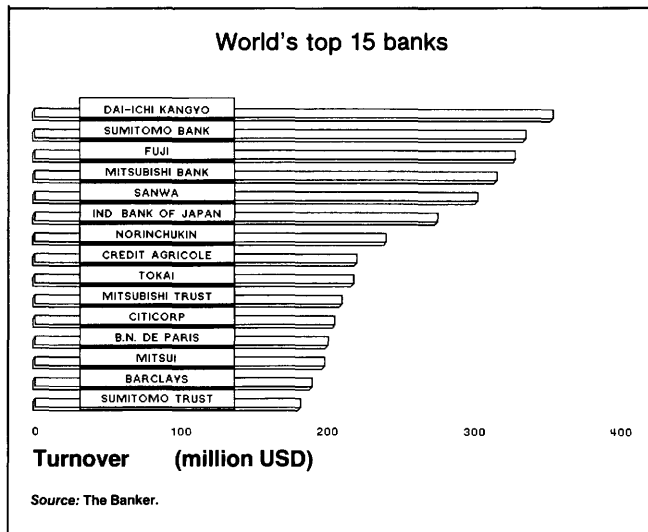
Statistics on outstanding assets of EC banks are presented in Table 2. They are not entirely comprehensive, but are drawn from official data supplied by the Member States to the International Monetary Fund.

The size of bank lending in relation to measures of economic activity illustrates the scale and significance of bank operations; the total assets of German banks in 1987 were considerably larger than the GNP of the Federal Republic of Germany in the same year.

The size of the banking sector in the individual countries clearly depends on a number of factors, including the size of the national economy, the extent to which wealth is held in liquid assets other than bank deposits, and the role of foreign banks.

Japanese banks expanded very rapidly, increasing their assets by 31% per annum between 1983 and 1988. Thus, 55% of the global increase in banking activity took place within Japanese banks, whose share of international assets consequently increased from 20 to 38%. The world's top 15 banks, ranked by assets, are listed in the table below.

Figure 1



General scope of banking activities

There is at present considerable variation in the scope of activities permitted to credit institutions in the various Member States. Banks established in the United Kingdom may freely undertake a wide variety of activities, whereas banks established in Greece may only engage in a much narrower range. The position in other Member States lies between

these extremes, though most countries are nearer the British model than the Greek one.

The Commission's proposal for a second banking coordination Directive, if adopted in its present form, is likely to widen the scope of allowable banking activities throughout the Community.

Several points are affected by this Directive: *inter alia*, it establishes a list of bank activities with respect to which the principle of freedom of cross-border exercise through mutual recognition applies (this list also includes underwriting and trading, for customers or for own account, of practically any type of security, the participation in share issues, money brokering, leasing and issuing of credit cards); it introduces minimum requirements as to the size of own funds of foreign establishments of credit institutions (ECU 5 million); it requires the disclosure of the identity of a bank's more important shareholders and of any taking, or changing, in the level of a qualified participation; it disciplines the banks' holding of shares in other financial and non-financial establishments; it regulates the exchange of information between home and host-country supervisory authorities and provides for the former to carry out on-the-spot verifications on the territory of the latter. But, more importantly, this Directive establishes the so-called single banking licence, valid across the EC, namely the principle that once a certain institution is authorized to pursue its activities in the home country according to the laws and regulations there prevailing, it may conduct the same operations in any Member State irrespective of whether or not these activities (which, however, must fall within those listed in this Directive) are allowed in the host country and, above all, without the need of obtaining any supplementary authorization. The wide-ranging implications of this Directive are evident, as are its risks: a major one is the possibility that foreign banks may conduct, in any one country, activities which, though allowed in their country of origin, are not permitted to locally incorporated banks. The potential for distortive competition effects is therefore substantial and it can only be hoped (as the Commission clearly does) that such 'dynamic disequilibria' between mutual recognition of each other's banking legislations and imperfect harmonization of the same may be quickly corrected by coordinated legislative changes.

Cross-border and international business

A distinction is drawn between cross-border business, which encompasses all foreign and domestic-currency transactions with non-residents,

and international business, which covers cross-border business and foreign-currency transactions with residents.

The activities of Community banks are increasingly spread between operations in their home countries, operations in, and with residents of, other Member States, and operations in and with third-party countries. The assumption must be that the completion of the internal market will further increase the importance of the second category of business mentioned above.

To assess the involvement of banks in business outside their home country boundaries, it is necessary to have consolidated statistics of the operations of the parent company and its domestic and foreign branches and subsidiaries. These are compiled by the Bank for International Settlements ('Inter-ownership', contained in BIS, International Banking Developments, quarterly) and enable the aggregate extent of most EC-country banks' non-domestic business to be assessed (see Tables 3 and 4). They do not, unfortunately, enable one to distinguish between business with other Member States and with third-party countries.

Table 3
Consolidated (1) International (2) claims of Member States and other banks (3)

	1987		1988 (4)	
	Billion ECU	% of total	Billion ECU	% of total
Belgium	82.9	2.5	85.9	2.3
Denmark	23.9	0.7	27.2	0.7
FR of Germany	266.2	7.9	288.3	7.7
Spain	28.3	0.8	34.2	0.9
France	288.9	8.6	317.3	8.4
Italy	141.9	4.2	163.0	4.3
Luxembourg	10.7	0.3	18.4	0.5
Netherlands	92.1	2.7	104.3	2.8
United Kingdom	194.8	5.8	211.2	5.6
EC 9	1 129.8	33.6	1 249.8	33.3
USA	498.3	14.8	543.4	14.5
Japan	1 192.2	35.4	1 369.0	36.4
Total	3 364.3	100.0	3 756.4	100.0

(1) Claims booked in head offices, branches and subsidiaries worldwide.

(2) Foreign and domestic currency claims on non-residents and foreign currency claims on residents.

(3) Numbers and percentages are rounded and may not sum to totals.

(4) 6/88.

Source: BIS, International Banking Developments, 2/88, 2/89, Statistical Annex, p. 25, Table 7.

In aggregate, the nine Member States whose banks' international business is included in the BIS data

accounted for just under one-third of the total outstanding international banking business of reporting banks at the end of September 1987. Total international banking business worldwide is rather larger, because the BIS statistics relate only to banks of the principal industrialized countries and to those located in the major off-shore banking centres. The Japanese share was slightly higher, but the American share is less than half the size of the nine Community countries taken together.

Table 4
Cross-border (1) claims of banks located (2) in Member States and other countries (3)

	1987		1988 (4)	
	Billion ECU	% of total	Billion ECU	% of total
Belgium	126.4	3.9	131.5	3.6
Denmark	13.1	0.4	14.9	0.4
FR of Germany	158.1	4.9	162.1	4.4
Spain	19.6	0.6	20.2	0.6
France	204.4	6.3	226.1	6.2
Ireland	4.1	0.1	5.3	0.1
Italy	48.6	1.5	55.2	1.5
Luxembourg	139.9	4.3	151.6	4.1
Netherlands	88.4	2.7	100.8	2.8
United Kingdom	671.8	20.8	739.7	20.2
EC 10	1 474.4	45.6	1 607.4	44.0
USA	391.9	12.1	445.2	12.2
Japan	442.6	13.7	552.2	15.1
Total	3 231.1	100.0	3 656.5	100.0

(1) Foreign and domestic currency claims on non-residents.

(2) Domestically-owned and foreign-owned branches and subsidiaries.

(3) Numbers and percentages are rounded and may not sum to totals.

(4) 6/88.

Source: BIS, International Banking Developments, 2/88, 2/89, Statistical Annex, p. 2, Table 2a.

From an analytical perspective, it is often usual to net out intra-group transactions, since they can be seen as representing the internal movement of funds rather than the basis of real activity. When this is taken into account, the EC 9 share rises to 38%, and the Japanese and American shares fall to 32 and 12%, respectively. In terms of direct international lending to non-banks, in other words ignoring inter-bank business, the EC 9 with 34% of the total were just ahead of the Japanese, while the Americans (7%) had a smaller share of the market than the German and French banks taken individually. In recent years the American banks have been reducing their international business, while the Japanese banks have been expanding rapidly.

Other statistics collected by the BIS on the basis of the country of location of banks, rather than the nationality of ownership, indicate the extent to which cross-border business of EC banks is conducted in branches and subsidiaries located outside the home country. In the case of the EC 9 (Portugal, Greece and Ireland excluded), the consolidated cross-border business of domestic banks is considerably greater than the business booked by all banks, domestic and foreign, in the countries themselves. The exceptions are the United Kingdom and Luxembourg, world centres of international banking activity which are host to a large number of foreign banks including those from other Member States. Foreign bank branches predominate in the United Kingdom, while foreign-owned subsidiaries are more common in Luxembourg.

The statistical record is incomplete but it is clear that the international business of EC banks is largely undertaken by commercial banks. Other credit institutions are increasingly engaging in cross-border activities, for example, the Danish mortgage credit banks in the Federal Republic of Germany and the UK, and the UK building societies in Spain; but, in many cases, there seems to be, at least initially, concentration on the Euro-banking market as a source of finance rather than a search for loans from foreign markets. At the end of 1986, French banks had the largest branch network in other Member States.

Mortgage credit

The role of credit institutions in financing residential and non-residential construction is one of their most tangible contributions to capital formation in the Community's economy.

The value of outstanding mortgage loans in the Member States totalled ECU 985 billion at the end of 1986. As a comparison, the EC's GDP amounted to ECU 4 023 billion in 1988. From an institutional perspective, there are significant differences in the importance of specialist mortgage credit institutions. The latter dominate in Denmark, France and the United Kingdom but the market is much more evenly divided between various types of credit institutions in other countries. It is perhaps important to note, however, that stock analyses of this kind can conceal significant changes in market share. This is true of the position in the UK, where commercial banks have sharply increased their share of new mortgage loans and the building societies have only recently regained a 50% share of new advances.

This sector is presently notable for the small scale of cross-border business, both within the Community and on a wider international scale.

Size ranking of Community banks

Based on the lists compiled by *The Banker* (July 1988), 44 EC credit institutions are in the ranks of the world's 100 largest banks, based on asset size (see Table 5).

Table 5
Nationality of world's largest banks by size of assets, 1987

Largest 10		Largest 500	
Japan	7	EC	162
France	2		
USA	1	Of which:	
		FR of Germany	44
		Italy	33
		France	20
		United Kingdom	15
		Spain	13
		Belgium	9
		Denmark	8
		Luxembourg	6
		Netherlands	5
		Portugal	4
		Greece	3
		Ireland	2
		Japan	107
		USA	28
		Switzerland	15
		Austria	9
		Canada	7
		Sweden	7
		Others	165
Largest 100			
EC	44		
Of which:			
FR of Germany	11		
France	10		
Italy	8		
United Kingdom	5		
Belgium	4		
Netherlands	4		
Spain	2		
Japan	28		
USA	11		
Canada	4		
Switzerland	3		
Others	10		

Source: EC Commission, DG XV.

The largest 10 Community credit institutions in 1987 are shown in Table 6.

Table 6
Top 10 Community credit institutions by assets, 1987

	Country	Assets (billion ECU)	World rank
1. Crédit Agricole	F	185.8	7
2. Banque Nationale de Paris	F	158.3	10
3. Deutsche Bank	D	146.4	11
4. Crédit Lyonnais	F	146.0	12
5. Barclays Bank	UK	142.4	14
6. National Westminster Bank	UK	141.2	15
7. Société Générale	F	126.0	19
8. Dresdner Bank	D	113.1	24
9. Compagnie Financière de Paribas	F	106.0	28
10. Commerzbank	D	88.0	32

Source: EC Commission, DG XV.

There are, of course, other ways of ranking credit institutions according to size. If published capital and reserves are used as the criteria and in view of the Commission's solvency ratio proposal and the Basle Supervisors' Committee recommendation on capital adequacy, many would agree that they are a better measure than assets — the picture is somewhat different (see Table 7).

Table 7
Top 10 Community credit institutions
by published capital and reserves, 1987

	Country	Published capital and reserves (billion ECU)	World rank
1. Barclays Bank	UK	11.0	1
2. National Westminster Bank	UK	8.0	2
3. Crédit Agricole	F	7.5	4
4. Deutsche Bank	D	6.0	8
5. Banque Nationale de Paris	F	5.0	13
6. Rabobank	NL	4.1	20
7. Crédit Lyonnais	F	4.0	21
8. Lloyds Bank	UK	4.0	22
9. Dresdner Bank	D	3.6	26
10. Société Générale	F	3.5	28

Source: EC Commission, DG XV.

Table 8 provides information on the number of credit institutions.

The impact of '1992'

From 1 July 1990, a single market for financial services will open for business in eight European Community countries. Spain and Ireland will join on January 1 1993 and Portugal and Greece will complete the picture two years later.

Table 8
Number of credit institutions in Member States

Belgium	End of 1980	End of 1986	End of 1987
1. Commercial banks	83	88	85
Of which:			
Incorporated under Belgian law	58	59 (1)	54
Incorporated under foreign law	25	29	31
2. Private savings banks	30	34 (2)	32
3. Other institutions	N/A	53	46
Of which:			
Public law credit	6	6	6
Others	N/A	47	40
Total	N/A	175	163

(1) Of which: 33 foreign bank subsidiaries: other EC countries 12, Japan 8, USA 6, others 7.

(2) 392 authorized savings banks in 1986, 396 in 1987 were affiliated to CERA, a cooperative society, which is included as one of the savings banks.

Denmark	End of 1980	End of 1986	End of 1987
1. Commercial banks	74	79	81
Of which:			
Incorporated under Danish law	74	73 (1)	76
Incorporated under foreign law	0	6	5
2. Savings banks	165	147	140
3. Cooperative credit institution	N/A	N/A	37
4. Other institutions	N/A	18	23
Of which:			
Mortgage credit	6	6	5
Others	N/A	12	18
Total	N/A	244	281

(1) Of which: Three foreign-owned bank subsidiaries (2 USA).

FR of Germany	End of 1980	End of 1988
1. Commercial banks	243	317
Of which:		
Incorporated under German law	N/A	259 (1)
Incorporated under foreign law	N/A	58
2. Savings banks	611	597 (2)
3. Cooperative banks	4 237	3 367 (3)
4. Other institutions	221	98
Of which:		
Mortgage credit (including building societies)	69	67
Others	152	31
Total	5 312	4 379

(1) Of which: 56 (legally independent) banks majority-owned by foreign banks: other EC countries 27, USA 8, Japan 6, others 15.

(2) Including 12 regional and national central institutions which represent the individual savings banks.

(3) Including five regional 'central' banks and one central institution acting on behalf of individual cooperative institutions.

Greece	End of 1980	End of 1986	End of 1987
1. Commercial banks	28	35	35
Of which:			
Incorporated under Greek law	N/A	16	16
Incorporated under foreign law	N/A	19	19
2. Savings banks	0	0	0
3. Cooperative banks	0	0	0
4. Other banks	6	9 (1)	3
Total	34	44	38

(1) Of which: two not yet under scope of Directive 77/780/EEC and five exempted institutions.

Spain	End of 1986	End of 1987
1. Commercial banks	135	137
Of which:		
Incorporated under Spanish law	97 (1)	97
Incorporated under foreign law	38	40
2. Savings banks	79	79
3. Cooperative banks	142	133
4. Other banks	260	288
Of which:		
Mortgage credit institutions	24	22
Official credit institutions	4	4
Finance houses	232	262
Total	616	637

(1) Of which: seven foreign bank subsidiaries: other EC 4, USA 3.

France	End of 1980	End of 1986	End of 1987
1. Commercial banks	387	386	384
Of which:			
Incorporated under French law	N/A	330 (1)	320
Incorporated under foreign law	N/A	56	64
2. Savings banks (2)	480	422	384
3. Cooperative banks	190	192	190
4. Other banks	N/A	1 080	1 090
Of which:			
Finance companies	N/A	1 049	1 059
Specialized financial instit.	N/A	31	31
Total	N/A	2 080	2 048

(1) Of which: 89 foreign-owned subsidiaries

(2) 'Caisses d'épargne et de prévoyance' and 'caisses de crédit municipal'.

Ireland (1)	End of 1980	End of 1986	End of 1987
1. Commercial banks	40	39	38
Of which:			
Incorporated under Irish law	N/A	33 (2)	32
Incorporated under foreign law	N/A	6	6
2. Savings banks	4	—	—
3. Cooperative banks	N/A	16	16
4. Other institutions	2	2	2
Total	N/A	57	56

(1) Credit unions and friendly societies outside scope of Directive 77/780/EEC.

(2) Of which: eight foreign bank subsidiaries: seven other EC, one USA.

Italy	End of 1980	End of 1986	End of 1987
1. Commercial banks	314 (1)	268 (2)	291 (3)
Of which:			
Incorporated under Italian law	289	229	254
Incorporated under foreign law	25	39	37
2. Savings banks	89	90	87
3. Cooperative banks	653	717 (4)	727
4. Other institutions	99	96	96
Of which:			
Specialized financial instit.	87	89	89
Other	12 (5)	7	7
Total	1 155	1 172	1 201

(1) Of which: 158 'banche popolari'.

(2) Of which: 101 'banche popolari' have cooperative form; one foreign bank subsidiary (EC).

(3) Of which: 132 'banche popolari'

(4) Not including the 'banche popolari' which also have cooperative form.

(5) Probably not comparable with 1986 figure.

Luxembourg	End of 1980	End of 1986	End of 1987
1. Commercial banks	115	115	121
Of which:			
Incorporated under Lux. law	N/A	98 (1)	104
Incorporated under foreign law	N/A	17	17
2. Cooperative banks	70	58	53
3. Other banks	N/A	28	29
Of which:			
Mortgage credit	N/A	3 (2)	3 (2)
Others	20	25 (3)	26
Total	N/A	201	203

(1) of which: at least 65 foreign-owned (the imprecision is the result of insufficient information on ownership).

(2) Of which: two German branches.

(3) Mainly foreign-owned (insufficient information).

Netherlands	End of 1980	End of 1986	End of 1987
1. Commercial banks	82	83	83
Of which:			
Incorporated under Dutch law	63	64 (1)	64
Incorporated under foreign law	19	19	19
2. Savings banks	62	N/A	58
3. Cooperative banks	1 (2)	1	1
4. Other banks	N/A	29	30
Of which:			
Mortgage credit institutions	7	8	8
Other capital market instit.	N/A	2	2
Other (mainly intermediaries in securities market)	21	18	20 (3)
Total	N/A	175	172

(1) Of which: 18 foreign-owned subsidiaries (seven EC, seven Japan, three USA, one other).

(2) Central, policy-making institution (Rabobank) having 1 865 affiliated banks at end of 1986, 1 851 at end of 1987.

(3) Including Postbank NV.

Portugal	End of 1980	End of 1986	End of 1987
1. Commercial banks	N/A	19	19
Of which:			
Incorporated under Port. law	N/A	10	10
Incorporated under foreign law	N/A	9	9
2. Savings banks	N/A	1	1
3. Cooperative banks	N/A	0	0
4. Other banks	N/A	3	3
Of which:			
Investment banks	N/A	2	2
Other	N/A	1	1
Total	N/A	23	23

United Kingdom	End of 1980	End of Feb. 87	End of 1987
1. Authorized banks	330	588 (1)	580
Of which:			
Incorporated under UK law	N/A	334	330
Incorporated under foreign law	N/A	254	250
2. Savings banks	17	N/A	N/A
3. Cooperative banks	1	N/A	N/A
4. Other banks	312	N/A	N/A
Of which:			
Building societies	273	164	163
Finance houses	38	N/A	N/A
National Girobank	1	(2)	(2)
Total	660	N/A	N/A

(1) Of which: 254 foreign branches. Of the 334 other credit institutions 86 were foreign-owned subsidiaries and consortium banks. Of the 67 subsidiaries, 14 were EC-owned, 20 US-owned, four Japanese-owned and 29 other; three EC banks had stakes in the 19 consortia.

(2) By 1987, name changed to Girobank plc and included in authorized bank category.

Source: EC Commission, DG XV, Eurostat; Germany: Bundesbank.

Freedom of establishment, liberalized capital movements and unencumbered external trade in financial services, the three cornerstones on which the Community's actions are built, will certainly modify the set of external parameters on which both day-to-day and long-term business behaviour is based. Adjusting to the new banking environment will require time and effort. It will also raise a few legitimate questions. What is the shape of the financial environment that banks are likely to face in the immediate wake of the introduction of these measures? How should they react? What will be the result of the interactions of the newly undertaken strategies?

Liberalizing measures will produce a significant increase in the well-being of Europeans: savers will be confronted with lower prices, a wider range of financial products, and with more favourable trade-

offs between risks and returns on financial assets. These would be the consequence of an increased level of competition among Europe's providers of financial products and of the economies of scale and of diversification in their supply permitted by a wider and more integrated European market. Financial resources will be more efficiently allocated across countries and sectors, thus resulting in an enhanced level of income and employment in Europe.

Table 9
Estimate of potential falls in banking product prices as a result of completing the internal market (1)

	B	D	E	F	I	L	NL	UK
Consumer credit	-41	136	39	105	N/A	-26	31	121
Credit cards	79	60	26	-30	89	-12	43	16
Mortgages	31	57	118	78	-4	N/A	-6	-20
Letters of credit	22	-10	59	-7	9	27	17	8
Foreign exchange	6	31	196	56	23	33	-46	16
Travellers cheques	35	-7	30	39	22	-7	33	-7
Commercial loans	-5	6	19	-7	9	6	43	46

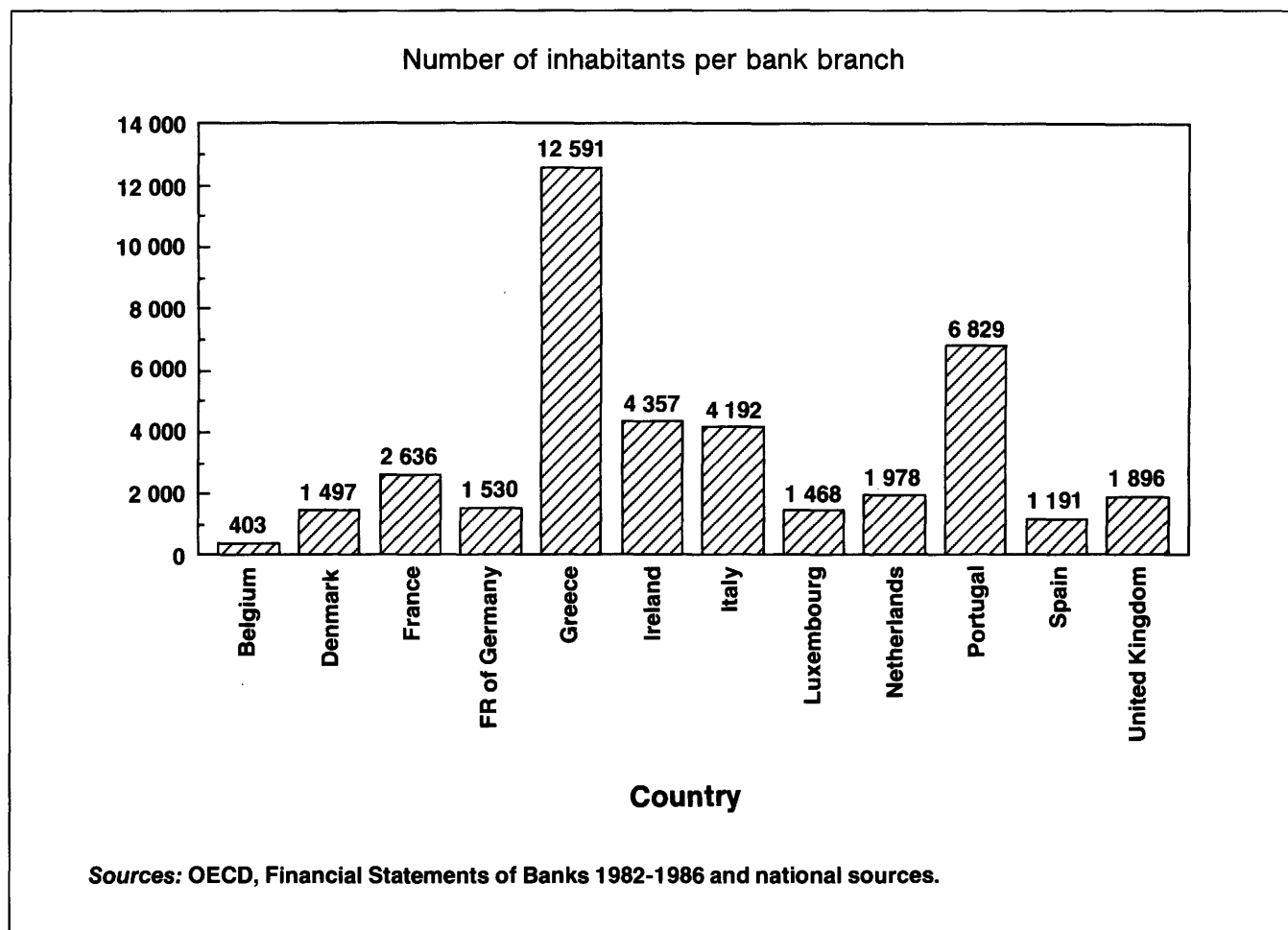
(1) Percentage differences in prices of financial products compared with the average of the four lowest observations.

Source: Price Waterhouse.

Competitive pressures

The conventional and accepted wisdom in business and official circles portrays the impact of the Community-driven deregulatory measures as an unmitigated and generalized increase in the level of competitive pressures in all the domestic banking markets. On a closer examination, however, one would tend to draw a distinction between over-banked markets, where competition is already high and profit margins low and those geographical areas where concentration is moderate and adequate profits may in principle be earned. One may thus expect a more selective and differentiated upward pressure in competition (or in concentration) levels, with a pick-up in profit margins not to be excluded for those geographical areas or product ranges where high supply pressures were previously observed. The reason for this is that the need to move on to more profitable activities is likely to be coupled, because of pressures on capital ratios and on the availability of human and technical resources, with the need to abandon traditional areas of interest where an adequate amount of surplus cannot be earned. Figure 1 and Table 10 give an idea of the spread of this effect. Figure 1 presents the number of inhabitants per retail banking outlets, while Table 10 gives an idea of the relative level of profit margins. According to the approximate indications provided by Figure 1, those of Greece, Ireland, Italy and Portugal appear to be under-banked markets, but are also charac-

Figure 2



terized, with the likely exception of Italy, by low levels of (inflation-adjusted) profitability. Entry in these countries on the part of foreign banks would not appear to be an enticing proposition, though it should be borne in mind that, on the one hand, highly profitable banks may very well exist in these countries which could become interesting partners or targets for a takeover, and that, on the other hand, low profitability may be due to either a particularly strict regulatory environment which could be changed by the EC measures or to a misallocation of resources on the part of domestic banks, a situation which more efficient foreign establishments might be able to correct. At the opposite extreme we find Spain and Belgium (Luxembourg being a case apart), both of which seem to possess quite extensive banking networks and to be characterized by moderate or low profitability levels. Here, entry of foreign banks may prove not to be an attractive course of action, though certain of the caveats advanced above might also apply. In countries like Denmark, France, the Federal Republic of Germany, the Netherlands and, to a lesser extent, the United Kingdom, where a moderate concentration of retail banking outlets is coupled with relatively

ample profit opportunities, competitive pressures are bound to increase via higher penetration by foreign banking establishments.

Table 10
Indices of bank profitability (1)

(%)	Rate of return on equity (before tax)	Rate of return on assets (before tax)	Average rate of inflation
Belgium	14.25	0.39	4.87
Denmark	10.83	1.07	5.20
FR of Germany	19.06	0.72	2.27
Spain	9.95	0.83	10.60
France	12.93	0.33	5.83
Greece	14.61	0.40	19.60
Ireland	12.84	1.08	6.27
Italy	19.27	1.09	9.53
Luxembourg	9.06	0.32	6.10
Netherlands	17.12	0.67	1.60
Portugal	5.06	0.33	21.67
United Kingdom	22.78	1.15	4.70

(1) Figures in percentages. Averages for the period 1984-86. The inflation rate has been approximated with the GDP deflator at market prices.

Source: OECD; Financial Statements of Banks and EC Commission.

Products and services

Despite the decline of non-interest-paying current accounts, raising consumer deposits will continue to be a vital activity for commercial banks. The overall level of credit outstanding is expected to show only a moderate increase (between 3 and 9%) over the next 10 years. Consumer and commercial lending will increase; international money market lending and sovereign lending will not.

Banks will continue to dominate the corporate market, though the profitability of traditional products and services will diminish. They will develop new and more profitable lines of business to compensate. The use of information technology will become increasingly important in the development of marketing strategy.

Technology

Technology will remain the most effective vehicle for reducing processing costs and increasing productivity. Technology can be used to provide competitive advantage in the market. Failure to keep up with technological development will lead to competitive

disadvantage. Banks are expected to use technology to create barriers against non-banks.

By 1990, more than 50% of all personal customers are expected to use ATMs regularly. By 1995, this figure could have risen to 75%. More than half of all the personal customers are expected to use electronic funds transfer at the point of sale by 1995. Between 15 and 30% of all personal customers are expected to be subscribers to a home banking system by 1995.

Risk management

Most bankers will be prepared to take greater risks in most areas of lending in the future. The risk of fraud is not generally expected to increase as a result of greater computerization. Better management information is expected to permit banks to take greater exposure without increasing their risks. Capital adequacy will be one of the most critical success factors for bank management in the 1990s.

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INSURANCE

(NACE 82)

Summary

The EC insurance industry is a large and important part of the Community's financial sector. In 1987, the value of gross premiums received by insurers totalled ECU 222 billion, or about 5.5% of European GDP. Employment in the industry is estimated at around 1.2 million persons.

The term insurance covers a number of different activities, which are destined to satisfy different needs and to perform various functions in the economy. Two elements characterize the activities of insurance: the diversification of risks and the allocation of financial resources.

The main economic function is to transfer risks to specialized companies which assure risks to a certain amount through the collection of a payment (premium). However, there are differences between types of insurance: the basic underlying principle of non-life insurance is the 'mutualization of risks' transferred by a wide range of insured persons or institutions; in life insurance, the principal function is the management and investment of savings; and reinsurance has as its objective the distribution and compensation of mainly large risks.

Insurance companies, especially life-insurance companies, are also financial institutions (although not in the technical sense of the EC Directive on consolidation) which play a very important role in the allocation of resources. The large amounts of money regularly received in the form of premiums have to be properly invested in various types of assets to ensure the necessary solvency and liquidity to meet claims; part of these amounts has to be invested in assets as determined by legislative technical provisions. In this respect, insurance is subject to economic policy.

Typical activities of the insurance sector include:

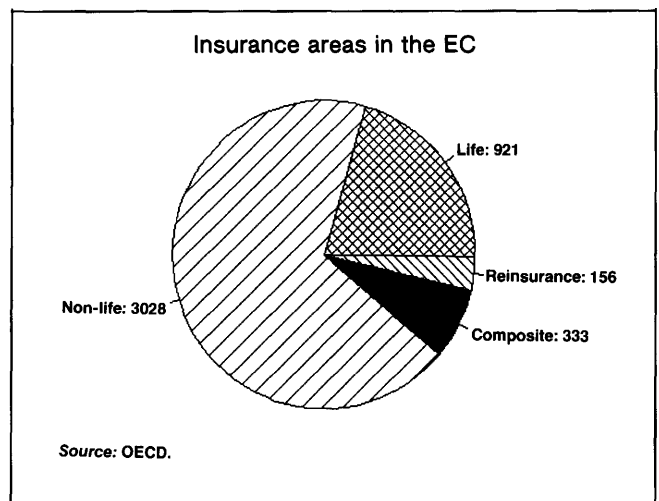
- Direct insurance (life, non-life)
- Reinsurance
- Services auxiliary to insurance, mainly brokerage.

Life and non-life insurance can be further divided into different classes. Life insurance embraces oper-

ations based on capitalization, of which there are a great variety: survival or death insurance, annuities, supplementary insurance against special personal injury or sickness, permanent health insurance, capital redemption operations, management of pension funds, etc. Non-life insurance business can also be divided into a number of classes: accident and sickness, motor insurance, transport (with the distinction between insurance of the merchandise and the means of transport itself), fire and natural forces, civil liability of all kinds (motor, industrial, professional, etc.) credit and suretyship, financial losses, legal expenses, etc.

The different classes of insurance also vary, as a result of the unique requirements of the industry that is being insured. For example, reinsurance and transport insurance are, by far, the most internationally traded businesses. Transport insurance is a necessary complement to transportation and it is customarily provided by the seller under the usual terms of international trade.

Figure 1



In general, it can be affirmed that life insurance, with the exception of group pensions, is *per se* a mass risk, like some classes of damage insurance such as motor or health insurance. On the other hand, air or maritime insurance and industrial risks such as liability, fire and reinsurance, are usually 'large' risks.

Current situation

Three indicators serve to measure the size and distribution of the EC insurance market: the volume of premiums collected, propensity to insure (insurance penetration), and the density of insurance.

In 1987, the value of gross premiums received in the EC totalled ECU 222 billion; 58.3% of the premiums were in the non-life sector, and the rest (41.7%) in the life sector.

The EC insurance market has experienced a high rate of growth over the years 1960-80; in 1960 total premiums (including Member States which joined since 1960), amounted to ECU 6 888 million representing 18.4% of the world premium income; in 1980 the figure reached ECU 84 594 million — 27.3% of the world market. However, in the 1980s, the EC

market share fell to less than 23% in 1985 along with increases in the American and Japanese share. Despite this decline, the annual rates of growth within the EC have been high in recent years, especially in the life insurance sector.

The size of insurance markets differs greatly from one Member State to another; differences in habits, levels of saving, strength and scope of social security schemes and of compulsory insurance, economic development and the economic situation in general, explain the variations in premium volumes and the distribution of premiums amongst subsectors or branches.

There are no data to establish a breakdown between mass risks and large or industrial risks nor to distinguish between different types of insurance policies.

Table 1
Premiums according to different sources

(million ECU)	1985			1986			1987		
	Total	Life	Non-life	Total	Life	Non-life	Total	Life	Non-life
OECD									
Belgium	4 966	1 339	3 627	5 266	1 512	3 754	5 891	1 862	4 028
Denmark	3 642	1 685	1 957	3 602	1 452	2 150	4 185	1 475	2 710
FR of Germany	48 435	18 391	30 044	51 196	19 865	31 331	N/A	N/A	N/A
Greece	515	120	395	N/A	N/A	N/A	N/A	N/A	N/A
Spain	4 894	681	4 213	7 551	2 954	4 597	9 400	3 969	5 431
France	35 823	11 251	24 572	38 466	13 635	24 831	43 003	16 711	26 292
Ireland	2 323	1 309	1 014	2 317	1 178	1 139	2 786	1 638	1 148
Italy	13 787	2 356	11 431	15 057	2 983	12 074	17 694	4 074	13 620
Luxembourg	158	39	120	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	10 292	4 499	5 793	11 216	4 826	6 390	12 535	5 460	7 075
Portugal	738	71	668	773	72	701	844	106	738
United Kingdom	56 173	25 619	30 554	57 537	26 432	31 105	N/A	N/A	33 600
EC 12	181 747	67 359	114 388	193 633 (1)	75 070 (1)	118 563 (1)	221 967 (1)	92 603 (1)	129 364 (1)
USA	N/A	N/A	N/A	366 306	189 264	177 042	360 591	178 623	181 969
Japan	N/A	N/A	N/A	142 465	109 656	32 809	162 444	128 261	34 182
Sigma									
Belgium	4 079	1 135	2 944	4 724	1 308	3 417			
Denmark	3 456	1 628	1 828	3 556	1 475	2 081			
FR of Germany	48 905	20 061	28 844	55 761	23 640	32 120			
Greece	472	136	336	431	132	299			
Spain	4 108	610	3 498	4 969	1 017	3 953			
France	30 429	10 454	19 975	34 044	13 248	20 796			
Ireland	1 975	1 247	728	2 037	1 199	838			
Italy	11 595	1 794	9 802	13 502	2 467	11 034			
Luxembourg	156	38	118	179	43	136			
Netherlands	9 228	4 305	4 923	10 720	4 890	5 830			
Portugal	701	70	631	732	71	661			
United Kingdom	42 761	25 561	17 200	42 792	25 413	17 380			
EC 12	157 865	67 039	90 826	173 446	74 901	98 545			

(1) Eurostat estimates.

Source: OECD; Sigma.

Table 2
Insurance market shares

	1960		1970		1980	
	Million USD	Share in world volume (%)	Million USD	Share in world volume (%)	Million USD	Share in world volume (%)
EC	8 546	18.4	24 002	21.2	117 783	27.3
Rest of Europe	1 374	3.0	3 889	3.4	22 611	5.3
North America	33 454	72.0	71 860	43.5	202 212	47.0
Japan	1 025	2.2	7 963	7.0	59 179	13.1
Rest OECD	855	1.8	2 087	1.9	7 831	1.1
OECD	45 254	97.4	109 801	97.0	409 616	95.0
Non-OECD	1 222	2.6	3 346	3.0	21 370	5.0
Total	46 476	100.0	113 147	100.0	430 986	100.0

Source: Ch. Zwonicek, 'Die EG — Ein Wachstumsmarkt für Versicherungen', *Versicherungswirtschaft*, 1/84, pp. 58-62.

In the EC the largest individual markets are the Federal Republic of Germany, the United Kingdom and France; the UK has the largest life insurance premium income and, along with Ireland, the highest proportion of life insurance to total business; the lowest proportions of life insurance to total business were in Portugal, Spain and Italy.

The insurance penetration is the total premiums collected by insurers (other than the State) as a percentage of GDP; this gives an indication of the importance of insurance business. It is obviously markedly influenced by the volume and extent of

public insurance, given the relative interchangeability of these categories (this is notably the case in Japan, where the value of life insurance premiums is very similar to the amounts destined for public pension schemes, while for most countries the value of life insurance premiums is considerably lower than those of public pension schemes). Habits and legal requirements, rather than income are the main factors which influence the ratio of non-life premiums to GDP. The life premiums to GDP ratio is influenced primarily by the strength of public pension schemes and also the structure of savings and the saving ratio.

Table 3
Propensity to insure: premiums as % of GDP

(%)	1985			1986			1987 (1)		
	Total premiums	Non-life	Life	Total premiums	Non-life	Life	Total premiums	Non-life	Life
Belgium	3.9	2.8	1.1	4.0	2.9	1.1	4.9	3.4	1.6
Denmark	7.0	4.7	2.2	4.2	2.5	1.8	4.8	3.1	1.7
FR of Germany	5.9	3.5	2.4	6.0	3.4	2.5	N/A	N/A	N/A
Greece	1.1	0.8	0.3	1.2	0.8	0.4	N/A	N/A	N/A
Spain	2.4	2.1	0.3	2.2	1.8	0.5	3.7	2.2	1.6
France	5.0	3.4	1.6	4.7	2.9	1.8	5.6	3.4	2.2
Ireland	9.0	3.7	5.3	8.5	3.5	5.0	10.9	4.5	6.4
Italy	2.4	2.1	0.4	2.2	1.8	0.4	2.7	2.1	0.6
Luxembourg	2.9	2.3	0.7	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	6.3	3.5	2.7	5.9	3.2	2.7	6.8	3.8	3.0
Portugal	2.6	2.3	0.3	N/A	N/A	N/A	2.6	2.3	0.3
United Kingdom	7.6	3.3	4.3	8.3	3.4	5.0	N/A	5.8	N/A
EC 12	5.2	3.1	2.1	5.5 (2)	3.4 (2)	2.1 (2)	6.0 (2)	3.5 (2)	2.5 (2)
USA	7.6	4.7	2.9	8.8	5.3	3.6	9.2	4.7	4.6
Japan	6.9	2.0	4.9	8.2	2.5	5.8	7.9	1.7	6.2

(1) Data not fully comparable with the previous years because of the different sources used.

(2) Eurostat estimates.

Source: F. Granado, 'The Leading European Insurers', L'Argus, Paris, December 1987; Sigma/Suisse de Réassurance 5/87 and 5/88; OECD (premiums 1987); Eurostat.

Table 4
Density of insurance

(ECU per capita)	1985			1986			1987 (1)		
	Total business	Non-life	Life	Total business	Non-life	Life	Total business	Non-life	Life
Belgium	413.8	298.7	115.2	476.7	344.7	132.0	597	408	189
Denmark	1 038.0	705.8	332.3	694.5	406.4	288.1	816	529	288
FR of Germany	803.1	473.6	329.5	913.4	526.2	387.2	N/A	N/A	N/A
Greece	46.2	32.7	13.5	43.2	30.0	13.2	N/A	N/A	N/A
Spain	134.6	118.8	15.8	128.5	102.2	26.3	242	140	102
France	616.0	415.1	200.9	614.6	375.5	239.2	773	473	300
Ireland	609.0	247.7	361.3	575.3	236.7	338.6	786	324	462
Italy	201.6	170.2	31.4	236.0	192.8	43.2	309	238	71
Luxembourg	378.4	290.7	87.7	498.3	378.9	119.4	N/A	N/A	N/A
Netherlands	717.2	403.7	313.5	736.3	400.4	335.9	855	482	372
Portugal	68.5	61.7	6.8	71.1	64.2	6.9	82	72	10
United Kingdom	797.9	345.7	452.2	753.9	306.2	447.8	N/A	590	N/A
EC 12	522.0	310.6	211.4	600.0 (2)	367.0 (2)	233.0 (2)	686 (2)	400 (2)	286 (2)
USA	1 647.0	1 022.5	645.5	1 434.9	855.1	579.8	1 479	746	733
Japan	1 005.8	288.2	717.7	1 307.2	390.6	916.6	1 331	280	1 051

(1) Data not fully comparable with the previous years because of the different sources.

(2) Eurostat estimates.

Source: F. Granado, 'The Leading European Insurers', L'Argus, Paris, December 1987; Sigma/Suisse de Réassurance 5/87 and 5/88; OECD; Eurostat.

For the EC, total premiums to GDP stood at 6% (non-life = 3.5%, life = 2.5%) compared with 9.2% for the USA (non-life = 4.7%, life = 4.6%) and 7.9% for Japan (non-life = 1.7%, life = 6.2%). Ireland has the highest ratio of premiums to GDP in the world, conversely, Greece is ranked 40th in the world.

The expression 'density of insurance' refers to the average premiums paid per head of population; a major factor, but not the only one, is income per capita. In 1985, average premiums paid per head

stood at ECU 686; in the US the comparable figure was ECU 1 479, and in Japan ECU 1 331.

With regard to the distribution of premiums between life and non-life (with the exception of Luxembourg, Ireland and perhaps Italy), it appears that insurance in general and, in a more marked way, life insurance, has a positive elasticity (greater than 1) in relation to the income of a country; more wealth implies still more insurance, particularly in the case of life insurance.

Table 5
Inward reinsurance ratio: reinsurance accepted/gross premiums

(%)	1985		1986		1987	
	Life	Non-life	Life	Non-life	Life	Non-life
Belgium	2.3	11.5	1.8	9.7	1.1	8.2
Denmark	4.1	7.4	4.0	7.2	3.2	16.1
FR of Germany	N/A	4.7	N/A	4.5	N/A	N/A
Greece	N/A	N/A	N/A	N/A	N/A	N/A
Spain	2.8	5.8	1.2	6.0	0.6	4.9
France	7.6	18.6	5.0	17.9	4.5	17.4
Ireland	< 0.1	3.0	0.1	3.3	0.1	9.6
Italy	23.6	14.8	21.6	13.6	20.0	13.3
Luxembourg	2.1	2.1	N/A	N/A	N/A	N/A
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A
Portugal	0.2	5.3	0.1	4.0	0.1	3.4
United Kingdom	N/A	24.0	N/A	22.7	N/A	21.3
USA	0.2	0.9	0.2	0.6	N/A	7.0
Japan	0.1	17.9	0.1	15.9	0.1	15.0

Source: OECD.

Other important indicators for the insurance sector are reinsurance ratios which indicate the proportion of reinsurance with regard to the total amount of premiums received. Data are available for the following:

- inward reinsurance ratio is the amount of reinsurance accepted as a proportion of total gross premiums; it shows the importance of the reinsurance business compared with total business in a given country;
- premium retention ratio is the proportion of net written premiums to total gross premiums; this ratio indicates the percentage of reinsurance which has not been ceded or retroceded and, conversely, the percentage of insurance ceded.

A comparison of the premium retention ratio with the inward reinsurance ratio gives an indication of which part of insurance has been ceded abroad. In principle, the net flow of reinsurance can be calculated as the difference between the proportion of insurance ceded minus the proportion of reinsurance accepted.

The importance of reinsurance for life insurance is considerably less than for non-life insurance. Reinsurance is of considerable importance in Italy, the UK and France; equally, the percentage of insurance ceded is relatively high for Italy, while for non-life it is about 20 to 30% in almost all the Member States.

Separate figures on the share of GDP provided by insurance for the whole Community are not obtainable; the existing figures include insurance with other financial services. There is little indication,

however, that growth in the insurance industry differs significantly from the rest of financial services. The growth rate of financial services as a whole has been considerably higher than that of the rest of the economy and its share in the sector 'market services' has also increased.

Industry structure

The insurance industry is composed of both profit-making companies and mutual (non-profit-making) companies which are described as follows:

- limited companies, in their various forms (public limited companies, or 'limited partnerships');
- companies based on mutual principles (cooperative societies, mutual companies, in which the insured persons are at one and the same time partners and whose premiums form part of the endowment capital of the company; these are normally non-profit-making);
- other kinds of non-profit-making companies, such as the Friendly Societies in the UK;
- the special case of Lloyd's of London, an association of syndicates whose members are unincorporated and liable without limit for the risks they underwrite.

In some Member States, a specialization can be observed according to the type of company, and the largest ones are not necessarily public limited companies.

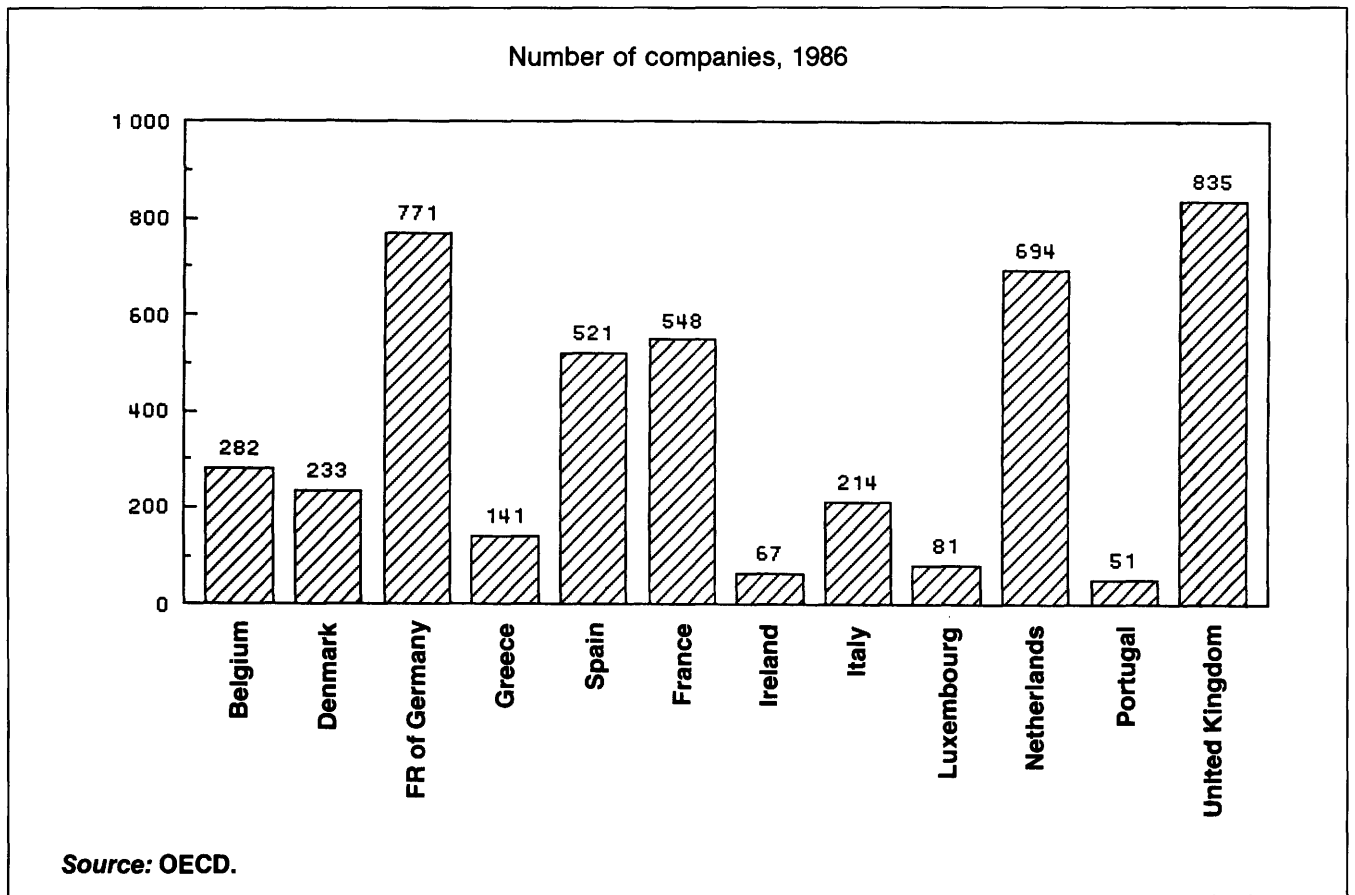
There are at least three ways in which the public sector is active in insurance-related activities. First of

Table 6
Premium retention ratio: net premiums/gross premiums

(%)	1985		1986		1987	
	Life	Non-life	Life	Non-life	Life	Non-life
Belgium	92.2	78.6	93.7	80.4	94.9	80.6
Denmark	97.4	N/A	97.1	N/A	97.3	N/A
FR of Germany	93.4	75.7	93.4	75.4	N/A	N/A
Greece	N/A	N/A	N/A	N/A	N/A	N/A
Spain	87.9	75.7	96.8	78.0	97.8	80.3
France	93.7	79.7	95.1	80.4	95.4	82.9
Ireland	94.0	72.3	95.8	74.1	98.4	78.0
Italy	82.9	76.2	82.6	77.9	83.3	77.9
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	94.8	82.5	94.4	85.0	95.8	85.5
Portugal	88.9	79.2	88.2	82.4	90.8	82.3
United Kingdom	100.0	76.3	100.0	77.7	N/A	75.0
USA	99.5	97.1	99.6	97.1	N/A	89.6
Japan	99.9	73.9	99.9	74.0	99.9	74.8

Source: OECD.

Figure 2



all, the social security system aims to a large extent to cover needs similar to those of insurance; the techniques and ways of operation are different, but in some areas social security and insurance are interchangeable activities; this is the case with pension schemes and health/accident insurance. Secondly, publicly owned companies have a large market share in some Member States and operate in competition with private companies. The Member States in which publicly owned companies are of the greatest importance are:

- Denmark, where the leading life insurance company, which holds 25% of the life market, is a nationalized company;
- France, where nationalized companies and the National Provident Fund write almost 35% of the total business; one of the biggest European insurers (UAP) is still publicly owned;
- Ireland, where there is a consortium created to reorganize insurance companies in difficulties (Insurance Corporation of Ireland), especially active outside Ireland;
- Portugal, where more than 70% of the total business is done by nationalized companies, and another 16% by partly State-owned companies.

The third sector of insurance activity in which the public sector has a strong involvement is export credit insurance; this covers national agencies which take on board the risk of non-payment for exports; private companies also cover these risks.

In 1986 there were 4 438 insurance companies operating in the EC: of these, 921 operated in the life sector, 3 028 in non-life, 333 engaged in both and 156 in reinsurance. Figures on 1987 are not available yet for EC 12.

At the Community level, in life insurance the 10 leading companies account for 27.9% of all the business, and the top 20 wrote 39.2%. For non-life insurance, the market shares of the 10 and 20 largest companies are, respectively, 17.8% and 26.9%. Taking into account groups of insurers, which operate through separate subsidiaries in different branches and kinds of insurance and in various Member States, the degree of concentration will inevitably be greater.

The UK has the largest number of establishments (affiliates and branches) in the EC (44.2% of the total number of establishments owned by EC insurers in other Member States). Next in order but far behind are the Federal Republic of Germany, France and

Belgium. The Member States with the greatest number of establishments originating from other EC Member States are France and the Netherlands; Greece has 10% of the non-domestic establishments in the EC, and the UK has less than 5% of the total. These percentages give no indication of the importance of the business concerned, but only the number of establishments.

Financing social security systems is becoming more difficult as the population ages and there are fewer people of working age to support the growing population of retired people. This will place a strain on public pension systems in the medium to long term, but also increases the opportunities for the development of new life insurance products to offset any previous sector deficiency.

It is in this field of life insurance that innovation is greatest and more new products and market players are coming into existence. Since life insurance aims at meeting a double need, investment of surpluses and assuring future revenues, there are many formulas for performing these economic functions. One of the most important areas is pension funds, which manage vast amounts of money (for instance, in the UK their funds were worth the equivalent of ECU 200 billion in 1985 compared with a Japanese figure of ECU 138.6 billion). Other important areas are combined systems of insurance and savings accounts, in which the frontier between insurance and banking is unclear.

Insurance companies are not alone in developing these new products. They are in direct competition

with both credit institutions and companies specializing in portfolio management. Credit institutions can also be very effective vendors of insurance, given their extensive network of branches.

Of increasing importance is the involvement of banks in the insurance industry by selling insurance policies of their affiliate insurance companies. These insurance policies may or may not be related to bank operations. For instance, life policies underwritten at the same time loans are granted, insurance linked to credit card selling, or merely combined savings products making use of the actuarial technique are all means by which the banking industry is becoming more involved in insurance.

Employment trends

In 1985, total employment in insurance represented about 33% of employment in financial services, 2.5% of total employment in market services, and a little less than 1% of total employment in the EC. The only available figures for employment growth rates are for the whole branch of financial services.

The figures provide an overview of the distinctions in the structure of the insurance business and of the differing importance of intermediaries in the Member States. Greece, Portugal and Italy feature the strongest role for intermediaries, while in the other Member States, mainly Luxembourg, the Federal Republic of Germany, the UK, the Netherlands and Denmark, their share is the lowest. These

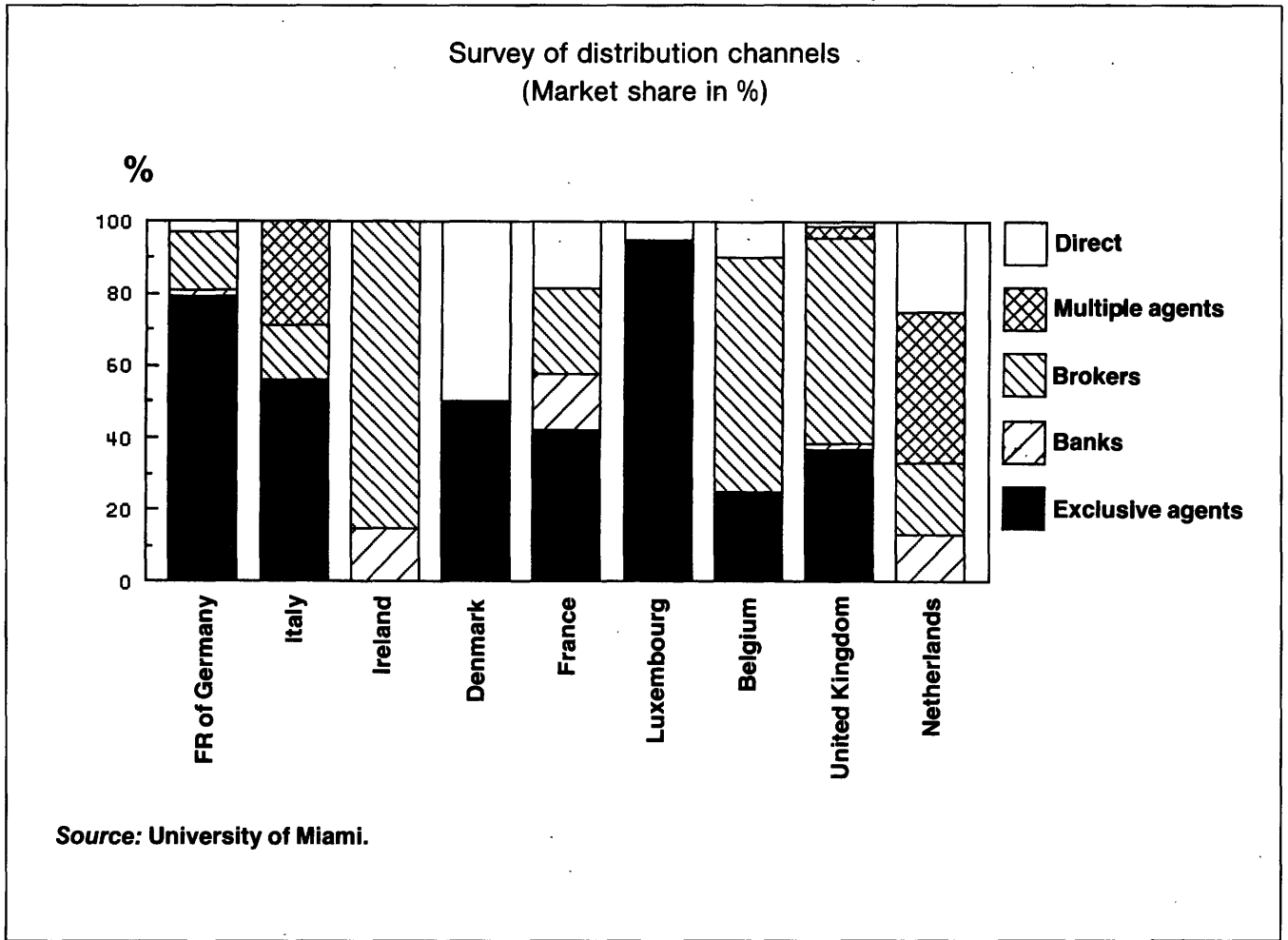
Table 7
Number of establishments abroad, 1984

Member State of origin	In EC Member States	% of total establishments in other Member States	In third countries	% of total EC establishments in third countries	Total abroad	% of total EC establishments abroad
Belgium	73	11.7	6	1.1	79	6.9
Denmark	10	1.6	9	1.7	19	1.7
FR of Germany	90	14.4	26	5.0	116	10.1
Greece	2	0.3	5 (1)	1.0	7	0.6
France	75	12.0	91	17.4	166	14.5
Ireland	11	1.8	5	1.0	16	1.4
Italy	46	7.4	24	4.6	70	6.1
Luxembourg	1	0.2	1	0.2	2	0.2
Netherlands	40	6.4	23	4.4	63	5.5
United Kingdom	276	44.2	232	63.6	608	53.0
EC 10	624	100.0	522	100.0	1 146	100.0

(1) All in Cyprus.

Source: Sigma, 11 December 85.

Figure 3



figures, however, do not provide an indication of whether intermediaries are full-time or part-time.

- mechanisms for enforcing good standards in the conduct of business and governmental intervention in the case of insolvency of a company, and for insurance of extraordinary risks, etc.

Regulatory environment

The activities of life and non-life insurance are highly regulated. The regulations are mainly intended to ensure the solvency of insurance companies in order to strengthen the safety of the financial system, and to provide for adequate consumer protection. The prudential requirements have taken the form of:

- authorization procedures and detailed minimum requirements for the taking-up and pursuit of insurance business (minimum own funds and technical provisions, etc.);
- disclosure requirements (publication of accounts) and supervision of solvency by public authorities;
- regulation and control of premiums and terms of insurance policies;

As a result of increasing European integration, highly regulated markets will have to be partly deregulated. Again, deregulation devalues certain investments.

At first glance, markets in transition from a highly regulated system to a more competitive system should provide good opportunities for entry. A closer look at the mechanics of regulation, however, shows that a deregulation process in itself represents a barrier to entry. Entry into a market in transition is not only risky, but will definitely bring losses to the investor. For deregulation is coupled with windfall losses of existing firms. Note that when markets were regulated the existing firms experienced windfall gains.

Table 8
Employment in insurance, 1985-87

	Insurance undertakings (1 000)	Inter- mediaries (1 000)	Total (1 000)	Inter- mediaries as % of total insurance	Insurance as % of total employment	Premiums per employee (1) (1 000 ECU)
1985						
Belgium	30.0	25.0	55.0	45.5	1.5	74.2
Denmark	8.7	4.0	12.7	31.5	0.5	417.9
FR of Germany	98.0	40.0	238.0	16.8	1.0	205.9
Greece	6.5	20.0	26.5	75.5	0.7	17.4
Spain	33.8	27.0	60.8	44.4	0.6	84.2
France	124.6	82.6	207.2	39.4	1.0	164.0
Ireland	12.4	N/A	N/A	N/A	N/A	N/A
Italy	42.9	76.0	118.9	63.9	0.6	96.9
Luxembourg	0.9	0.2	1.0	15.0	0.6	138.5
Netherlands	36.5	15.0	51.5	29.1	1.0	201.7
Portugal	14.0	37.8	51.8	73.0	1.3	13.5
United Kingdom	233.6	93.4	327.0	28.6	1.4	138.1
EC 12	741.7	421.0 (2)	1 162.7	36.2 (2)	1.0 (2)	144.6
USA	1 112.0	700.0	1 812.0	38.6	1.7	217.5
Japan	557.0	831.0	1 388.0	59.9	2.4	87.5
1986						
Belgium	30.2	25.0	55.2	45.3	1.5	95.5
Denmark	N/A	N/A	12.7	N/A	0.5	283.6
FR of Germany	200.3	40.0	240.3	16.6	1.0	213.1
Greece	7.0	25.0	32.0	78.1	0.9	N/A
Spain	N/A	N/A	N/A	N/A	N/A	N/A
France	124.5	83.4	207.9	40.1	1.0	185.0
Ireland	8.7	N/A	N/A	N/A	N/A	N/A
Italy	43.5	84.3	127.8	65.9	0.6	117.8
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	36.5	15.0	51.5	29.1	1.0	217.8
Portugal	13.9	36.7	50.6	72.6	1.2	15.3
United Kingdom	239.9	103.4	343.3	30.1	1.4	167.6
EC 12	748.1 (3)	445.8 (3)	1 193.9 (3)	37.3 (3)	1.0 (3)	162.2(3)
USA	1 080.0	580.7	1 660.7	35.0	1.5	220.6
Japan	589.0	880.0	1 469.0	59.9	2.5	97.0
1987						
Belgium	30.3	25.0	55.3	45.2	1.5	106.5
Denmark	N/A	N/A	14.0	N/A	0.5	298.9
FR of Germany	N/A	N/A	N/A	N/A	N/A	N/A
Greece	N/A	N/A	N/A	N/A	N/A	N/A
Spain	34.0	N/A	N/A	N/A	N/A	N/A
France	124.1	82.8	206.9	40.0	1.0	207.8
Ireland	8.8	N/A	N/A	N/A	N/A	N/A
Italy	44.4	84.3	128.7	65.5	0.6	137.5
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A
Netherlands	37.0	12.0	49.0	24.5	0.9	255.8
Portugal	14.1	35.4	49.4	71.7	1.2	17.1
United Kingdom	257.9	113.1	371.0	30.5	1.5	N/A
EC 12	777.3 (3)	452.0 (3)	1 229.3 (3)	36.8 (3)	1.0 (3)	180.6(3)
USA	1 418.2	603.6	2 021.8	29.9	1.8	178.4

(1) The results for the years 1985 and 1986 are not comparable because of the different sources used for the premiums in 1985 (F. Granada) and 1986 (OECD).

(2) Excluding Ireland.

(3) Eurostat estimates.

Source: mainly OECD, Statistics on Insurance, 1988, except: total civil employment: Eurostat; premiums 1985: F. Granada, 'The Leading European Insurers', L'Argus, Paris, 12/87.

Figure 4

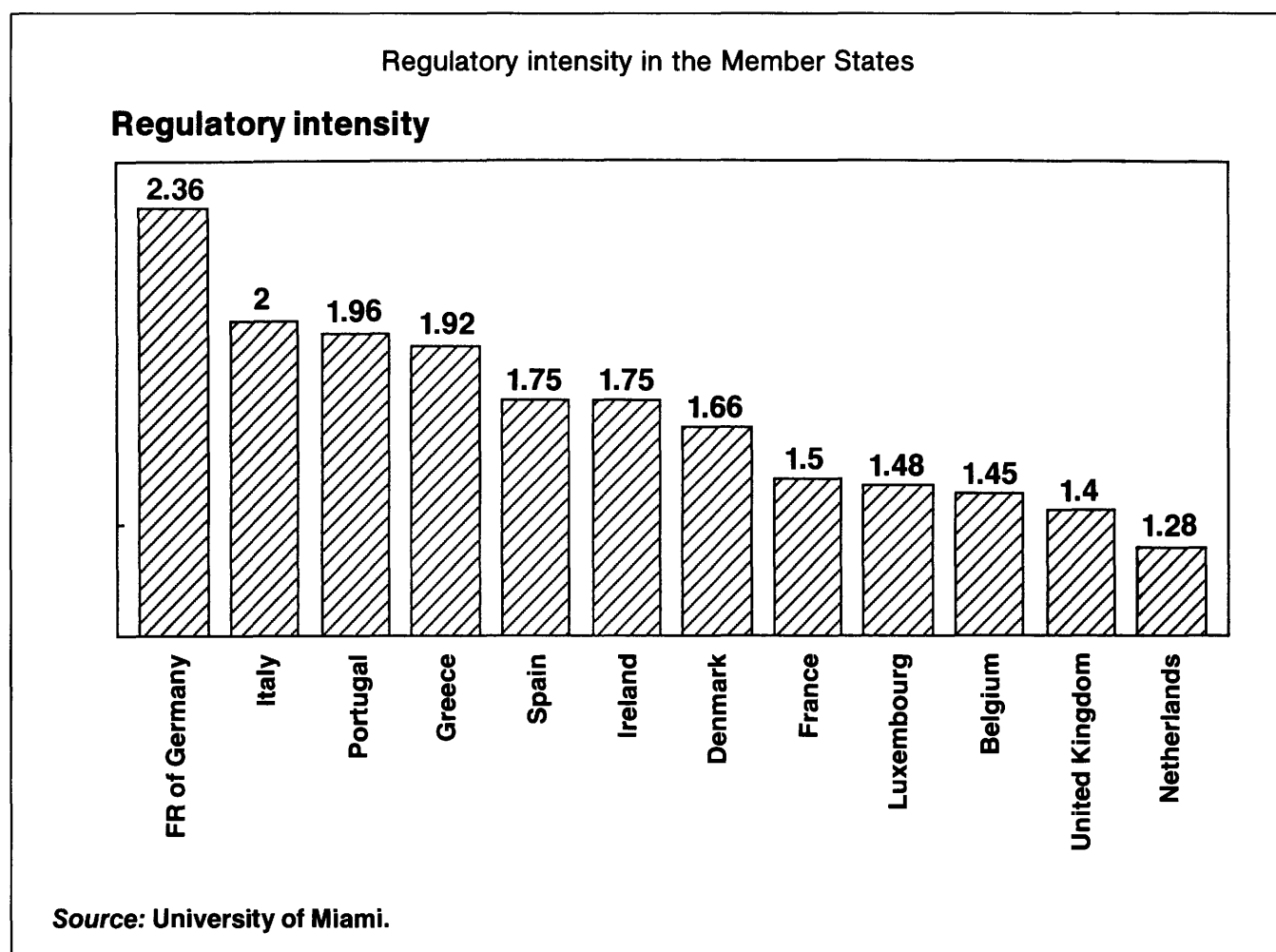


Figure 4 shows the regulatory intensity in the Member States.

Reinsurance is a much less regulated sector, given that the particular concern of consumer protection does not exist in this field (reinsurance is not subject to direct supervision in half of the Member States of the Community).

Financial activities of insurance companies

The insurance companies play an extremely important role in the financial system of the EC.

Here there is an important distinction between life and non-life insurance, which perform very different functions and also fulfil different needs. Even though non-life insurance participates in the allocation of financial resources (for instance, in the way they invest their technical reserves and their surplus), life insurance is more closely related to saving and therefore plays a major role in the allocation of these funds. This role is carried out by life insurance companies as institutional investors.

In this way, insurance companies manage an enormous volume of assets, and invest in other companies, either financial, industrial or commercial, and often direct groups of companies. They have great importance in underwriting corporate debt and in buying equities in the stock markets; they also take up significant amounts of government debt. Insurance companies are by preference long-term investors and are also major owners of property.

International business

A comparison with the international (non-EC) insurance trade including business done through establishments, shows that for EC 10 in 1984, 19.8% of the total of EC companies were owned by nationals of a Member State other than that in which they were based; this number of subsidiaries of Member State companies in other Member States (624) was higher than the number of subsidiaries in third countries (522).

The EC market for direct insurance is relatively large (21.6% of the world premium income in 1985); nevertheless, compared with the markets of other developed countries, the EC's share of world insurance business decreased between 1980 and 1985. The strengthening of the dollar over this period, however, has played a significant part in this. The average premium per head in the EC in 1985 (ECU 521.97 in 1980) was considerably lower than in other developed countries: Switzerland (ECU 1 670.3 per head), USA (1 647.0), Japan (1 005.2), Canada (875.5), Sweden (816.5) or Australia (659.3). Only four Member States (Denmark, the Federal Republic of Germany, the Netherlands and the UK) have a bigger premium per head than Australia, and of those only one matches Japan (Denmark with ECU 1 038.0 per head).

In 1985, the EC total insurance market was not much bigger than Japan's. Japan's life insurance market, however, is considerably bigger than that of the EC, due mainly to one of the highest personal savings ratios in the world and to a weak public pension scheme. Currently, life insurance monthly premium income in Japan is over ECU 115 billion (about yen 1.5 trillion). On an annual basis, the life insurance premiums amount to 5.4% of Japanese GNP which is as much as the percentage of the whole insurance sector in Europe. The relatively small size, propensity to insure and insurance density of the EC insurance markets can be explained only partly by comparatively higher standards of

social protection (this argument may be valid for, say, the USA or Japan, but not for other countries).

With regard to reinsurance, despite the greater scarcity of data, it can be assumed that EC insurers hold a very large share of the world market. Some indication of this is that the largest reinsurance company in the world is EC-based (the Federal Republic of Germany) and eight out of the world's 15 largest specialized professional reinsurers in 1985 (excluding Lloyd's of London) were from the Community and accounted for 50% of a total of USD 15 280.4 million (ECU 20 024.4 million) in premiums. The importance of Lloyd's in this business does not need to be restated.

A distinction must be drawn between premiums received for the sale of insurance policies abroad ('cross-frontier services'), and insurance business done in third countries by EC companies through a permanent presence in the form of branches and subsidiaries; the same distinction is logically valid for business in the EC by third country companies. This distinction corresponds approximately to the EC's international notions of 'services' business and 'establishments', respectively.

A breakdown between classes of insurance and between Member States is not fully reliable; according to the data available, the UK has the largest trade in insurance; in 1985 its net insurance surplus with the rest of the world (no exclusion of EC is possible) was ECU 5 633.5 million; the second biggest exporter in the EC was the Federal Republic of Germany, whose

Table 9
Distribution of premiums collected

(million ECU)	Non-life		Life		Total		Share of world market (%)		
	Total amount	Per head	Total amount	Per head	Total amount	Per head	Non-life	Life	Total
1985									
USA and Canada	220 520	842.3	137 404	524.8	357 924	1 367.1	56.9	42.6	50.4
EC 12	90 646	282.1	66 684	207.5	157 330	489.7	23.4	20.7	22.2
Rest of Europe (1)	12 832	396.9	12 850	405.2	25 682	810.1	3.3	4.0	3.6
Japan	35 310	292.4	87 923	728.2	123 233	1 020.6	9.1	27.2	17.3
Australia and New Zealand	6 719	353.4	3 204	168.5	9 923	521.9	1.7	1.0	1.4
Other countries	21 561	N/A	14 737	N/A	36 298	N/A	5.6	4.5	5.1
Total	387 588	80.1	322 802	66.7	710 310	146.9	100.0	100.0	100.0
1986									
USA and Canada	216 778.2	811.3	148 401.5	555.4	365 179.7	1 366.7	51.9	38.6	45.5
EC 12	98 544.4	305.3	74 901.4	232.1	173 445.9	537.4	23.6	19.5	21.6
Rest of Europe (1)	29 440.9	N/A	29 029.9	N/A	58 470.8	N/A	7.0	7.6	7.3
Japan	47 449.5	390.6	111 356.7	916.6	158 806.2	1 307.1	11.3	29.0	19.8
Australia and New Zealand	6 068.9	315.7	3 004.5	156.3	9 073.4	472.0	1.5	0.8	1.1
Other countries	19 793.9	N/A	17 281.7	N/A	37 075.6	N/A	4.7	4.5	4.6
Total	418 075.8	85.0	383 975.8	78.1	802 051.6	163.1	100.0	100.0	100.0

(1) Excluding Turkey.

Source: Sigma, 5/87, 5/88.

exports totalled ECU 1 706.9 million (net flows not available).

In terms of foreign involvement in insurance markets, the situation differs considerably from country to country. In 1984, total foreign market share in the US market was only 5%; in Japan, for non-life insurance this figure was 2.9% and for life insurance even lower at only 1% (1981). These two countries together represented 67.7% of the world market in 1985. In 1984, the market share of non-European insurers in Europe was 24%.

Data on the number of foreign companies operating in the EC and EC companies working in third countries need to be interpreted with care. A large number of foreign companies or establishments does not imply a correspondingly large foreign market share: for instance, in France 39.3% of the number of insurance companies are foreign but they hold only 9.4% of the French market. Conversely, there is a low percentage (17%) of foreign companies and establishments in the UK which, however, underwrite a significant chunk of UK insurance policies (13% of life premiums in 1985). The UK is the Member State with the lowest presence of other EC companies (37%) by comparison with the total number of foreign companies. Similarly, a high numerical proportion of EC companies does not mean a comparable presence in terms of market share; a case in point is Greece where, despite the fact that 80% of the foreign companies are from other Member States, a single American insurer received more than 40% of the life premium in 1985.

The UK is the Member State with the strongest presence abroad; the business written by overseas subsidiaries of UK companies amounted to ECU 15 423.4 million in 1985, well ahead of any other Member State.

Trends in Member States

The insurance markets in the EC are fairly concentrated. For life insurance, in four out of the nine Member States for which data are available, the 10 leading companies share more than 90% of the market. In only one Member State is the market share of the top 10 companies below 50%.

Non-life insurance shows less concentration; in two of the 10 Member States for which data are available, the 10 largest companies write more than 80% of the business, and in five the market share of the 10 biggest companies is under 50%.

With regard to reinsurance, data are only available for the Federal Republic of Germany, where the top 10 companies hold a share of 71.6%; one of them

(Munich RE, the world's biggest reinsurer) has 36.7%. Reinsurance business is presumably more concentrated than other types of insurance, mainly due to the nature of the risks covered which requires a larger company.

Main European firms

Most of the leading individual insurers (leaving aside the British companies) are German and French. The Spanish, Greek and Portuguese leading companies are very small; in non-life insurance, Allianz's income is almost 150 times that of the leading Portuguese insurer. However, reorganization and concentration is taking place in these three Member States. For instance, in Spain the leading company (Union y el Fenix) received, in 1987, an estimated ECU 285 million in non-life business, and ECU 790.5 million in life insurance, without taking into account the life business performed by a single savings bank mainly in single premiums (in 1987 La Caixa received an estimated ECU 4 280 million).

Table 10
Leading groups of insurers in the EC, 1984

	Country	Premiums (million ECU)
1. Allianz Worldwide	D	7 348.6
2. Nationale Nederlanden	NL	5 878.9
3. Generali Group	I	5 321.4
4. Commercial Union Assoc.	UK	5 041.4
5. Royal Insurance plc	UK	5 018.6
6. Münchener Rückversicherung	D	4 660.1
7. UAP	F	4 159.6
8. Sun Allianz & London Insurance	UK	3 873.3
9. General Fire and Life Assurance Co.	UK	3 552.7
10. Guardian Royal Exchange	UK	3 433.6
11. AGF	F	3 244.8
12. Aegon Insurance Group	NL	3 163.7

Source: Investir, 1/86.

In 1987 Allianz's overall premium income in all branches of insurance, including reinsurance, was ECU 12 367.2 million; of this 4 444.4 million (32%) came from outside the Federal Republic of Germany.

The criterion of legal form is relevant in the insurance sector because of the sometimes dominant presence in the market of companies based on the mutual principle. Data on the breakdown of the number of companies according to their legal form exist for some countries; for others, the data available concern the market held by each kind of company.

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PROFESSIONAL BUSINESS SERVICES

(NACE 83)

Description of the sector

Business services include all services purchased by enterprises and used to improve their efficiency and productivity. They are classified according to their traditional function as:

- management and administration services (management, legal, accounting, fiscal advice etc.);
- production services (engineering, leasing and renting, repair and maintenance, inspection, control and certification, packaging etc.);
- research services;
- personnel services (vocational training, recruitment, temporary labour etc.);
- sales services (advertising, sales promotion, market research etc.);
- information and communication services (software, data banks, technical computer services, courier and messages, advanced telecommunication services etc.);

Most of these different activities are covered individually below, in two distinct chapters, depending on whether these services are designed exclusively for business companies or for both the corporate sector and households. Generally speaking, thus, Chapter 27 covers the so-called 'professional business services', such as:

- real estate
- legal services
- notaries
- accountancy services
- consulting engineers
- construction economists
- architects
- management consultants

whereas Chapter 28 covers those business services that are more particularly destined for the business sector, namely

- advertising
- direct marketing
- sales promotion
- public relations
- market research
- industrial cleaning services
- security services
- temporary work services
- express couriers.

Each subchapter within Chapters 27 and 28 identifies the main trends associated with the different service industries, their past development and future prospects.

Some of the business services described in those two chapters are contained in the NACE classification; however, some business service industries are not included in this classification given that most of them available in 1989 did not exist or were significantly smaller when the NACE classification was established (in 1970). In the subchapters that follow, however, the trends, characteristics and developments for business services will be examined in more detail based on information largely provided by the representative federations.

This overview discusses the general trends within the business services sector considered in its entirety, that is covering the subsectors of Chapters 27 and 28 taken together.

Importance of the industry in the EC economy

Although data on production and employment are limited, conservative estimates suggest that total turnover of the business services industry probably exceeds ECU 240 billion and employment 5.4 mil-

lion people. These figures must, however, be used with caution, given that they have been drawn from a variety of trade associations, surveys, and industry spokespersons, and thus do not represent a consistent measure across all subsectors within business services.

Business services has been one of the fastest growing industries of the economy in the last 10 years and is expected to continue so. It is useful to look at the overall growth in the EC services sector as a benchmark. Where employment in the services sector as a whole has expanded at an annual rate of approximately 1.5% between 1980 and 1988, agriculture, manufacturing and building and construction have each declined by over 2%. Within the subsectors of business services, advertising expenditure grew at an average annual rate of 7.2% between 1980 and 1987. Telemarketing has been growing at 30 to 40% annually over the last several years and temporary labour services expanded by 14% in 1988. In the period 1980-85 business services as a total have increased by 14.6%.

Part of the growth in business services relates to the externalization of many business functions, the process by which companies contract these services out to an external supplier rather than provide for them internally. For example, in Belgium and France, 25% of the total market for cleaning services was provided by outside cleaning firms in 1970, compared with the 40% rate of externalization of cleaning services in these two countries in 1988.

Technological developments, competitive pressure and the increasing sophistication of many companies has also expanded the range of and demand for business services. For example, the development of satellites that can transmit across national fron-

tiers has increased the market for advertising services. Computer technology has had a positive impact on growth in direct marketing given that the task of generating mailing lists and maintaining a database of client contacts has been made much simpler. Computer technology in general had a great impact on the development of business services.

Industry structure

Business services appears to have a fairly fragmented industry structure although the level of concentration varies considerably between the various subsectors and across the Member States. There are, at the one end of the scale, large, sometimes multinational firms which have a dominant presence in the market, but the remaining portion of the market is served by very often small, specialized companies, often offshoots of larger firms.

Outlook

Growth in business services is mainly linked to the structural need of enterprises to be more efficient and more competitive. General economic conditions play a role but this role is minor, taking into consideration that in periods of economic decline, business services have shown considerable growth rates.

The creation of the European single market offers considerable opportunities to the business services sector, as many companies, in their efforts to restructure and rationalize their efforts, will look for external specialized business services.

DRI Europe

THE REAL-ESTATE SECTOR

(NACE 833 and 834)

Summary

The real-estate services sector covers a wide range of activities which meet a vital need of all segments of society (individuals or businesses), be it the purchase of a dwelling, renting office space or the management of a building. There are more than 120 000 professionals working in this sector throughout the EC, more than 70 000 in the United Kingdom alone. The regulation of the profession in EC countries is far from being uniform. Taxes on property transfers and VAT rates on construction vary as well. Recently, prices of immovable property and the number of transactions are rising fast nearly everywhere in the EC, and in all markets at that: residential buildings, offices and industrial real estate.

Definition of the sector

NACE 833 comprises companies and individuals working in real-estate services on their own behalf, as well as those who finance and construct buildings in order to sell them. NACE 834, on the other hand, comprises only companies and individuals who work for third parties and who are not directly liable under agreements of sale.

Description of the activities of real-estate professionals

The role of real-estate professionals is virtually the same in all the Member States. Nevertheless, the way the profession is actually carried on varies, depending on the legislative environment of each country. More specifically, the real-estate process consists of a set of services (sectors of activity), which may be specified as follows:

- Consultancy, to determine the feasibility of a project;
- Expertise, to assess the factors that might affect the value of a project or of a piece of property;
- Financing, to finance this project;
- Development-construction, to see the project through;
- Transactions, so that it can be duly transferred to the user or buyer;
- Property management, to provide optimal operation.

Quite often, the same professional may provide more than one of these services. This is particularly the case in the United Kingdom, where the so-called 'surveyors' perform several specialized tasks,

Table 1
The real-estate profession in numbers, 1988

	Total number of real-estate professionals	Total number of real-estate professionals member of professional organizations	Proportion of transactions made with the assistance of real-estate agents	
			1987	1988
Belgium	N/A	2 400	60	60
Denmark	3 100	2 860	15	70
FR of Germany	10 000	4 600	60	60
Greece	4 000	3 000	N/A	25
Spain	N/A	19 000	20	20
France	12 000	9 000	40	50
Ireland	2 000	1 200	80	80
Italy	15 000	4 500	30	35
Luxembourg	80	55	90	90
Netherlands	3 000	2 100	65	70
Portugal	N/A	680	20	20
United Kingdom	70 000	65 000	90	90
EC 12	119 180	114 395	—	—

Source: FIABCI.

whereas in Spain and in France there is a tendency to specialize only in one field. In certain other countries, at times, some of these services are not rendered by real-estate professionals. For example, property management is handled by lawyers in Greece, and by bailiffs, lawyers and the Chamber of Property Owners in Portugal.

Current situation

The real-estate sector is closely linked to the overall economic growth and other economic activities such as banking and finance, and the construction industry. The development of the real-estate market is conditioned by private demand, and hence very susceptible to all economic fluctuations, especially variations in rates of interest and legislative decisions regarding taxation. Sociological factors should also be taken into consideration as they too have an impact on the market, e.g. the mobility and ageing of the population, the size of families, number of landlords, etc.

Real-estate market trends

Prices are on the rise, be it in the residential or business real-estate sector. These rises are sometimes spectacular, especially in big cities. London and Paris have peaked. Madrid and Lisbon, where prices were very competitive hitherto, are now in the midst of a veritable real-estate boom accompanied by sizeable price increases in both the residential and office sector, attributable to the adhesion of Spain and Portugal to the common market. Geographical variations are in fact still important. In 1988 for instance, the square metre price of office space varied between ECU 68 in Athens and ECU 647 in London, which is by far the most expensive city for office rents. The second most expensive city in Europe was, still in 1988, Paris, where office space was rented at ECU 320 per square metre, i.e. half the price of London.

The massive influx of foreign investors in certain Community countries also has an impact on rising prices. More specifically, there is a mounting increase in investments from non-EC European, especially Scandinavian countries. A case in point are the Swedes who are establishing their presence in force in numerous cities in the Community, especially in Brussels and Madrid.

Table 2
Occupation status of dwellings, 1985

(%)	Owners	Tenants		
		Total	Private rental	Others
Belgium	65.0	35.0	30.0	N/A
Denmark	52.8	40.0	N/A	7.2
FR of Germany	42.8	56.0	40.0	1.2
Greece	74.7	25.3	21.3	N/A
Spain	69.0	27.5	N/A	3.5
France	52.0	40.9	27.8	7.1
Ireland	73.4	25.0	N/A	1.6
Italy	59.0	36.0	31.6	5.0
Luxembourg	70.0	N/A	N/A	N/A
Netherlands	43.0	55.5	18.5	1.5
Portugal	58.6	39.0	35.0	2.7
United Kingdom	61.3	37.7	8.0	1.0

Source: Cereve, UN, 1985; FIABCI.

Structure of the profession

Real estate as a whole in EC countries embodies approximately 120 000 people authorized to exercise the profession, and 100 000 if only real-estate agency heads are taken into account. Most agencies in the real-estate sector are small, catering in most cases mainly for local customers. This is less true for agencies which specialize in business real estate; the latter are clustered in major business districts and operate on an international scale. The majority of large real-estate firms in this sector are English.

The progress of the profession

Computerization has meant leaps and bounds in new professional techniques that have furthered contacts with customers while improving the quality of the services rendered. Though not yet widespread in Europe, multiple listing services offer real-estate professionals a new formula for professional cooperations and sales promotion. Used mainly in the USA and Canada, this formula enables real-estate agents to pool their offer of property for sale and rental, and then share their fees with the colleague who actually carried out the transaction. This new type of real-estate marketing is gaining currency in Europe, particularly and in exemplary fashion in the Netherlands, where real-estate professionals (NVM) are already fully computerized. The current state of development in information technology and telecommunications provides the technological bases needed to set up such networks and to plan their further development at the European scale.

The regulation of the profession

The regulation of the real-estate profession in the 12 EC countries is far from homogeneous, and pro-

professionals are subjected to widely different conditions. A few exceptions notwithstanding, existing legislation in most countries governs, almost exclusively, the activity of real-estate agents. In certain countries, the regulation is the subject of specific laws which stipulate the conditions of access to and exercise of the profession. In some countries, these conditions are quite strict, as for example in Denmark, Spain, France and Italy. In others, real-estate professionals are usually subject to the rules of common law in civil, commercial or tax matters.

Codes of professional conduct

Rules of professionals are enacted by professional associations which enforced them among their adherents, especially where the profession is little if at all regulated by law. This is the case in the Federal Republic of Germany, Belgium, Luxembourg, the Netherlands and the UK (where professional associations wield considerable influence). Most of the associations have arbitration and disciplinary committees which sanction any individual who fails to comply with these rules. There are no codes of professional conduct in Denmark, Greece and Portugal.

Conditions of access to the profession

Professional permit

All Member States, except for Belgium and Portugal, have plans, to be implemented either by law or by

professional associations, for a professional permit (card) authorizing the bearer to exercise the profession. Nevertheless, the criteria established for obtaining this permit vary widely.

Professional training

As a rule, governments do not intervene directly in the real-estate professional training, a task which is performed virtually everywhere by professional associations which undertake to train their members. Practically all professional associations have continuing education and training programmes. A professional aptitude test, which gives official recognition to professional experience or an appropriate diploma (one or the other) prior to access to the profession is required by law only in Denmark, Spain, France and Italy.

In the Federal Republic of Germany, the Netherlands and the United Kingdom, professional organizations require a mandatory admission test, and organize continuing education and training programmes. No specific diploma is required by law in Belgium and Portugal in order to exercise the profession.

Financial guarantee

France and Ireland require professionals to be covered by a professional guarantee for monies which their customers leave on deposit. This guarantee is actually provided in the United Kingdom,

Table 3
The property market in European cities, 1988

(ECU)	Residential property market (average sales prices/m ²)			Office property market (average rental prices/m ² per annum)
	New apartments	Old apartments	Urban homes	
Brussels	1 266	748	1 266	118
Copenhagen	1 258	755	N/A	86
Frankfurt	N/A	N/A	N/A	266
Munich	N/A	N/A	N/A	202
Hamburg	1 449	918	2 415	153
Athens	895	597	388	68
Madrid	2 180	2 108	2 180	256
Barcelona	N/A	N/A	N/A	186
Paris	4 261	3 196	4 616	320
Nice	N/A	N/A	N/A	128
Dublin	962	897	705	115
Milan	2 277	1 464	N/A	295
Luxembourg	2 418	1 209	1 727	298
Amsterdam	1 288	858	429	112
The Hague	N/A	N/A	N/A	106
Lisbon	1 029	588	529	210
London	2 860	2 107	3 612	647

Source: FIABCI.

the Netherlands and in Spain through professional associations, and also in Italy as security.

Civil liability insurance

Professionals are required to take out a civil liability insurance policy by law in France, and by professional associations in the Federal Republic of Germany, Belgium, Ireland, the Netherlands and the United Kingdom; while in Luxembourg, the Chamber of Real Estate urges its members to take out such insurance voluntarily.

Payment for services

Professional fees are regulated by the government in Spain (Escala Arancel), in Ireland and in Luxembourg (Ministerial decree of 5 January 1972). There is no regulation in the other EC countries.

- In the Federal Republic of Germany, fees vary considerably from one state (*Länder*) to the other.
- In France, professionals have been entitled to fix their fees as they like since 1 January 1987.
- In the Netherlands, only those professionals who are accredited as 'makelaars' (brokers) are subjected to a fee rating system by their association.
- In the United Kingdom, sale and rental fees must be fixed by private contract with the customer and cannot be governed by set rates.

Property purchase

Real estate taxation

In the case of property transfer, taxes are levied by the State, and vary widely from one country to the other. Some countries have relatively high taxes on property transfer, e.g. France, Belgium, Greece and Portugal. All the same, there is a noticeable trend to lowering such taxes, following the examples of the Federal Republic of Germany and the United Kingdom.

Fees

Fees for services rendered by real-estate professionals are added to the taxes charged to the buyer. These fees may vary depending on the type of services. More specifically, certain fees may include expertise costs, though this is not the case everywhere. Similarly, advertising expenses are sometimes incurred by the agent who then invoices his or her customer for them along with the fees. In most European countries, fees are commensurate with the purchase price.

Rates of interest on mortgage loans

With the free movement of capital making it possible for any national of one Member State of the European Community to borrow in the country of his or

Table 4
The components of the acquisition price, 1988

	Home ownership transfer duties (% of sale)	VAT rate on construction (%)	Real-estate agents' fees for the sale of residential property (% of the sales price)	Interest rate on mortgage loans (1st quarter)	
				1987	1988
Belgium	12.5	17.0	3.0 — 5.0	8.5	8.3
Denmark	N/A	22.0	2.0 — 5.0	12.4	12.0
FR of Germany	2.0	14.0	5.0 — 6.0	7.4	7.0
Greece	13.0	— (4)	4.0	17.5 (7)	17.5 (7)
Spain	6.0	6.0	3.0 — 5.0	14.0	14.5
France	18.2	18.6	5.0 — 7.0	9.8	10.0
Ireland	2.0 (1)	23.0	2.0 — 3.0 (5)	13.0	14.0
Italy	8.0	18.0	1.0 — 3.0	N/A	N/A
Luxembourg	6.0 (2)	N/A	3.0	N/A	N/A
The Netherlands	6.0	19.0	1.5 — 2.0 (6)	7.7	8.0
Portugal	10.0	N/A	3.0 — 5.0	19.5	N/A
United Kingdom	1.0 (3)	15.0	1.5 — 2.5	11.3	10.3

(1) 6% above UKL 50 000.

(2) 9% in the town of Luxembourg.

(3) Exoneration below UKL 30 000.

(4) Adoption of VAT in progress.

(5) + VAT of 25%.

(6) + VAT of 20%.

(7) Housing Savings Plan; the rate of interest on loan without maximum limit was 22%.

Source : FIABCI; European Community Mortgage Federation, Hypostat '88.

her choice, it is to the advantage of a potential buyer to compare the mortgage rates in force at different European financial institutions.

The harmonization objective

Given the great disparity of European regulations, many real-estate professionals would like to see a harmonization of the conditions of access to the profession. Some professional associations have set up working groups which are busy drawing up a draft directive to be submitted to the Commission of the European Communities. Since national requirements are relatively strict depending on the Member State, however, two positions are emerging:

- Countries with strict regulations which do not want their rules weakened, and are favourable to a specific directive at Community level;
- Countries with less strict regulations, or regulations handled by the associations, which want to avoid excessively strict rules; they believe that the directive on the mutual recognition of diplomas is sufficient.

The impact of '1992'

With 1992 just around the corner, the real-estate industry, like most other economic sectors, is busy getting ready for this dateline.

The creation of a single European market in 1993 will undoubtedly mean more purchases of real estate in the other Member States, be it for personal use or as investments.

The last barriers to the free movement of capital are scheduled to be lifted by 1 July 1990 at the latest, except as regards Ireland, Spain, Greece and Portugal, which have been granted an exemption until 31 December 1992. At present, five countries (the Federal Republic of Germany, the United Kingdom and the Benelux countries) no longer have any exchange control.

Yet the impact of 1992 on the real-estate profession is already being felt. The free movement of capital furthers the internationalization of a sector that is still too national, too local even. New agreements are being concluded between European firms for joint ventures in preparation for the opening of the single market. Investments abroad are encouraged,

and indeed certain European regions are already feeling the effects: leisure real estate in Spain, office real estate in Brussels and Lisbon, etc. The harmonization of interest rates in the 12 countries will also affect the real estate sector, which will be spurred by a drop in the cost of credit for consumers.

There are no restrictions applied to foreigners who wish to purchase real estate in most European countries. Nevertheless, an authorization from the public authorities is required in Denmark, France, Italy and Spain. Furthermore, foreigners are not entitled to purchase vacation homes in Denmark, though this rule is bound to be abolished as it is inconsistent with European regulations. In Greece, foreigners cannot acquire immovable property in border regions.

In addition, the free movement of people coupled with the freedom of establishment are added incentives for professionals to show greater interest (via the associations that represent them) in the status of the profession in the different countries. This status differs widely from one Member State to the other at present, and in some cases harmonization is essential.

Though numerous professions have been the subject of specific directives, this is not the case for real estate. As a matter of fact, the European Community has expressly stated that it has no intention of requesting a regulation on real-estate activities at the Community level. The directive on the mutual recognition of higher education diplomas, adopted by the Council of Ministers of the EC on 21 December 1988, is at present the only Community instrument to which real-estate professionals can refer. By calling on the Member States to draw up a system of degree equivalences, this directive will facilitate the establishment of professionals in other Member States by granting them access to regulated professions. Real-estate professionals are therefore affected, as in most countries the exercise of the real-estate profession is subject to conditions of aptitude linked to diplomas or a certain level of professional training.

Real-estate professionals are closing ranks and are creating associations on a European scale. In the absence of any Community regulation, some of them are worried about the great disparity in the status of the profession in the 12 Member States which they fear may adversely affect the free play of competition. National associations are consequently endeavouring to cooperate with their counterparts to set up

the foundations of a self-regulation of the profession.

There is also a trend towards consolidation of real-estate offices, particularly in the business real-estate sector, where there is more and more cooperation by and between big firms from different Member States. On the other hand, the residential sector does not appear to be much affected by the prospect of the single market of 1992, because here transactions are still mainly local. Nevertheless, networks of franchise agencies have started to emerge throughout the Community, strongly suggesting a more interna-

tional future in this sector as well. As to leisure real estate, it is in the midst of a major expansion which is expected to continue in the years to come.

Professionals are optimistic about the growth of real estate activities and the future health of the market, but continue to be concerned about the conditions under which they will be able to exercise their profession.

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LEGAL SERVICES

(NACE 835)

Summary

This sector covers a wide variety of legal services. The status of each of these varies across Member States. Within the EC, the number of registered lawyers reached over 300 000 in 1988. In addition, law offices employ close to 400 000 employees. The best available estimate of total gross income for the profession in the EC is around ECU 14 billion, again with large variations in national average income.

Description of the sector

NACE category 835 covers legal services. Besides lawyers, it includes barristers' chambers, solicitors' offices as well as public notaries and other independent legal experts, including patent agents, etc. Also to be classified in this group are bailiffs.

Lawyers provide highly specialized services to virtually all persons and bodies in public and private life. The term 'lawyer' means, except where otherwise specified, any person permitted to exercise the profession under one or other of the various designations listed in Directive 77/249 of 22 March 1977 on the freedom of lawyers to provide services:

Belgium: avocat — advocaat

Denmark: advokat

FR of Germany: Rechtsanwalt

Greece: dikigoros

Spain: abogado

France: avocat

Ireland: barrister, solicitor

Italy: avvocato

Luxembourg: avocat-avoué

The Netherlands: advocaat

Portugal: advogado

United Kingdom: advocate, barrister, solicitor

In view of the highly responsible tasks carried out by lawyers, the profession is organized by law on a national or local level in each Member State. In

addition to their other duties lawyers are frequently called upon to provide legal advice. However, legal advice is also provided by other professions, such as tax advisers, chartered accountants, patent agents, etc. It is to be expected that the profession will be extensively consulted in the next few years about the legal aspects of the EC Commission's harmonization programme for the achievement of the internal market.

The Council of the Bars and Law Societies of the European Community (CCBE) unanimously adopted at Strasbourg on 28 October 1988 a common Code of Conduct applicable to the transnational activities of the European Community lawyer.

The discussion of the profession of lawyer in the EC Member States that follows is based mainly on information obtained from the 12 national delegations of the CCBE. Where statistics are not available — the most common situation — these delegations have made estimates, except where it appeared to them to be impossible.

Current situation

Everyone, every day, commits acts with legal consequences. For example, when an individual is employed, he or she has an employment contract. If he decides to have his house repaired, he signs a commercial contract. An individual is responsible if, through his acts, he causes a car accident.

People invoke professional legal assistance when it becomes necessary to establish the extent of their rights and obligations. The professional can advise, draft a contract, give an opinion on difficulties which may arise, reconcile positions and draft the compromise to which the parties have agreed.

The proliferation of laws and rules and the increasing complexity of legal problems is such that recourse to a lawyer is useful, if not indispensable.

If attempts to reconcile the parties fail, the individual will be obliged to go to law. After studying the case, the lawyer will draft a summons indicating briefly the facts and legal means on which the action is based, draft submissions or memoranda to

develop the means and reply to the adversary's arguments, and plead before the relevant court.

If a person is accused of a criminal act, only a lawyer may defend him during the prosecution process and subsequently before the criminal court.

Some of these activities are so important and are so close to a public service that the State reserves them in principle to an organized profession. To this effect, either the State creates the organization, as in 10 Member States or else it recognizes it officially (United Kingdom and Ireland).

Thus, lawyers' clients are both informed and protected; informed because, through the professional body whose membership is compulsory for lawyers, they know whom to contact, and protected because a service, whether well or badly performed, cannot be changed once rendered — unlike a product which can be replaced if defective. As the service cannot be controlled, only the person who renders it can, and this monitoring function is therefore the main task of the professional body in most Member States. These bodies, which are called 'Ordre des Avocats', 'Law Society', 'Rechtsanwaltskammer', etc. have considerable powers, which sometimes fall under the control of the judicial authorities. The justification for these powers is the necessity to guarantee to the lawyer, as both counsel and defender, complete independence of public authorities.

These bodies control both access to the profession and the conditions under which it functions. They maintain respect for professional rules such as those relative to professional secrecy or legal privilege; exercise disciplinary powers, sometimes implying the right of exclusion; possess certain regulatory powers; in most cases organize the free advisory service; deal with lawyers' training, particularly that of trainees; and generally in the public interest ensure the correct exercise of lawyers' activities, the dignity of the profession and the observance of rules on incompatibility with the exercise of other activities (Article 4 (4) of the Directive of 22 March 1977).

Professional training

In most countries, a period of in-house training is compulsory, and varies between a year and a half (Greece and Portugal) to three years (Belgium, Denmark, Luxembourg and the Netherlands). Usually, this period includes the requirement to take courses (Belgium, France, Ireland and the Netherlands) and sit examinations (Belgium, FR of Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and the United Kingdom). Member States,

however, have different requirements regarding the time that trainees must devote to these activities. In Belgium, this can be estimated at 120 hours per year. The same holds for the Netherlands.

Other professions within the legal sector

Certain of the legal profession's activities are undertaken by other categories of self-employed persons than the one described above, as their main occupation.

Some of these professions, such as *conseil juridique* (France), *Rechtsbeistand* (FR of Germany), public notary and *huissier*, are exclusively legal in nature. Others have a wider scope. Patent agents and advisers, tax experts, accountants and land surveyors are examples of these.

Some professions, such as those whose sole activity is to represent parties legally, are in the process of disappearing. They are to be found in Spain; in France only for the *avoués à la Cour d'appel*; and in Portugal in connection with minor cases.

A few of these professions are legally organized and controlled internally and externally in the same ways as lawyers are. This is the case in France for *notaires*, *avoués*, *huissiers* and *conseils juridiques*; in Germany for *Steuerberater*, *Wirtschaftsprüfer* and *Rechtsbeistände*, (who are controlled by the *Land* or *Amtsgericht Director*, in Belgium for *notaires*, *experts comptables* and *réviseurs d'entreprise*; in the Netherlands for public notaries, *huissiers* and accountants; in Italy for public notaries and accountants and in Spain for *procuradores*.

As a matter of principle, foreign lawyers not registered at the bars and law societies in the country in which they reside permanently are subject to the rules of their original bars and law societies.

Some legal services usually provided by lawyers are occasionally provided by others as a secondary activity. Banks, savings banks and estate agents draft non-registered legal acts, notably in Belgium, Denmark, Ireland, Luxembourg, the Netherlands and the United Kingdom. They also provide legal advice, as do certain categories of persons enumerated below.

Scope of activities

In the 12 Member States, lawyers participate in the judicial system as the body qualified to assure the rights of defence: they deal or may deal with written and oral procedures before all courts. However, their

extra-judicial role increasingly tends to require a greater share of their time.

The scope of the solicitor's activity in the United Kingdom and Ireland is wider. To a certain extent this is also true of lawyers in Denmark. In those three countries, notarial work is done by lawyers.

Judicial representation

When an individual either does not wish to be or cannot be present in person before a court, he or she must be legally represented. In Belgium, Denmark, Greece, Italy and the United Kingdom this representation is undertaken by lawyers. In the other Member States, other persons also carry on this task, notably:

- the *avoués à la Cour d'appel* in France;
- the *solicitadores* for the smaller cases in Portugal;
- the *procuradores* in Spain;
- fiscal advisers before fiscal courts in Germany and the Netherlands;
- the *Rechtsbeistände* in Germany;
- *huissiers* and legal advisers before lower courts in the Netherlands;
- chartered accountants and patent agents before administrative tribunals in Ireland;
- those exercising power of attorney or *agrés judiciaires* before lower courts in Luxembourg, although this profession is in the process of extinction.

Trade-union representatives represent parties before employment tribunals in Belgium, the FR of Germany, Spain (in the case of collective disputes), Ireland, Luxembourg, the Netherlands and the United Kingdom. They do so, however, as employees of their trade union and not as self-employed persons. The same is true of public officials before the Council of State, notably in Belgium.

Legal defence

The person who represents the plaintiff before a tribunal is not always the same as the person who pleads. In France, for example, the *avoué à la Cour d'appel* represents his client legally, notably when signing the conclusions prepared by the lawyer and containing the written summary of legal submissions, but it is the lawyer who pleads. Lawyers have,

in principle, a monopoly on pleading as participants in a legal process.

In certain Member States, however, members of certain professional categories plead before certain tribunals. These categories are:

- fiscal advisers (*Steuerberater*) before fiscal courts in the FR of Germany, the Netherlands and the United Kingdom (accountants in tax matters);
- legal advisers (*Rechtsbeistände*) in Germany;
- *huissiers* and legal advisers before lower courts in the Netherlands and in France before the tribunal on agricultural leases;
- *solicitadores* for trials of lesser significance in Portugal;
- chartered accountants before administrative tribunals in Ireland;
- patent agents for certain actions involving patents in Ireland and the United Kingdom;
- land surveyors before certain tribunals in the United Kingdom;
- those with powers of attorney or *agrés judiciaires* before lower courts in Luxembourg.

In France, other persons frequently plead before certain courts. Thus, any person in possession of the requisite power can plead before commercial tribunals. The same applies in the Netherlands for lower or administrative courts.

Trade-union representatives plead before employment courts as employees of their union in Belgium, Denmark, Spain (for collective disputes), France, Luxembourg, the Netherlands and the United Kingdom. This is therefore not their main occupation. The same applies to members of agricultural organizations pleading before the tribunal on agricultural leases in France or public officials pleading before the Council of State in Belgium.

Before certain higher courts only a certain category of lawyers is allowed to plead. For example, barristers in England, Wales and Ireland; advocates in Scotland; *Rechtsanwälte* before the *Bundesgerichtshof* in Germany, *avocats à la cour de cassation* before the *Cour de Cassation* and the *Conseil d'État* in France; lawyers to the Courts of Appeal before these courts in Greece; and in Italy *avvocato abilitati al patrocinio presso la Corte di Cassazioni* before this and other superior courts.

Drafting of private and authenticated acts

In the majority of Member States, public notaries exercise an independent and autonomous profession, which is, moreover, a quasi-public office (Belgium, the FR of Germany, Greece, France, Italy, Luxembourg and the Netherlands) or a public one (Portugal).

Public notaries receive certified acts, but may also draft any non-registered act.

In the United Kingdom, most notaries are at the same time solicitors, although in London there are a few notaries who are not. In this country, as in Ireland and Denmark, the concept of certified acts has no equivalent. Nevertheless, drafting of acts and contracts on titles to property is in general reserved for lawyers, although in England and Wales they may also be drafted by licensed conveyancers.

With the exception of Greece, lawyers do not have the exclusive right to draw up non-registered acts. In no Member State does this depend on any autonomous profession other than lawyers. In France, however, a draft law will modify this situation, and in Italy non-registered acts are also drafted by accountants (*dottori commercialisti and ragionieri*).

Legal advice

Because of its importance for the legal client, certain countries, in the public interest, reserve legal advice to lawyers.

This is the case (a) in Denmark, where only lawyers are allowed to offer themselves for the giving of legal advice; (b) in Germany, where there is a legal provision reserving this activity to *Rechtsanwälte*, and (c) there are also provisions with a similar effect in Greece, Spain, Luxembourg and Portugal. Proposals for reform in the interest of the consumer are currently under discussion in the United Kingdom, France, and Italy.

In Italy, a preliminary draft professional law attributes to lawyers a monopoly of advice, except for those areas covered by public notaries and accountants.

Apart from lawyers, the following persons provide legal advice as their main activity:

- tax advisers in the FR of Germany and the Netherlands;
- *Rechtsbeistände* in Germany;

- legal advisers in France (although the unification of this profession with that of lawyer is under discussion) and in the Netherlands;
- foreign lawyers not specifically admitted, in Belgium, France, Ireland, the Netherlands and the United Kingdom;
- foreign lawyers admitted in another Member State, in Belgium and the Netherlands;
- public notaries in Belgium, Greece, France, Luxembourg and the Netherlands.

Table 1

Number of representations, 1970 to February 1989

Belgium	786
Denmark	52
FR of Germany	903
Greece	47
Spain	7
France	373
Ireland	82
Italy	357
Luxembourg	266
Netherlands	258
Portugal	2
United Kingdom	348
EC 12	3 481

Source: CCBE.

The following persons provide legal advice as a secondary activity:

- accountants — on tax law — in the FR of Germany (*Wirtschaftsprüfer, vereidigte Buchprüfer*), Italy, the Netherlands and the United Kingdom, and in France provided that such advice is directly connected with their accountancy work;
- patent agents or advisers in Germany, France and the United Kingdom;
- surveyors in the United Kingdom;
- university professors in Belgium, France and Portugal (*jurisconsultos*);
- *huissiers* in France and the Netherlands.

Anybody, including persons without any legal qualification, can provide legal advice for payment, notably in Belgium, Denmark, France, Ireland, Italy, the Netherlands and the United Kingdom.

Some lawyers direct their activities mainly towards other countries or Community law. Their numbers can only be estimated: 100 in Belgium; 20 in Denmark; 50 in Spain; between 500 and 1 000 in France;

200 in the Netherlands. In Greece, there are 'very few', in the United Kingdom and Italy lawyers are mainly found in the 'large offices', in Portugal there are 'certain lawyers' and at least half of the total number of lawyers in Luxembourg.

The number of times that lawyers from each Member State have pleaded before the European Court of Justice between 1970 and 1 March 1989 is shown in Table 1.

Structure of the profession

A law office may consist of a single lawyer, a lawyer with associates or a group of lawyers. By group is meant any form in which lawyers are grouped such as firms, often called associations, companies, professional firms or, as in France, groups sharing the same building with shared expenses. In the Community, there are more than 15 000 groups of lawyers. A breakdown is provided in Table 2.

Groups of lawyers including persons exercising another profession are groups which include, besides domestic lawyers, lawyers affiliated with foreign bars and law societies and non-lawyers.

In most Member States, lawyers do not or may not enter into groups with persons exercising another profession. In Spain such groups exist but are rare. In the Netherlands, they involve around 300 lawyers. In Germany, lawyers are permitted to form a firm with notaries, *Rechtsbeistände*, patent lawyers, accountants, auditors and *vereidigten Buchprüfern*, but less than 10% of the partnerships include accountants or auditors. In these countries, however, there are strict rules protecting the free and independent exercise of the profession which could be endangered by multidisciplinary partnerships.

Groups with lawyers from foreign bars or law societies are permitted in the Netherlands and Belgium. In December 1987 there were 44 foreign lawyers, from 13 different countries or courts, without a diploma in Belgian law registered at the French-speaking, and 12 at the Dutch-speaking Brussels Bars.

In Denmark, Ireland, Luxembourg, and the United Kingdom there are no such groups, in Italy and Greece they are forbidden. In France, theoretically there are none but in practice there may be a few in Paris. Similarly, there are a few in Spain. In the Algarve (Portugal), there are a few English solicitors in association with Portuguese lawyers. Prior to the judgment of the Constitutional Court of 14 July 1987, firms with foreign lawyers were not permitted in the FR of Germany.

A certain number of lawyers practise mainly as associates or employees of other lawyers. This is the case in Belgium for one-third to one-half of lawyers; in Denmark this is true for around 250 lawyers; in Greece for around 1 000 lawyers; in the Netherlands for around 2 200 lawyers of whom 1 000 are associates and 1 200 trainees; in the United Kingdom for around 14 250 solicitors.

Strictly speaking, there are no lawyers practising as employees in Belgium, France, Italy and Portugal. In the United Kingdom and Ireland, barristers have no associates.

Lawyers may be hired under an employment contract by firms or public administrations only in certain Member States: specifically, in the United Kingdom and Ireland (barristers and solicitors), the FR of Germany (*Syndikusanwalte*), Spain, Italy, the Netherlands and Portugal.

Table 2

Number of groups of lawyers and individual practices

	Number of groups of lawyers	Individual practices
Belgium	150 groups, of which 99 in Brussels (grouping 2 500 to 3 000 lawyers)	5 000 to 5 500
Denmark	N/A	around 500
FR of Germany	7 255 <i>Sozietäten</i> plus an unknown number of <i>Bürogemeinschaften</i> (1/1/1987)	N/A
Greece	Officially none (group practice authorized only since 1986)	19 000
Spain	around 100, of which 40 to 50 in Madrid	the great majority
France	Around 1 000	around 5 000
Ireland	Barristers: 0 (obligation to practise alone) Solicitors: around 1 250	700 around 350
Italy	N/A	the majority
Luxembourg	46	around 55
Netherlands	1 014 groups (4 474 lawyers)	886
Portugal	32 civil firms	the majority
United Kingdom	Solicitors: around 4 050 partnerships	5 370

Source CCB E

Employment

To be a lawyer, it is obligatory to be registered at a bar or law society. Registration may, however, cover very different situations. It may cover a traditional practising lawyer, or, in those Member States where it is permitted, the employee of other lawyers. It may also cover, where permitted, a full or part-time occupation as an employee of a public administration or of a firm (in-house lawyers). Lastly, there may be registration even when practice is limited or non-existent.

Table 3
Registered lawyers by Member State (1)

Belgium	8 000
Denmark (2)	3 523
FR of Germany (3)	54 108
Greece	around 20 000
Spain (4)	87 239
France	around 18 000
Ireland	barristers: 690 solicitors: 3 396
Italy (5)	around 55 000
Luxembourg (5)	346
Netherlands (5)	5 807
Portugal (2)	8 644
United Kingdom (3)(6)	around 64 000
EC 12	300 000

(1) Latest available data.

(2) At 1/6/89.

(3) At 1/1/89.

(4) At 31/12/87.

(5) At 31/5/89.

(6) Barristers, advocates or solicitors.

Source: CCBE.

The total number of registered lawyers in the EC is around 300 000. The breakdown by Member State is shown in Table 3.

A certain number of registered lawyers exercise another profession or practise little or not at all. They are estimated to represent: 5% of the total in Belgium; 10% in the United Kingdom; in between 2% and 5% in the Netherlands; around 400 (13%) in Denmark; around 15 000 (28%) in Italy. In Spain, 23 379 lawyers do not practise. A certain number of lawyers are employees of a public administration or firm (in-house lawyers).

A number of lawyers of foreign nationality are registered at the bars and law societies of each Member State. They are lawyers of foreign nationality registered with the professional organization just as domestic lawyers are, and those registered at the bar or law society as a foreign lawyer on a special list, as is the case in Brussels. For certain countries, no distinction can be made. Thus, in Spain, there are hundreds, many from Latin America; in Italy 'very few';

in the Netherlands between five and 10; in Portugal a few come from former Portuguese colonies.

In the first above-noted category, there are around 25 lawyers in Belgium, around 25 in Luxembourg, 20 in Greece and very few in Denmark and France.

In the second category, there are none in Denmark, France and Greece, and around 50 in Belgium, mainly in Brussels.

There are also a number of lawyers of foreign nationality permanently established in a Member State without being registered. In the United Kingdom, there are at least 1 000 such lawyers, many from the United States; in France, around 300; in Belgium, around 100; and in the FR of Germany, there are some, although it is not possible to estimate their number. In other Member States, there are very few: around eight in Denmark; between five and 10 in Luxembourg; around 15 in the Netherlands and Ireland, where they work for solicitors. In Italy, there are a few, mostly American, mainly established in Rome and Milan, and in Portugal, there is one.

The average number of employees per lawyer, whether or not legally trained, is around one in Belgium, Spain and Portugal; around three in Denmark; around 2.6 for solicitors in the United Kingdom; between one and two in the Netherlands and Luxembourg. In Ireland, there is one per 'practising solicitor', and less than one per barrister. These figures appear to relate more to secretaries and administrative personnel than to legally trained employees. This is the case in the Netherlands and Portugal, but not necessarily in all countries.

In France, the number of employees in lawyers' offices is 24 500, more than half of whom work in the provinces. Employers, whether individual lawyers or groups of lawyers are 7 226 in number, and 100 offices employing more than 10 employees each. Personnel has doubled over the past 10 years. The number of persons working in solicitors' offices in England and Wales who have legal training of some kind is estimated at 30 000.

When the figures for the number of employees per lawyer are combined with those estimated for the number of lawyers actually practising, total EC employment in lawyers' offices is estimated at 675 000 (265 000 lawyers and 410 000 employees).

Turnover and income

Gross annual income per lawyer is defined as total receipts from clients in the form of fees and charges before VAT, minus those sums destined to third par-

ties (adversaries, *huissiers*, experts, etc.) or received from third parties for a client.

Statistics are only available for England and Wales and were compiled by the Law Society for Solicitors.

Average gross annual income per lawyer is estimated (end 1988) at:

- in Italy, ECU 33 000;
- in Belgium (trainees included), between ECU 30 200 and ECU 34 850. For lawyers of less than 30 years of age, between ECU 20 900 and ECU 27 900. For lawyers between 30 and 60 years of age, between 46 500 ECU and 55 750 ECU;
- in the Netherlands, ECU 64 000, and ECU 34 000 for salaried lawyers;
- in the FR of Germany, ECU 29 000 for lawyers with five years' experience; no data are available for other lawyers;
- in France, ECU 135 000;
- in Ireland, ECU 130 000;
- in the United Kingdom, ECU 146 000 for solicitors in England and Wales for 1986/87 per partner or sole practitioner, compared to ECU 132 000 for 1985/86.

Net average annual income is estimated at:

- in Greece, ECU 3 523;
- in Luxembourg, ECU 28 000. However, this evaluation which was made in April 1985 by the Centre for the Study of Population, Poverty and Socioeconomic policy covers all the liberal professions.

Professional expenses represent between 30% and 50% of gross income for a lawyer. Multiplying the net income figure by a factor of 1.5 to 2 generates gross incomes of ECU 7 000 and ECU 56 000 for Greece and Luxembourg, respectively.

Total gross income received by lawyers is estimated at (September 1988):

- ECU 280 million in Belgium; ECU 300 to 350 million in Denmark; ECU 4 330 million in Germany; ECU 70 million in Greece; ECU 540 million in the Netherlands. No information is available for other Member States.

- An approximate figure may however be calculated by combining the data on gross income per lawyer with the number of lawyers practising in each country, at least where such are consistent. Doing this, one can estimate that the total gross income in the Community is around ECU 15 billion.

The impact of '1992'

The main consequences of the creation of the single European market for the legal profession will result from the removal of obstacles for clients. The profession itself will see little change.

The legal-services profession was liberalized long ago by the Commission Directive of 22 March 1977. Setting up office in this profession has been facilitated by jurisprudence of the Court of Justice of the Community concerning nationality and residence, as well as by the Directive of 21 December 1988, which instructs Member States to recognize the competence of professionals who have received their training in other Member States.

In a number of Member States (Luxembourg, France, Italy) national regulations are being modified to provide better protection for the users of legal services. Also, efforts are being made in several countries (the United Kingdom, Netherlands, Denmark) to ensure that the client's information requirements are taken care of.

The German and Dutch experiences in multi-disciplinary partnership between lawyers, notaries, patent agents and tax advisers, have been thoroughly studied by all the European Bars and Law Societies, in an attempt to reach a common solution safeguarding the independence of the profession and avoiding conflicts of interests damaging to clients. Important meetings of delegations representing all the lawyers' national organizations have been devoted to this subject (Copenhagen May 1988, Rhodes May 1989, Munich May 1990).

The association between lawyers of different countries is in fact the best way to meet efficiently, on a European level, the needs of the clients whether international or immigrated.

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THE NOTARIAL PROFESSION

(NACE 835)

Description of the profession

General characteristics

The office of notary is chiefly concerned with a number of essential tasks:

- He drafts legal instruments and contracts in authentic form: transfers of rights *in rem*, formal declarations, wills and ante-nuptial settlements, mortgage deeds, Articles of Association of companies and alterations thereto.
- In some countries, the notary provides legal advice. In the Netherlands, the legal advice aspect has developed to such an extent as to generate most of the turnover of some practices.
- Where special legislative provisions exist for leases longer than nine years, the notary certifies the fact. Such is particularly the case in Belgium, Luxembourg and Greece.

He also acts as an unpaid collector of taxes for the State in the form of revenue stamps on the instruments he engrosses, the registration duties he collects, recoveries of arrears of direct and indirect taxes and social security contributions in transactions effected through his offices.

The intervention of a notary confers exceptional authority on the document advised, drawn up and sealed by him after having satisfied himself that the parties concerned fully understand and agree to the provisions contained in it. The instrument drawn up under his seal has evidentiary value and may even be enforceable in the same way as a court judgment. Essentially, his intervention offers a triple guarantee:

Contractual fairness

The notary gives common binding expression to the consensus between contracting parties with separate interests. Instruments drawn up under his control will conform to the rule of law and public policy which it is the notary's duty to know thoroughly and apply to the letter at all times. This special expertise and the concern for contractual equity to assure balance in legal agreements have led the legislatures of written (codified and statute) law countries to

reserve the power to authenticate documents to notaries.

Legal security

The compulsory use of a notary's services for conveyances of real property, mortgages, company instruments, and those making binding dispositions concerning their personal assets, such as ante-nuptial settlements, is intended to assure the parties of dependability and legal security.

Impartial counsel

The notary is the umpire invested with the powers of the public authority and the favoured, active witness of agreements which he delivers into legal life. His duties must be performed with strict impartiality and his counsel given without distinction or favour to all parties.

With the exception of Portugal, the notary performs his duties as a public legal official as a self-employed member of the professions in all written law countries. This, with his expertise, offers the highest guarantee of the quality and impartiality of the services he provides to his clients.

National characteristics

In addition to the duties which recur in virtually all EC Member States, the notary has other particular functions in specific Member States:

In Belgium, notaries act as auxiliaries to the courts, notably as regards distraints, bankruptcies, court partitions of real property, expert appraisals, etc. They play an active part in land purchase negotiations.

One peculiarity of French notaries is their involvement in negotiations for the purchase and even management of real property.

A specific feature of Greek notaries is their frequent involvement in car sales.

A distinguishing function of Italian notaries is their recording of protests as an officer of the court in exchange market transactions.

Employment

The notarial function recurs in all European Community countries. In nine of them, however, it is exercised as a distinct office, that of notary, while in Denmark the function is fulfilled by the judiciary, and in Great Britain and Ireland by solicitors, except for the City of London which has a special body of notaries. Finally, only in Portugal and the *Land* of Baden-Württemberg (Germany) are notarial functions assigned to civil servants.

With the exception of Portugal, notaries have legal representation in national or regional associations in all EC countries.

Training

Notaries undergo at least the same type of training as solicitors/advocates. Additionally, in most written law countries, special examinations, often post-graduate examinations of the highest legal standard, ensure that intending notaries possess sufficient knowledge of the law to pursue their intended profession. With the exception of Spain and Greece, access to the profession requires post-graduate probationary training (articles) of 2 to 5 years.

Table 1
Number of notaries, notaries' offices and employees, 1988

	Notaries	Notaries' offices	Employees
Belgium	1 260	1 260	4 000 (1)
FR of Germany	7 711	1 000 (1) 'Nur-notare' 5 000 (1) 'Anwaltnotare'	11 000 (1)
Greece	2 465	2 465	3 150 (1)
Spain	1 794	1 550 (1)	7 762
France	7 377	4 984	39 400
Italy	5 184	4 500 (1)	28 000 (1)
Luxembourg	35	35	150 (1)
Netherlands	1 000	750 (1)	8 000 (1)
Portugal	325	325	N/A
EC 9	27 151	15 869	101 462

(1) Estimates.
Source: CACE.

The period of articles varies in Portugal from 4 to 8 months according to where they are served. Notaries constantly update their knowledge through their own personal efforts, using the structures established by the profession.

Access to the profession

One consequence of the admission restrictions inherent to the office of notary in the majority of EC

countries is to confine the notary, professionally speaking, to a clearly delimited geographical area, often with a residential obligation. Hence, the notary (who may not refuse to act for a client) will perform his public service even in the remotest and most impoverished regions.

Generally speaking, there is a compulsory retirement age, normally around 70.

Structure of the practice

In addition to associates who are members of other professions (lawyers, accountants, secretaries), the notary often has a number of trainees (articled clerks), whose pay is generally commensurate with their level of progress through the vocational examinations.

Association with other professions is permitted in most Member States except Belgium and Luxembourg, albeit there is a pronounced trend in this direction.

Pay

Most services are subject to compulsory legal rates. This rule applies in all Member States apart from Britain, where remuneration is recommended but not imposed. Scales of charges are often set with reference to the declared value in the legal instrument.

Portugal constitutes an exception insofar as the services of the notary are not paid by the client but by a salary supplemented by a contribution to the income of the practice's fees charged for the account for the Ministry of Justice.

Table 2
Number of documents, 1988

Belgium	657 204
FR of Germany	9 000 000 (1)
Greece	1 246 383
Spain	5 102 659
Italy	Documents: 14 996 981 Conventions: 14 849 904 (2)
Luxembourg	35 822
Netherlands	850 000 (1)
EC 7	31 889 049

(1) Estimates.

(2) 1987.

Source: CACE.

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ACCOUNTANCY SERVICES

(NACE 836)

Summary

In the EC, about 268 000 persons are registered as members of a professional accountancy organization. They offer a wide range of services, from accounting to tax advice and insolvency services. In such a situation, the distinction between accountants on the one hand, and legal and management advisers on the other hand, is difficult to make. In the Member States, regulations exist to control statutory audit requirements both in public and private-sector institutions. In addition, there are licensing requirements for the providers of these services.

Description of the sector

According to the official definition, NACE category 836 includes units exclusively engaged in bookkeeping, accounting and auditing and in furnishing advice on economic, financial and tax matters. The services in question are essentially those made available to other enterprises. Where units provide such services for the account of their own enterprise, they are considered as administrative units and classified under the same heading as the enterprise for which they work. Not included, however, are market research offices and management consultants.

Accountants have evolved from acting as mere statutory auditors and accountants, to serving as financial advisers, to becoming advisers in many other areas of government and business services. In the latter capacity, the profession touches in particular upon management consultancy. This extension into other areas has considerably increased overall turnover for the profession.

Accountants engage in a wide range of activities in public practice, industry, commerce and government services. Due to differences between countries in the way in which accountancy and accountants are regulated and organized, it is difficult to define a common scope. For instance, of those professional bodies that are members of the 'Federation des Experts comptables européens' (FEE), the umbrella body for the accountancy profession in Europe, some confine their membership to accountants in public practice while other organizations do not

require their members to work or to have worked in public practice.

However, for the purposes of this description, the sector is defined as consisting of those firms and individuals in practice as public accountants, providing accountancy services (in the widest sense — see below) to clients, both individual and corporate, in the public and private sector. This excludes non-professional staff and non-accountant professionals working in public accounting firms. A distinction is, therefore, drawn between the accountancy profession and the accountancy-services sector.

Table 1
Employment in accountancy services, 1989

	Members of professional bodies	Accountants working in the public sector	% of total members
Belgium (1)	7 879	3 879	49
Denmark	2 400	1 980	83
FR of Germany (1)	5 205	5 205	100
Greece (1)	700	640	91
Spain	5 200	1 900	37
France	14 461	14 461	100
Ireland (2)	6 425	3 142	49
Italy (1)	46 000	28 000	61
Luxembourg	325	325	100
Netherlands (1)	6 000	2 500	42
Portugal (1)	460	377	82
United Kingdom (3)	173 174	44 391	26
EC 12	268 229	106 800	40

(1) Data from 1988.

(2) Including Northern Ireland.

(3) Excluding Northern Ireland.

Source: FEE.

Employment

In the Community, a total of 268 000 persons are members of a professional accountancy body. In some Member States, membership of a professional body is confined to those individuals actually working in public practice. This explains why the number of accountants per 1 000 inhabitants varies so widely between individual Member States. The United Kingdom and Ireland have traditionally had a large number of accountants, many of whom move into other activities or work outside their home country. In Italy, which also has a proportionately high number of accountants, the profession is involved in a wide range of activities, one of which is

legal advice. In the Federal Republic of Germany, a separate body of tax advisers exists which has 35 000 members.

Accountancy services

As explained further on, in certain Member States, regulatory constraints may impose limitations on the provision of accountancy services — either in general or to certain categories of clients. However, it is possible to identify several broad categories of services across the entire range of services supplied in the Community. These areas are as follows:

- accounting
- auditing
- tax advice
- management consultancy
- insolvency
- trustee and administration work
- other services

Accounting

Assistance and advice are made available to clients regarding the organization and design of accounting systems, the keeping of accounting records and the preparation of financial statements, whether required by law or for other reasons. The nature of the services can vary from basic bookkeeping for small or unsophisticated clients to detailed advice on the application of accounting principles and standards for sophisticated clients.

Auditing

Under Community law, many companies are required to have their annual financial statements audited, whereby a properly approved auditor or firm of auditors is required to express an opinion as to whether the financial statements give a true and fair view of the results of the company's activities and of its financial position, and whether they comply with the relevant legal provisions. The purpose of this independent, external audit is to lend credibility to financial information and thereby to enhance the effectiveness of economic decisions made on the basis of it. In addition, many companies and other entities not subject to the statutory audit requirement voluntarily request contractual audits, in view of the benefits that accrue from this service. Finally, there is a growing demand for audit-related services, which involve the issuance of spe-

cial-purpose reports and opinions or the application of certain defined procedures.

Tax advice

In this area, services can be broadly categorized as relating to tax planning or tax compliance, the former consisting of advice on the application of taxation law and the latter relating to the preparation and presentation of the various returns and declarations required by law, and assistance to clients in their dealings with the relevant authorities.

Management consultancy

Given the broad and comprehensive nature of their education, training and experience, accountants can contribute a considerable body of information and guidance to clients in a wide range of areas. These may include general financial and business advice, the management of financial systems, internal controls, information technology, strategic planning, mergers and acquisitions, marketing, production, personnel, executive search, and personal financial planning. There is a very clear trend towards expanding the range of services provided. In many countries, the management consultancy units of accountancy firms are the largest consultancy organizations. This state of affairs leads to difficulties in drawing a clear dividing line between accountancy services and management consultancy sectors. More information on the latter sector is provided in the chapter on 'Management consultancy'.

Insolvency

Accountants are either the leading, or significant, providers of insolvency services in those countries where they are permitted by law to act in this capacity. Their role may thus be that of liquidator, receiver, administrator or a similar role for companies or individuals in financial difficulties or of adviser to other professionals acting in these capacities. Clients may also turn to accountants for advice before financial difficulties reach a critical stage. In many cases, therefore, this area of practice is known as 'insolvency and corporate recovery'.

Trusteeship and administrative duties

In certain countries, accountants frequently act in a fiduciary capacity for clients, handling investments and similar financial arrangements.

Other

Legislation in many Member States authorizes certain accountants to perform statutory defined duties such as representing clients before certain administrative and other tribunals and/or issuing certain declarations and reports.

Regulatory environment

In general, governments exercise influence on the accountancy services sector via the regulatory framework. Two kinds of regulations can be distinguished.

The first relates to the services provided by the sector. All Member States have a statutory audit requirement, and many also require the involvement of suitably qualified accountants in the expression of opinions or the issuing of reports in other circumstances. Furthermore, many accountancy services relate to the provision of advice and assistance with regard to laws and regulations on taxation, insolvency, company law, etc. Certain countries impose limitations on the range or combination of services which can be provided to particular clients.

The second category of regulations directly affects the providers of accountancy services by establishing requirements for the education, training, qualification and professional conduct of accountants and accountancy firms. In many cases, there are also further licensing requirements for specialized areas of practice.

Frequently, governments delegate many of their powers of regulation to self-regulating professional bodies which are responsible for enforcing the rules applicable to their members. The extent of this delegation and self-regulation varies from country to country, reflecting differences in tradition and legal background.

Government regulations can also have an influence on the organization and structure of accountancy firms, and can limit the forms of legal entities that can be used by accounting firms.

It should be noted that Community legislation, particularly in the area of company law, is achieving a greater degree of harmonization of laws and regulations having an impact on the accountancy-services sector.

Structure of the sector

Given the wide range of activities encompassed by the accounting services sector, and the number and variety of its clients, there is considerable variation in the scale and organization of accounting services providers.

National requirements, both governmental and self-regulatory, influence whether providers may be natural persons (individuals and partnerships) or legal persons (e.g. limited liability companies). They also affect the ownership and control of firms in the sector, and can prohibit or permit the involvement of members of other professions in such firms.

The size of services providers also varies considerably, responding to different client needs. Small firms, or even individual accountants, can achieve success by identifying appropriate market niches, in terms of either location or services provided. At the other end of the scale are major firms, employing several thousand staff members, with international networks (either regional or world-wide). The links between practices in different countries can vary from common partnerships across borders to loose affiliations that do not involve profit-sharing arrangements. Such large firms seek to provide a full range of accountancy services to a wide spectrum of clients, including large transnational corporations with operations on an international scale.

Within the sector, there is a trend towards growth of firms through mergers; this partly reflects a desire to provide more comprehensive service to clients, in terms of both geographical coverage and the nature of services provided. It is also a means of ensuring that adequate funds are available to support the continually increasing investment required for training and personnel development, introducing advanced information technology, and remaining innovative in the development of new services. This, in turn, is a reflection of growing competition between providers within the sector seeking both to increase the cost-effectiveness and efficiency with which traditional services are provided and to diversify into more rapidly expanding areas of practice.

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CONSULTING ENGINEERS

(NACE 837)

Summary

Consulting engineers are in charge of the design and supervision of all types of construction and engineering projects. This activity can be carried out both by individuals and by firms. Turnover in this profession was estimated at ECU 21 billion in 1988, and employment around 350 000 persons in the EC. Economic trends in the sector largely depend on the growth in investment expenditure by both the private and the public sector. About 30% of the turnover in this sector is derived from exports to non-EC countries.

Description of the sector

Consulting engineers and the engineering consultancy are classified under NACE category 837 which comprises various types of technical services. This includes units exclusively or primarily engaged in engineering, consulting engineering and architects' offices, as well as self-employed engineers, architects and surveyors. Also classified in this group are construction-site supervision offices, technical design offices and technical test centres and laboratories.

Clearly, this NACE group includes more than just consulting engineers. This classification makes it rather difficult to distinguish between statistical data concerning consulting engineers and those concerning related professions such as architects and construction economists. The latter two professions are discussed elsewhere in this overview.

The consulting engineer can be described as a person, who by virtue of skills, experience and ethical standards can design, supervise and generally advise on engineering projects on behalf of his clients in an impartial and independent manner.

The consulting engineer's activities are mostly related to design and supervision of the following types of projects:

- infrastructure for transport systems
- buildings
- public utilities (water, gas, electricity, communications, waste treatment, etc.)
- environmental protection and studies
- industrial infrastructure and equipment
- agricultural infrastructure
- mining and other natural resources.

These services belong to various disciplines, among which the most important are civil, structural, mechanical, electrical, electronic, chemical, mining, and agricultural engineering, architecture, and other related scientific disciplines. Clients can request a wide range of services, from project identification and appraisal, to design, impact studies and actual supervision of the works.

In view of the statistical problems in this sector, the data presented in this monograph have been obtained directly from the two professional associations in this sector, Comité européen des Bureaux d'Ingénierie (CEBI) and Comité européen des Ingénieurs Conseils (Cedic).

All CEBI affiliates are firms, compelled to produce annual accounts, which are consolidated into an overview of the activity of the CEBI member associations. Cedic, on the other hand, has among the affiliates of its member associations, next to affiliated firms, a large number of individuals and non-incorporated small offices, which are not subject to the publication of the annual accounts. This requires additional survey-work to produce reliable data. Note the two organizations together represent only part of the engineering consultancy sector, and the relative organizational strength varies widely from one Member State to the other.

Production and employment

Table 1 presents a number of key variables for the engineering consultancy profession in the EC Member States. The data are from a CEBI/Cedic survey of their members, but can be viewed as a representative sample for the entire sector to the extent that each of the member associations in each Member State is representative of this sector in its home country.

An evaluation of the coverage of the sector by CEBI/Cedic members is difficult because of the absence of a clear distinction between engineering



that CEBI/Cedic represent about 40% of the profession.

On the basis of the above sector coverage and the CEBI/Cedic figure for their members' annual turnover and employment in Table 1 — a turnover of ECU 8.4 billion and 140 000 employees in 1988 — EC totals can be estimated. In 1988 total sector turnover in the EC was estimated at ECU 21 billion, and employment at 350 000 units (professional engineers and their employees).

Table 1 also shows that the average engineering consultancy firm in the EC employed 28.6 persons in 1988. However, the degree of concentration varies considerably between the CEBI and Cedic member associations as a result of the type of affiliates, only larger incorporated firms in CEBI, against non-incorporated and small offices next to incorporated firms in Cedic. The differences in average employment per affiliate between the various Member States should only be considered when the organizational strength of the member association allows it to be considered as representative for the sector in that Member State.

The average turnover per employee in EC engineering consultancy services was close to ECU 60 000 in 1988. France topped the ranking with more than ECU 76 000 per employee.

As expected, the peripheral and lower income economies in the EC show the lowest income, with Portugal closing the ranking at ECU 24 000 per employee. Since the cost of their services is, in general, lower than that in higher-income countries, the volume of services provided by these countries and

consultancy and related but distinctive professional technical services, such as architectural services by architects, engineering services by manufacturers, contractors, real estate and industrial developers. The most reliable estimates available at present show

Table 1
Enterprises, employment and turnover in consulting engineering, 1988

	Number of enterprises	Employees	Turnover (million ECU)	Exports (million ECU)
Belgium	110	3 900	272 000	84 320
Denmark	282	9 290	493 000	69 020
FR of Germany	2 168	26 764	1 724 000	620 640
Greece	120	2 500	65 000	7 800
Spain	143	12 710	768 000	69 120
France	874	20 880	1 594 000	541 960
Ireland	85	652	21 000	N/A
Italy	174	20 740	1 254 000	401 280
Luxembourg	15	242	17 000	1 360
Netherlands	128	7 097	456 000	145 920
Portugal	69	2 500	60 000	15 000
United Kingdom	744	33 157	1 665 000	566 100
EC 12	4 912	140 432	8 389 000	N/A

Source: CEBI/Cedic.

their importance on the engineering services market is somewhat underestimated by the nominal turnover figures.

The engineering-investment link

The performance of the engineering consultancy sector is highly dependent on investment expenditures (both public and private) on construction as well as mechanical and other types of engineering.

Typically, investment expenditure is subject to cyclical economic effects. Since 1988 the general macro-economic investment climate has been very optimistic in most EC Member States. Annual real increases in investment expenditure vary between 6% and 10%, a rather high figure compared to the sluggish investment growth recorded in the late 1970s and early 1980s.

The short-term outlook for investment expenditure remains good in most EC countries. The engineering-services profession is expected to increase its turnover by around 5 to 10% per year during 1989 and 1990.

However, there is a clear trend away from public investment expenditure and towards more private expenditure. Government budgets have come under increased pressure as authorities attempt to trim deficits in nearly all EC Member States. Also, it is easier to realize savings in a project-based investment budget than in the current budget. The consulting engineering sector had to adapt to these changes. Thus, the relative importance of public procurement projects in the income of engineering consultants has declined during the 1980s.

Trade

The export of engineering consultancy services to the developing countries is estimated to have decreased since the early 1980s as a consequence of the external and internal budget problems of most of these countries, as well as the reduced access to hard currency credit lines. In developing countries, emphasis has shifted from the construction of new infrastructure to the maintenance and replacement of existing infrastructure. Finally, local engineering consultancy is developing rapidly and claiming an increasing share of the assignments.

It can be seen from Table 1 that revenue from exports of engineering consultancy services represents about 30% of total turnover for EC firms. But, among the Member States, figures vary from a low 8 to 9% for Luxembourg and Spain to 36% for the Federal Republic of Germany. The high engineering services export revenue figures in the major European economies — Germany, France, the United Kingdom and Italy — prove that engineering exports are often related to market presence and profile on foreign markets, rather than price competition alone.

The impact of 1992

At present, cross-border engineering consultancy activities within the EC represent a relatively small amount of total turnover. It probably does not exceed 4% of the total.

Within the EC, the engineering firms based in lower-income Member States enjoy an advantage in terms of the cost competition for projects. They are increasingly more successful than their colleagues from higher-income Member States. With the creation of the single market in 1992, competition from these countries will increase, and this applies to the public procurement sector as well. The expected result is a downward pressure on the prices of engineering consultancy services.

There are still many barriers to trade in consultancy services within the EC:

- language difficulties
- building codes and regulations
- restrictions on the submission of offers
- various labour regulations
- no mutual recognition of professional titles and degrees
- the requirement to establish a local office.

The Commission's programme to create the single market in 1992 will do away with at least a number of these barriers, notably with reference to building and labour regulations, mutual recognition of degrees, fiscal harmonization and the opening up of public procurement markets.

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CONSTRUCTION ECONOMISTS

(NACE 837)

Summary

The task of the construction economist is essentially the costing and valuation of construction projects in both the public and private sectors. In recent years, the responsibilities of the construction economist have broadened, partly due to the increased complexity of, in particular large-scale projects. Demand for services of construction economists is closely connected to the general level of building activity within the economy.

Sector definition and description of activities

NACE category 837 group includes units engaged exclusively or primarily in engineering, consulting engineering, surveying and architects' offices. In addition, self-employment engineers, consulting engineers, architects and surveyors are assigned to this group. Finally construction-site supervision offices, technical test centres and laboratories also fall into this category.

Being thus defined, this category numbers a wide variety of professions related to the construction sector. This monograph deals with construction economists only. Other monographs in this chapter discuss the architects and engineering professions. Chapter 25 on the Building industry also contains a section on the closely related profession of the plant construction engineers.

The construction economist — known as the quantity surveyor in many countries — is a professionally qualified expert whose role is to safeguard the financial interests of the client so that overall value is achieved over the anticipated life of a construction project.

The construction economist or quantity surveyor may function in a variety of different fields, including building construction, civil and structural engineering, mechanical building and engineering services, petrochemicals, cost and production engineering, planning and urban development, landscaping and interior design. A major part of his or her work consists of the costing and valuation of projects, which involves working closely with the

architect, engineer, town planner, or interior designer.

The client may be an individual, an organization or a public body. The work extends from giving advice on the economic and financial implications of the initial functional concept of a construction programme, to the commissioning of the completed project, financial settlement, subsequent property portfolio management and life-cycle cost management. Construction economists have a major role to play in the preparation of contract documentation and will advise on the use of appropriate contract conditions; they also prepare and issue tender documents and evaluate the tenders received.

Other services provided by construction economists include:

- giving expert evidence in arbitrations and disputes
- preparing statements of expenditure for tax and accounting purposes
- assessing the replacement value of construction projects for insurance purposes.

In those countries where the profession has no separate identity, the activities of cost-control and value-management have been carried out by architects, engineers or contractors; but as the complexity and cost of modern construction projects increases, so does the demand for the expertise of the construction economist. This demand is leading to the development of this expertise into a separate, professional specialization in those countries where it does not already exist. In 1985 the Danish Association of Practising Architects (PAR) established a new PAR chapter (PAR building economists) to reflect this development. In Belgium, government support has contributed to the setting up of university courses in construction economics.

Current situation

Employment

The total number of construction economists within the European Community is greater than 50 000.

Table 1
Number of construction economists, 1988 (1)

Denmark	60
Spain	16 000
France	6 100
Ireland	360
Netherlands	5 400
Portugal	2 000
United Kingdom	22 000
EC 7	51 920

(1) Estimates.
Source: CEEC.

Table 1 shows the distribution of the profession amongst those Member States for which data are available.

Table 2
Breakdown of the profession by employment, 1988 (1)

(%)	Private practice	Contractor organizations	Public sector
Denmark	67	17	16
Spain	37	41	22
France	87	8	5
Ireland	73	15	12
Netherlands	27	70	3
United Kingdom	59	19	22
EC 6 average	52	30	18

(1) Estimates.
Source: CEEC.

In most Member States, the construction economists work in the private sector, the majority of them being found in private-practice firms. However, in some countries, notably the Netherlands and Spain,

a substantial majority work as employees in contracting organizations. In all countries a smaller number of construction economists work for the public sector.

Table 3
Independent private practices of construction economists, 1988 (1)

	Total number of firms	Average size
Denmark	25	5.0
Spain	3 000	5.0
France	1 500	5.0
Ireland	110	8.0
Netherlands	60	2.5
United Kingdom	1 600	20.0
EC 6	6 295	8.8

(1) Estimates.
Source: CEEC.

The total number of independent private-practice firms within the EC Member States varies from 25 (Denmark) to 3 000 (Spain). The average number of qualified staff within such firms is less than 10, except in the United Kingdom, where it is 20. However, in the UK, in particular, there are a number of firms of construction economists with a total worldwide staff of more than 100, and in some instances over 500. In the UK, there has been an increase in the number of mergers between firms, resulting in a corresponding growth in the number of firms employing more than 100 persons.

Services provided

The consultant construction economist works in both the public and private sector in all areas of

Table 4
Breakdown of the services provided, 1988 (1)

(%)	Denmark	Spain	France	Ireland	Netherlands	United Kingdom
Public sector	33	70	45	60	30	40
Private sector	67	30	55	40	70	60
Total	100	100	100	100	100	100
Building	80	80	98	95	70	75
Civil engineering	20	20	2	5	30	25
Total	100	100	100	100	100	100
National	80 - 90	90	92	95	92	80 - 90
International	10 - 20	10	8	5	8	10 - 20
Total	100	100	100	100	100	100

(1) Estimates.
Source: CEEC.

activity. While the main outlet for the services of the construction economist lies in the national construction markets, there is an involvement in engineering projects domestically and in all projects in foreign markets. Table 4 shows the distribution of the workload of the construction economist in private practice.

In most EC Member States, the construction economist is appointed by and responsible to the building owner or his employer. However, in France, it is more usual for the construction economist to be appointed by the architect or engineer to the project; in Portugal choice is made by the contractor.

Turnover

As with many other service industries, no comprehensive or accurate records are available regarding the fee-earning capacity of the profession of construction economists within the European Community as a whole. However, figures are available for six Member States, and these provide a relatively accurate national assessment. Data for 1988 can be found in Table 3. Total earnings for the UK in 1988 amounted to ECU 778 million.

Estimating the income attained by the profession through overseas contracts is even more problematic. Table 4 gives an indication of involvement by the profession in overseas contracts. The two Member States with the greatest overseas activity, i.e. Denmark and the UK, estimate that overseas earnings by the profession in 1987 were ECU 12 million and 76 million, respectively. The 1988 figure for the UK is ECU 82 million.

The fee income of the profession is, in many instances, linked to the total cost of the construction project since the fee charged is based on a percentage of that cost. This percentage varies between 1.5% (Portugal) to 3.5% (Denmark). The construction economist is permitted to fix his fees on a competitive basis in all Member States except Spain, where published fee scales are mandatory.

Special issue: 1992

The advent of a single European market is viewed positively by construction economists. The European Committee of Construction Economists (CEEC) is endeavouring to assist its members to take advantage of the new situation by promoting an understanding of European working customs and procurement methods. Traditionally, construction economists have exported their skills outside Europe

— primarily to the USA, the Middle East and the Far East. However, the publicity surrounding 1992 has focused attention on the opportunities in Europe and a number of working relationships both formal and informal, have been set up between construction economists practising in different EC Member States. The period 1988-89 has also seen the opening up, particularly by the large UK firms, of offices in other Member States.

Structural changes

In response to client demand, the profession is also developing its range of services beyond building economics and cost control towards the complete management and coordination of projects. The use of computers has freed the construction economist to develop his management skills and, for example, to act as a management consultant to major client organizations offering high-level strategic advice on the use of property or construction investment.

Substantial research has recently been conducted into information technology including the study of the relevance of Computer Aided Design technology to the profession and the development of an expert system for construction economists. The next generation of CAD technology will profoundly influence the design and construction processes and present further opportunities to the construction economist in such areas as cost modelling, cost planning, appraisal and global costings.

There is also a growing awareness of the importance of the costs of buildings in use, and the construction economist has developed financial techniques to ascertain the total cost of the building asset over its operating life — a service increasingly sought by clients. The CEEC is keen to see the establishment of a European building cost data bank as part of the development of the Community information service market. Work on this data bank is taking place in the light of the work being undertaken in the EC on electronic data interchange for the construction industry.

Outlook

The earning capacity of construction economists is inevitably dictated by overall activity in the construction industry within the Member States. In recent years — for example, in the United Kingdom — the industry has been particularly active, creating a correspondingly high demand for the services of the construction economist. Indeed, the demand is such

that many firms are experiencing severe recruitment problems. Most economic forecasts indicate strong demand for construction until the end of the century, particularly if infrastructure problems are solved.

The profession continues to expand its activities beyond the traditional building industry into civil engineering and heavy engineering. Within the building industry, the profession is involved in those areas that will assume increasing importance, for

example rehabilitation and particularly inner city regeneration. This often includes carrying out a cost/benefit analysis in which the state of the existing building and its expected life after rehabilitation have to be weighed against the cost of the rehabilitation itself.

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ARCHITECTS

(NACE 837)

Summary

The slump in building activity in the early 1980s resulted in very unfavourable employment and turnover conditions for the profession during that period. Although building activity has picked up moderately in some Member States, employment and turnover have not yet recovered to pre-1980 levels.

The architect is required to bring together many apparently different professional abilities; in addition to an ongoing appreciation of totally new construction methods, the architect needs to understand and know how to manage restoration projects, preserve and maintain historical and technically built-up areas, follow the trends in interior decoration, organization, landscape architecture, environmental protection, training and research, design, etc. Historically and geographically, these tasks have developed in different ways in the EC Member States.

Description of the sector

The functions of the architect are:

- to master drafting techniques; be able to execute construction programmes and explain them to the builder;
- to possess specialized knowledge of building techniques and physics;
- to be aware of and apply both general and specific legislation and regulations to the projects they are in charge of.

The task of the architect involves reconciling the — often conflicting — interests of the world of construction and real estate, and the cultural and artistic requirements of the user and of society in general.

Professional specialization in different types of construction is necessarily based upon general knowledge; however, most specializations are short lived due to the rapid evolution of the profession. The specialized involvement of various kinds of 'technicians', both in the planning and the execution phases of a project, is often wrongly classified as a specialization. In many cases the architect, in his or her capacity of 'overall coordinator', will have to rely to

an increasing degree on the counsel and studies of these semi-specialists.

Table 1
Number of architects and students, 1983

	Number of architects	Number of students	Architects per million inhabitants
Belgium	5 940	3 400	600
Denmark	4 900	2 270	961
FR of Germany	60 424	29 823	985
Greece	9 500	1 000	990
Spain	10 391	13 586	275
France	20 081	16 200	373
Ireland	1 200	475	324
Italy	65 000	66 000	1 136
Luxembourg	125	50	347
Netherlands	2 500	3 000	176
United Kingdom	27 575	7 259	493
EC 11	207 636	143 063	672

Source: Claeu.

The architect's impact on the economic aspects of a construction project is considerable. He has to ensure that the building is attractive, the design well suited to the surroundings, that it functions well on all levels, is completed within a reasonable budget and that the occupants have a general feeling of well-being.

Besides these general requirements, the architect is confronted by a number of other factors:

- architectural 'trends';
- financial and technical aspects of new construction methods and techniques, new building materials or changed production methods for existing materials;
- energy and material-saving methods;
- renewed interest in the past and in the existing cultural heritage;
- a critical approach by society and the individual to the modification of built-up areas;
- security;
- the qualitative character, both physically and aesthetically, of the building as an enrichment or an impoverishment of the cultural heritage.

The fundamental role of the architectural profession is similar in all Member States. However, architects operate under different circumstances in each Member State and these circumstances are mainly determined by the following three factors:

- the existing legislation with regard to construction;
- the professional training required to qualify as an architect;
- the way in which projects are realized within built-up areas (legislation, structure and capabilities of builders, climate, population density, degree of industrialization of the area, etc.).

Regulatory environment

Since the subject of building legislation is so wide, only the most important points are mentioned. These are:

- a 10-year liability period in those countries with a legal system based on the Napoleonic Code (France, Belgium, Luxembourg, Italy);
- the possibility of appointing various experts on behalf of litigating parties in the Anglo-Saxon countries;
- the existence of compulsory insurance (France, Belgium);
- locally-inspired customs, legislation and regulations (e.g. concerning earthquakes in Greece);
- the procedure used for obtaining a building licence;
- limitation on and specification of building methods and/or materials.

With regard to the two final points, regulations are very different. Whereas in some countries and/or regions there are few restrictions, others have such strict rules that a project has to be fully specified, including form, choice of materials, contents and external aspects. Historically important sites and regions generally possess relatively clear guidelines, but some countries only have 'recommendations' concerning application and/or choice of materials. The laws on quality, materials usage, norms and margins allowed in building techniques are totally different from country to country. The availability of materials is regionally determined and certain materials can be made available in other regions only at enormous expense. Materials are also cli-

matically linked to certain areas and can sometimes only be transferred to other areas at great cost.

Training exercise of the profession

As far as technical aspects are concerned, training varies considerably in the different Member States and regions of the Community. The cultural and educational background is clearly different as well, with a more technical bias in the Federal Republic of Germany, Spain and Greece, a more artistic basis in France and Italy, a cultural-historic foundation in the insular Member States and a more practice-oriented one in Belgium, Denmark and the Netherlands. Training and teaching methods are varied and are currently under discussion both at a national and international level. It is clear that the training period, entry qualifications for admission to the profession, and existence of continuous education, represent significant areas of difference between Member States.

The influence of the administrative authorities on these factors is also very unequal. Whereas in some Member States they are entirely a matter for the administration, in other countries they have historically developed as a matter of concern only to the profession itself

Finally, the exercise of the profession is subject to very different regulations in the Member States: at one end of the scale the profession is completely regulated, whereas at the other, protection of the title of architect hardly exists. This means that the architect's role is difficult to compare.

Another important aspect of professional practice is the notion of professional conduct and deontology, which may vary from very lax standards to very stringent and complex regulations which sometimes extend to the personal conduct of the individual professional. In some Member States, entry to the profession is linked to the compulsory membership of a professional association as well as to a continuous education programme.

Current situation

Since the current situation of the architectural profession is very different in each Member State, recent trends in each country are discussed separately below.

In Belgium, the demand for architectural services has increased slowly following the stabilization of demand in the building sector. Order levels are still

only 70% of their 1980 level. Some concern exists regarding the changing legislative environment, due to the progress of federalization. Entry to the architectural profession is subject to regulation; VAT on fees has been modified to 17%. 20% of the professionals are less than 32 years old, and employment seems to have stabilized. There has been an important reduction in the number of training centres with closure of four establishments.

The architectural profession in Denmark has seen a rise in the registration of new professionals (50% since 1977) leading to a decrease in average age to 33. However, unemployment is still high among the younger professionals at 7 to 8%. Activity in the building sector is low but has recently stabilized. A significant number of architects are employed in related professions.

In the Federal Republic of Germany, new registrations in the profession have stabilized. Demand is stable but the number of orders for large projects is decreasing.

Building activity in Greece is running at low levels; this is especially the case for small family homes. The profession is better organized since the accession of Greece to the EC.

In Spain, there is an important concentration of building firms around densely populated areas but this has meant decreased activity in the less populated areas. In general, building activity is weakening and competition is becoming tougher in the sector. The number of new entries to the profession has stabilized.

The architectural profession in France is now regulated since the enactment of new legislation. However, there are many inadequately qualified members of the profession. The registration statistics show the entrance of many new professionals which has lowered the average age of members. Building activity in the economy continues to be depressed but there is a strong tendency towards renovation.

In Ireland, building activity has almost halted. Partly as a result of this, young (and some older) professionals have emigrated to the USA, the United Kingdom or even Africa.

There has been an increase in the number of registrations in the Italian profession; however, a large number of architects are employed in other capacities not always related to the profession. New building activity is very limited; there is a preference for renovation, especially in historic areas. A rise in

building costs has also had an influence on building activity.

In Luxembourg, enactment of a law regulating access to the profession is expected. Architects suffer from insufficient job security. The building sector had to deal with a stabilization of orders but it is continuing to experience a shortage of skilled labour.

Registration law and protection of professional title have come into force in the Netherlands and this is expected to bring improved standards in the profession. 50% of architects are under 50. The profession offers reasonable job stability, especially in densely populated areas where demand for architectural services is relatively steady. Demand in the building sector is expected to remain stable.

In Portugal, new legislation is expected to clarify the status of the profession. However, building activity is currently running at low levels.

The architectural profession in the UK has experienced stabilization of new registrations. There is a strong demand for qualified professionals by established professionals, and the supply shortage is being filled by architects from Ireland. In the building sector there has been a strong increase in property prices.

There is a strong trend toward the development of more commercially oriented activities. In view of the long and difficult training for the profession, there is a general feeling that the architect's remuneration, in relation to his responsibilities, is far too low. As a result, many youngsters seek job security through employee status. The established architect's only income is the professional fee, usually a percentage of building costs. Depending on the country, area, and type of project, this percentage varies from 5 to 12%, and from a low percentage in a depressed economy to a 'normal' one in a booming economy.

Since the number of architects is rising, a continuous flow of new customers needs to be ensured; this poses the deontological problem of 'advertising' the profession.

Insurance costs are rising due to the increased tendency to take even small points of litigation to the courtroom, and the apparent eagerness of the courts in encouraging such steps. In some Member States, insurance coverage has become compulsory (France and Belgium). The risk is, however, that this may halt experimental building projects (hampering architectural development), and that a number of dynamic individuals would leave the profession for

fear of being unable to find sufficient insurance coverage.

Outlook

The influence of each architectural project on the conception, overall cost and execution period of a building project, are determining factors in the creation and preservation of cultural heritage.

An increasing number of architectural tasks appear to be carried out by non-architects, since existing tasks are becoming so complex that they require specialization.

In the Community in general, little change is expected over the next decade, in spite of the adoption of the new architects' regulations. On a worldwide scale, a slight slowdown is expected to take place for large international offices in the previously rapidly expanding markets of developing countries; a levelling-off in prestigious projects is forecast. European architects will need to fight to maintain their position or gain an increased share of a weakening world market.

The less complex projects in local markets outside the Community are expected to be taken over, to an increasing extent, by locally or internationally trained locals, utilizing traditional designs. International cooperation will be of limited duration and probably linked to specific projects, with each partner making an individual contribution.

The choice of materials and techniques will lead to more diversified projects, thereby weakening the monopoly position of certain industries and/or countries. In the Community as a whole, especially after 1992, a rapid change is expected to take place in the use of previously well-established materials and techniques in certain areas.

Solid, up-to-date training of the 'European architect' needs to be implemented, together with that of all other building technicians, in order to promote overall building activities.

Edited by DRI Europe, based on information published in *Panorama of EC Industry 1989*

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MANAGEMENT CONSULTANCY

Definition of sector and description of activities

Management consultancy is the service which provides advice to client organizations. The advice is given by specially-trained, qualified specialist consultants.

Consultants give independent and objective help to their client organizations in identifying and analysing their management problems, recommend appropriate actions, and in certain cases, help their clients to implement those recommendations.

This service sector forms part of NACE Subgroup 839.1 — 'Market research and management consultancy'.

The actual project to revise the NACE 'NACE Rev.1' puts management consultancy in the subgroup 7415, referring to the sector as 'Trade and management consultancy'.

The Feaco, however, believes that the statistical information and the description of the sector are not adapted to the importance and the reality of the sector, and wishes to see the management consultancy as a separate category (for instance 742), which would itself be subdivided into 3 subsectors:

- 7421: General management
- 7422: Recruitment
- 7423: Professional training

Without pretending to be exhaustive, the following list covers the main activities in this sector:

- Information technology systems;
- Finance and administration;
- Corporate strategy and development (including research and development);
- Production, service, technology and organizational support management (including quality control);
- Internal and external communications (including public relations);
- Human resource management (including recruitment of executives and temporary staff);
- Project management;

- Economic and environmental impact studies;
- Other aspects of management consultancy.

Current situation

Management consultancy in 1989 is maintaining high growth, sustained profitability and is gearing up for the future.

Four main trends can be distinguished:

- A sustained, appreciable rise in activity.
- A moderate increase in total employment.
- Considerable strategic activity.
- Marked growth in management consultancy.

Economic conditions have been conducive to satisfactory growth in management consultancy. The increase in activity is reflected by the rise in turnover from ECU 3 629 million in 1987 to 4 059 in 1988.

Evolution of management consultancy firms

For want of reliable national, European or professional figures, the 1988 (1 January — 31 December) turnover of management consultancy firms who are members of Feaco (European Federation of Management Consultants' Associations) can be estimated at around USD 2 420 million, representing a percentage increase in turnover comparable to that achieved in the United States.

The number of national management consultancy associations, members of Feaco continues to rise slowly. Besides national associations, member of the Feaco, the number of management consultancy firms with less than six people appears to have grown considerably.

Areas of activity

The new demand has not yet wrought substantial changes to the activity of management consultants.

A substantial increase can be observed, however, in the field of advanced information systems: this is the

sphere of new information technologies and the invasion of computer-based systems in management consultancy.

Table 1
Turnover and number of enterprises for members of Feaco and for the global market

	Number of enterprises	Turnover (million ECU) (1)	Turnover: share of the global market (%)
Members of Feaco			
Belgium	20	87	60
Denmark	65	34	40
FR Germany	296	690	45
Spain	130	48	40
France	40	225	45
Ireland	17	27	41
Italy	40	165	40
Netherlands	34	131	65
Portugal	47	75	41
United Kingdom	29	568	70
EC 10	611	2 051	50
Global market (2)			
EC 10	1 800-2 300	4 068	100

(1) 1988 conversion rates used.

(2) Estimates.

Source: Feaco.

Human resources is an expanding area in certain countries, particularly Belgium, Spain and Italy.

Public management consultancy markets are developing especially in Italy and the United Kingdom.

There are no notable changes in the other areas of activity.

Patterns of trade

Management consultancy is an essentially national business; no significant developments were noted in the international activity of the different Community Member States. The main exporting countries remain Belgium (over 25% of total turnover for the sector), France, Holland and Italy (around 15%), Germany and the United Kingdom (between 12 and 13%), Denmark and Spain (about 7 to 8%).

The trade between EC Member States increased only very slightly, at least where small and medium-sized firms were concerned. The intra-European activities of their client organisations are not yet sufficiently developed to generate a significant turnover.

By contrast, the leading European multinational consulting firms enjoy more favourable opportunities, thanks to the fact that they generally deal with large client organisations.

Employment trends

The number of consultants has risen by 5% or so, to approximately 20 000.

The staffing structure of management consultancies has not changed substantially compared to 1988. The following three traditional categories are still prevalent:

- senior consultant (10 years' experience or more) — 40%;
- consultant with over 3 years' experience — 30%;
- junior consultant (young graduate) — 30%.

Table 2
Fields of activity

(%)	B	DK	D	E	F	IRL	I	NL	UK
Administrative information management	11.7	N/A	14.8	5	15	31	15	N/A	9
Information systems	21.1	N/A	34.5	15	15	0	17	N/A	16
Financial consultancy	8.4	8	3.0	5	5	0	3	8	10
General management	12.3	N/A	11.8	12	15	16	8	N/A	7
Government administration	9.5	18	7.0	5	15	0	7	18	26
Executive search	6.9	N/A	4.6	20	5	0	4	N/A	4
Human resources	8.7	14	4.2	15	10	22	21	14	6
Manufacturing	7.9	11	5.0	8	15	15	18	11	9
Marketing	7.1	8	3.4	6	2	10	4	5	7
Procurement	5.5	N/A	1.5	4	2	0	0	N/A	1
Research & Development	0.0	N/A	3.5	3	5	0	3	N/A	3
Specialized services	0.9	N/A	6.7	2	1	6	0	N/A	2

Source: Feaco.

Table 3
Number of management consultants

Members of Feaco	
Belgium	610
Denmark	325
FR Germany	7 395
Spain	1 290
France	1 700
Ireland	287
Italy	1 900
Netherlands	1 310
Portugal	795
United Kingdom	4 756
EC 10	20 368
Global market (1)	
EC 10	43 000

(1) Estimate.

Source: Feaco.

There is, however, a perceptible increase in the proportion of women in the category of young graduates. Initially, the level of pay would seem to explain the increase in female consultants. There seems to be no barriers to their career progress, however, and the trend looks set to continue.

Moreover, the introduction of new technologies and the systematic use of computer-based systems with the level of expertise required, will increase further the standards of qualifications that are already called for.

Management consultancies are in fierce competition for the recruitment of consultants with organizations providing other intellectual services (banks, computing, law, etc.). This is one factor in the rise of entry-level salaries, with the inevitable knock-on effect on consultancy fees.

These broad trends seem likely to continue, and even to increase, at least in the short term.

Investment

There are no reliable figures concerning investment. The only reported capital spending is meant to enhance the firm's public image.

Nonetheless, it can be estimated that major movements are involved, concerning both existing management consultancies and firms in sectors allied to management consultancy.

Two main trends are observable among management consultancy firms:

- investments tending to increase an existing specialization: this is the case in particular, with regard to information technology and financial consulting;
- investments consolidating the firm's 'European' position in two different, but complementary, directions:
- the setting up of a European company or management structure to coordinate or direct all groups of operations in Europe;
- the acquisition or installation of new production units in previously unexplored countries, or strengthening existing structures.

Companies in sectors allied to management consulting are continuing to endeavour to get their foot in the door; this is particularly the case with accounting and auditing firms, banks, communication firms and computer software houses.

Nor is there any discernible significant investment by European management consultancies in other parts of the world.

Structural changes

The various developments noted above naturally affect the structure of firms but has not thus far wrought any changes in the general typology.

A marked increase in concentration has occurred among the large international groups.

Ernst & Whinney have merged with Arthur Young, and Deloitte, Haskins & Sells have merged with Touche Ross. Last year's 'Big eight' have become this year's 'Big six'.

Table 4
Top international groups

(1 000 million ECU) (1)	Turnover
KPMG	3.6
Ernst and Young	3.3
Deloitte-Ross	3.2
Arthur Andersen	2.4
Coopers and Lybrand	2.1
Price Waterhouse	1.9

(1) 1988 conversion rates used.

Source: *International Accounting Bulletin*, revised by «Le Figaro».

The category of medium-sized European firms (between 250 and 800 consultants) will increasingly assume the form of a European network.

The third category — smaller consultancies — will be less affected, except for a possibly increased specialization of some of them.

Geographical developments

The geographical topography of management consulting in Europe seems unlikely to change, at least in the short term. There are neither any exceptional success stories, nor any notable laggards.

Spain is catching up with an extremely significant increase in its consultancy potential.

Outlook

Despite a less optimistic outlook than the reality of 1988 compared to 1987, the forecasts for management consultancy in 1989 are optimistic. All countries retain strong confidence in the growth of management consultancy: two countries (Netherlands and Ireland) expect growth to be 'markedly higher' than in 1988, while all the other countries expect it to be 'appreciably higher' than in 1988.

More generally, the average income of a European management consultant in 1989 could be 15 to 20% higher than in 1988.

The differences between the development of general economic conditions and growth in management consultancy are not solely an expression of the confidence of professionals in their own future, but a consequence of a much improved appreciation of the increased usefulness of this sector of services.

Demand for management consultancy in Europe, which was lagging behind the United States, is growing chiefly under the influence of two different but complementary factors.

On the one hand, the quality and high level of qualification of consultants are now being appreciated at their true worth; while on the other, the trend among client organizations towards concentrating their potential for action on their core businesses forces them to resort increasingly to external advisory services.

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ADVERTISING

(NACE 838)

Summary

Advertising is one of the growth industries in the Community. In recent years, expenditure on advertising has expanded rapidly, in part due to the more strongly competitive environment in EC industry generally. This trend is likely to be further enhanced by the drive towards unification of the single European market. The advertising business has been greatly affected by technological developments in telecommunications and the print media. Specialized sectors of the industry such as direct marketing and sales promotion have similarly experienced strong expansion.

Function of the advertising industry

Advertising is the process by which purveyors of goods, services or ideas find and persuade customers through communications media. It is a key element of marketing, which is the strategic planning function whereby products are developed, made appealing and available to users, and sold to them at a profit. Advertising, in short, means salesmanship via media. The five main media are print, television, radio, cinema and outdoor.

The three major parties in the advertising business are: the media, who attract an audience through their publications and programming; the advertisers, who buy access to these audiences in order to sell their products; and the advertising agencies that link the buyers and sellers of time and space, providing the expertise and creativity that produces persuasive, cost-effective advertising.

Advertising agencies in the EC are normally remunerated by 15% of the value of the media space and time purchased. Extra fees are usually charged to cover the wide range of services that agencies offer in addition to media advertising, and to compensate for small budgets.

Data coverage

The numbers throughout this text refer to media advertising (in newspapers, magazines, television, radio, cinema and outdoor). They do not, therefore, include sales promotion activities, which are discussed in a separate section. They do, however, include those direct marketing activities that make use of print and television advertising. Although it is practically impossible to calculate how much overlapping there is between general advertising and direct-response advertising, the bulk of direct marketing is in direct mail, telemarketing and other 'database communication', and is not therefore included in the figures for investment in general advertising.

Current situation

In 1987 approximately ECU 31 000 million was spent on advertising in EC countries, around 64% of which was spent on print media, 25% on television and 5% on radio. This compares with respective shares of 69%, 20% and 5% in 1981.

Total EC advertising expenditure in the traditional media (print, television, radio, cinema and outdoor) represented 0.92% of the EC gross domestic product in 1987; this compares with a US figure of 1.57% and a Japanese figure (excluding outdoor and cinema advertising) of 0.75%. In the EC, advertising agencies account for just under 15% of total advertising expenditure, thus representing about 0.1% of GDP.

The factors influencing the size and growth of the advertising business are many and varied, but the principal ones include: the rate of growth in consumers' expenditure, the level of company profits, per capita GDP, the availability of commercial media, the intensity of competition in the economy and the degree of import penetration.

Levels of advertising expenditure differ considerably between countries, partly because of the factors listed above but also because of problems of defini-

tion. On average, over the period 1980 to 1987, the EC countries recorded real growth in advertising expenditure of 62.4% (i.e. 7.2% annually).

This average conceals sharp differences between Member States, ranging from Portugal and Spain with growth rates of 148.2% and 141.0% respectively to Ireland at 4.7%. The overall EC average compares with an increase over the same period of 45.6% in the USA and 29.0% in Japan (again, the Japanese figures do not include outdoor and cinema advertising).

There are three major problems in comparing advertising expenditure data in different countries. First, some countries use volume-based statistics to estimate expenditure. Other countries use survey-based figures which are based on asking media companies and agencies for actual expenditure data.

Secondly, media coverage is not always comprehensive. Cinema expenditure in Portugal, for example, is not available, while measurement of print media, in particular, may be limited.

Thirdly, elements in the total cost of advertising to advertisers, including the cost of producing commercials and the cost of paying commission to advertising agencies are not included consistently. Although estimates can be attempted, the figures in Table 1 represent the published figures for the industry without any such estimates.

Table 1
Advertising expenditure, 1987 (1)

	million ECU
Belgium/Luxembourg	777
Denmark (2)	635
FR of Germany	7 666
Greece (2)	194
Spain (2)	2 902
France (2)	5 139
Ireland	160
Italy (2)	3 615
Netherlands	2 045
Portugal (2) (3)	140
United Kingdom	8 204
EC 12	31 476
Europe	36 442
USA	60 762
Japan	15 564

(1) These figures have not been adjusted to account for different methods of compilation and are therefore not fully comparable. Expenditure on direct marketing and sales promotion are not included.

(2) Excludes classified advertising.

(3) Excludes outdoor advertising.

Source: European Advertising Tripartite, 03/89.

A fourth factor to consider when compiling advertising expenditure statistics is the inclusion of money spent on classified advertising in newspapers and magazines. This consists of small, generally pre-paid advertisements placed directly by individuals and companies in pages devoted to such advertising. It is generally 'classified' under headings such as 'houses', 'cars', etc.

Special factors influencing the advertising industry

Apart from economic developments, which naturally affect the advertising industry, changes in government regulations and progress in communications technology also have a strong influence on the business.

Restrictions (some legal, some voluntary) differ from country to country, but essentially they deal with limitations on methods of advertising, media usage and the promotion of certain products. The main product categories covered by such regulations are tobacco, alcoholic drinks, medicine and drugs, and sanitary products. All the EC countries ban or restrict the advertising of some of these products, and in some countries, such as the United Kingdom, advertising of all these products is regulated.

Technological change has been affecting all media. In the print medium, newspapers are now able to print simultaneously in several geographical locations via satellite transmission of pages from a single publishing centre. Examples of this include the *Financial Times*, which prints in London, Frankfurt and New York, the *Guardian*, which prints in London, Manchester and Marseilles, and the *International Herald Tribune* which prints all around the globe. The *Wall Street Journal* and *USA Today* both now print in Europe.

The magazine market is also becoming increasingly international, with publications such as the *Economist*, *Stern*, *Paris Match*, *Fortune* and *l'Equipe* available widely outside their country of origin. In addition, several major publishers are now launching local versions of successful magazines, tailored to the readers of each European country. They include *Cosmopolitan*, *Prima*, *Marie Claire* and *Auto Bild* (published as *Auto Express* in the UK).

In the television medium, the development of satellites that can transmit across national frontiers has influenced government attitudes to the commercialization of their own channels. They will have an even more profound effect in the 1990s as direct

broadcast satellites make their mark. Until recently, low-powered communications satellites broadcast a number of television channels across most of Europe, but these could only be received via very large reception dishes. In practice, this meant that signals had to be picked up by cable companies and relayed direct to subscribers. Now, medium and high-powered satellites have started to broadcast direct to individual household dishes, measuring between 35 and 85 cm in diameter, depending on the household's geographical location and the power of the satellite. Up to 30 new television channels could be directly available to many European households in the early 1990s, most of which will be funded by advertising.

The adoption of the EC Directive on Television without Frontiers on 3 October 1989 sets out a legal framework for the future development of the audio-visual sector. This directive allows for the free circulation of television broadcasts throughout the Community, thereby opening up new perspectives for broadcasters and programme makers.

Table 2
Satellite launch programme, 1989-90

Year	Satellite	Number of TV channels	Power
1989	Intelsat VF15	6	Low
1989	Tele-X	3	High
1989	DFS-Kopernikus 1A	13	Low
1989	Olympus	2	High
1989	TV-Sat 2	5	High
1989	BSB 1	5	High
1989	Intelsat V1F1	6	Low
1990	TDF 2	4	High
1990	DFS-Kopernikus 2	10	Low
1990	BSB 2	5	High
1990	Eutelsat II	16	Medium
1990	Atlantic	5	High
1990	Astra 1B	16	Medium

Source: Saatchi & Saatchi.

Industry structure

The three principal parties in advertising are the advertisers, the media and the advertising agencies.

Advertisers exist in most sectors of the economy, most notably in consumer goods and retailing,

though increasingly firms are aiming advertising at other businesses as well.

No comprehensive or even comparable figures exist on how advertising expenditures are split between the major product areas, though food and drink, retail and automobile advertising are important in all markets.

The processes involved in creating and executing an advertisement begin at the planning stage, involving the identification of target consumers through market research. A creative concept is then decided upon and executed via electronic or printed advertisements. Media specialists plan a campaign schedule aimed at reaching the target market most cost effectively, purchasing the space and airtime from the media companies. These processes are usually all handled within a full-service advertising agency, although they may also be handled by specialists in one or other of the disciplines. Media buying in particular is sometimes placed with specialists; in the Federal Republic of Germany, such specialists are estimated to represent 45% of advertising billings in 1987. Media buying shops are also important in France. In the UK, Saatchi & Saatchi has set up a specialist media company, Zenith, to purchase time and space on behalf of all its agencies.

Other suppliers to the industry include companies providing specialist services such as photography, audiovisual and printing services. Many of these industries are very fragmented.

Advertising agencies are effectively divided into two types:

- large, multinational agencies and agency groups;
- small to medium-sized agencies mainly operating in domestic markets.

Both groups are represented by the European Association of Advertising Agencies. The aggregate membership represents about 1 500 agencies, and their combined billings amount to ECU 33 billion, which is about 80% of all commercial communications in Europe.

There are no significant barriers to entry for starting an advertising agency, although expansion has often been achieved through acquisition rather than

internal growth. Alternative services such as direct marketing and sales promotion, discussed in a separate section, have recently been growing more rapidly than the mainstream advertising media. The larger agencies are increasingly becoming involved in some or all of these other services; for example, Saatchi & Saatchi have subsidiaries operating in advertising, direct marketing, sales promotion, public relations, design, market research and management consultancy.

Advertisers are often bigger than the advertising agencies, and have a large number of agencies from which to choose. Measures of advertising 'effectiveness' are, however, under-developed and are rarely used as part of the selection process. Often, key individuals in agencies will be a significant factor in a prospective advertiser's decision and there may be other, more subjective elements involved. Once an agency has been appointed, its relationship with the advertiser may last for many years; but some advertisers switch agencies quite frequently.

Table 3
Top advertising agencies in the EC

Rank	Advertising agency	Billings (¹)	Gross income (¹)
1	Young & Rubicam Europe	2 051 961	307 757
2	Publicis-FCB	1 793 329	N/A
3	Saatchi & Saatchi Worldwide	1 617 797	N/A
4	McCann-Erickson	1 615 356	242 182
5	J. Walter Thompson	1 149 756	156 480
6	BSB	1 110 861	166 503
7	BBDO Europe	1 109 705	166 447
8	Lintas Worldwide	1 063 398	159 429
9	Ogilvy Group	1 019 913	202 269
10	DMB & B Europe	991 567	135 548
11	Grey International	938 182	140 657
12	Belier WCRS	931 697	135 248
13	Lowe International	872 340	N/A
14	Roux Seguela Cayzac Goudard	794 173	108 251
15	DDB Needham Worldwide	627 494	97 669
16	TBWA	577 055	82 575
17	CDP International	572 034	91 390
18	Leo Burnett	501 852	75 274
19	BDDP	448 000	67 000
20	Alliance International	425 330	62 870
21	FCA International	324 510	48 650
22	Bozell Jacobs	312 603	43 580

(¹) 1 000 ECU.

Source: Agency totals for EC countries as declared to the EAAA.

top advertising agencies in the EC

Advertising agencies often define their turnover or 'billings' in terms of the amount of money they spend with the media on behalf of clients, and of which they receive a proportion in the form of commission or fixed fee. It is not possible to quote true

turnover figures (known as gross income in the advertising business) with any degree of accuracy. In their company reports, agencies often include figures from activities other than main media advertising, and figures are rarely reported by country. For these reasons, the following tables are based on agencies' own unaudited claims for gross income and may in some cases be exaggerated due to the battle for market leadership in the industry.

Table 4
Employment in major agencies

Belgium/Luxembourg	Top 26	1 422
Denmark	Top 30	1 061
FR of Germany	Top 48	6 156
Greece	Top 22	760
Spain	Top 38 (¹)	2 211
France	Top 39 (¹)	7 597
Ireland	Top 12	480
Italy	Top 35 (¹)	3 001
The Netherlands	Top 35 (¹)	2 098
Portugal	Top 14	695
United Kingdom	Top 58 (¹)	11 291
EC 12		36 772

(¹) Some agencies excluded.

Source: EAAA.

Although comprehensive figures are not generally available on employment, it is possible to assemble data from tables published each year by the top agencies. These give some data on employment in the major companies, although in a fragmented industry such as advertising there are often a large number of small agencies with only a small number of staff employed in each.

Major trends in Member States

A key issue for the advertising industry is media availability, especially with regard to television. Most Member States are now seeing an expansion of commercial television, since many governments have felt that national television channels could suffer in the face of competition from foreign satellite channels.

In the UK, television is relatively deregulated, with seven minutes' advertising time per hour allowed on the two commercial networks and nine minutes per hour on the 46 local commercial radio stations. In the UK, major broadcasting changes are proposed, introducing new channels and further deregulation in both television and radio, including the first national commercial radio stations. Rupert Mur-

doch's Sky Television is now concentrating its output on the UK rather than Europe as a whole.

In Germany, on the other hand, the two major television channels each take a total of only 20 minutes of advertising per day (advertising is not permitted on Sundays and public holidays), less than one-fifth of that permitted in the UK. A government-funded programme aims to enable over 80% of households to receive cable television by the mid-1990s. Satellite television, with far fewer restrictions on advertising than the public service channels, is also permitted, and an agreement has been reached for the Astra satellite signals to be distributed to the majority of the 5 million cabled homes in Germany. Some *Länder* have licensed commercial television stations.

Italy, which has experienced one of the fastest growth rates in advertising during the 1980s, effectively deregulated its commercial television in the late 1970s, thereby increasing the availability of advertising time dramatically; television's share of the market has grown from 26% in 1980 to 51% of total advertising in 1987.

Greece has shown rapid growth and discussions on the introduction of commercial broadcasting are now under way. Spain has also enjoyed spectacular economic progress. The regional communities have been allowed to set up local television services for a number of years. Spain offered three franchises for national commercial stations in 1989. These will probably start to operate in 1990.

In Belgium, after many years in which the Luxembourg channel, RTL, was the only real commercial outlet for television advertisers, new commercial channels have been licensed by the government, and advertisements are now permitted on the public service channel RTBF. Satellite television channels such as Super Channel and Eurosport, based in London, have also been allowed access to many Belgian homes.

In Denmark, where domestic commercial television began in 1988, local TV stations are now permitted to sell advertising, in addition to the national channel.

In France, following the introduction of the commercial channels Canal Plus, La Cinq and M6 and the privatization of TF1, the government is planning to reorganize the two public TV channels, Antenne 2 and FR3; they will develop complementary programming and no longer compete with each other for advertising revenue.

In the Netherlands, two Dutch-language satellite channels are shortly expected to break the advertising monopoly held by the State-run channels, following the abandonment of plans to privatize one of the three State channels. Ireland is shortly to introduce a third television channel to be run independently of the State-run channels.

Outlook

Growth in the advertising industry is closely linked to general economic conditions and particularly the trend in consumer spending. Over the short to medium-term, the industry will benefit from steady economic growth within the EC, though individual countries could experience a slowdown in that growth. More rapid development is expected in some of the southern European Member States, such as Greece, Spain and Portugal, where expansion in recent years has markedly outpaced growth elsewhere in the Community.

Table 5
Advertising expenditure forecasts, 1988-92 (1)

(million ECU)	1988	1992	Growth rate 1988-92
Belgium/Luxembourg	825	1 137	37.8
Denmark	659	904	37.2
FR of Germany	7 989	9 663	21.0
Greece	233	501	115.0
Spain	3 862	8 283	114.5
France	5 696	8 045	41.2
Ireland	177	225	27.1
Italy	4 202	6 843	62.9
Netherlands	2 038	2 317	13.7
Portugal	183	366	100.0
United Kingdom	10 349	14 672	41.8
EC 12	36 213	52 956	46.2
USA	63 463	79 386	25.1
Japan	18 491	22 600	22.2

(1) Including advertising by TV, print, radio, cinema, outdoor/transit.

Source: EAAA.

A major force for growth over the years up until the end of 1992 will be the moves towards the EC's single internal market. Another is the increasing availability of television to advertisers. Advertising expenditure in the 12 Member States is forecast to grow by 46.2% between 1988 and 1992 (Table 5) (i.e. about 10% annually), representing an increase of ECU 16 743 million (from ECU 36 213 million in

1988 to ECU 52 956 million in 1992). This growth is estimated to be over twice as fast as that of Japan, and almost twice that of the USA.

Given Germany's large population and economic power, and the business pressure to increase the availability of television advertising (only 10.2% of total media in 1987), the current forecast rate of increase may be low and the actual figures may reach those of France. The Netherlands too may

grow faster than forecast as television restrictions are lifted.

Despite these healthy expenditure forecasts, competition amongst the advertising agencies will continue to be intense as the struggle for market leadership continues.

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DIRECT MARKETING

Summary

Direct marketing, which is often viewed as part of advertising in its broad sense, and therefore included in the NACE 838, is the branch of marketing whereby companies establish a two-way relationship with their customers via the media. It includes direct mail, which is part of print direct marketing and which is virtually the only area of direct marketing for which reliable data are available. Another part of direct marketing, telemarketing, has been developing extremely rapidly in recent years and its turnover is estimated around ECU 3 to 6 billion, but growing by about 30 to 40% a year on average in the EC Member States.

Direct mail expenditure grew rapidly in the EC between 1982 and 1988, but the size of the business varies widely across countries, depending on the availability of other media.

Description of the industry

Direct marketing is the branch of marketing through which companies establish a direct two-way relationship with their customers via the media. It uses one or more advertising media to effect a measurable response and/or transaction at any location. It embraces all communications media that can create an interactive relationship with an individual retailer, business customer or consumer. Though it can be used in conjunction with advertising, it differs from it by establishing direct relations with named customers at the outset.

Direct marketing is also called 'Database marketing', since it enables the marketer to maintain a database of every individual inquirer or customer (and their addresses), what communications have been directed towards each of them, and what responses have been received. The 'customer file' may be linked to the accounting and inventory files, and overlaid with or enhanced by external information, such as demographic, socio-economic or psychographic data about individuals or neighbourhoods or business characteristics.

The European Direct Marketing Association divides direct marketing into print direct marketing, 'telemarketing', and 'new technologies'.

Print direct marketing, which is by far the biggest sector, includes direct mail sent through the post; circulars and leaflets delivered by hand to homes and businesses; and direct response advertisements placed in newspapers and magazines.

Telemarketing involves the use of the telephone to establish a link with customers. It is often used at an early stage of the direct marketing process to build up customer lists prior to mailings or visits by salesmen, but also in the final stages to follow up requests for more information or to place orders.

New technologies include videotex, whereby computer terminals linked by telephone lines can be used as a communications vehicle by marketers, either to consumers or to businesses linked to the system.

There are three main problems involved in measuring and comparing direct marketing expenditures in different countries. The first is that organizations simply do not exist in every EC country to measure, promote or even define the industry, although post offices in many countries have made estimates for direct mail, and telephone companies can estimate the use of the telephone for marketing.

Secondly, direct response advertising through main media such as television, newspapers and magazines is not usually measured separately from non-direct response advertising, and therefore cannot be separated from total advertising expenditure figures for these media.

Thirdly, the companies involved in bringing the marketers and the direct marketing media together operate in different areas and at different levels within the industry.

Current situation

Figures on total market size in each country usually only cover the direct mail sector, which is measurable at least partly through the national postal administrations' monitoring of the volume of direct mail items through the post. It is difficult to distinguish production costs in the industry, since much of the expenditure includes the costs of paper and printing, as well as postage itself; the latter repre-

sented 31% of direct mail expenditure in the UK in 1986. Compared with advertising through the mass media, where production costs represent around 5% of total expenditure in print media and 12% on television, the communications costs of direct mail are relatively low. The USA is generally considered to account for more than 60% of the total worldwide market for direct marketing services, although in the absence of comprehensive figures from most countries this is only a tentative estimate.

Growth trends

Differences in media availability between Member States help explain why the direct mail business is more significant in some countries than others. In countries such as Norway, where commercial television does not exist, and Denmark, Germany, Belgium and the Netherlands, where its availability has been very limited, direct marketing tends to be more important than in those countries where television is a significant advertising medium, such as the UK, Spain and Italy.

By contrast, the USA and Japan, as very mature advertising markets, have to deal with the problems of 'clutter' — or too many competing messages — in the main advertising media, making it difficult for marketers to reach their target audiences with a minimum of wastage. Direct marketing has assumed relatively great importance in these countries.

Table 1
Growth in direct mail expenditure, 1982-88

(%)	Growth of direct mail 1982-88
Belgium/Luxembourg	64
Denmark	74
FR of Germany	20
Greece	N/A
Spain	N/A
France	61
Ireland	185
Italy	N/A
Netherlands	72
Portugal	N/A
United Kingdom	60

Source: European postal services, 04/89.

The figures in Table 1 show the total growth of direct mail expenditure between 1982 and 1988, in the various EC Member States. The growth in Denmark, the Netherlands and Belgium is indeed impressive, but so is that in the UK and Ireland. In this latter country, however, the very high rate of growth bet-

ween 1982 and 1988 applies to a very low starting base in 1982.

Table 2
Index of estimated growth in media costs, 1980-87

(1980 = 100)	Television costs index	Consumer price index
Belgium/Luxembourg	249.9	144.5 (1)
Denmark	N/A	157.8
FR of Germany	138.9	121.0
Greece	660.1	366.1
Spain	240.5	201.9
France	201.1	167.3
Ireland	176.3	191.0
Italy	287.0 (2)	211.0
Netherlands	89.5	122.5
Portugal	525.6	347.2
United Kingdom	138.9	152.4

(1) Luxembourg: 142.7.

(2) RAI only.

Source: Saatchi & Saatchi; Eurostat.

The steep increase in advertising costs in the major media, and increasing media fragmentation, are other reasons why companies are turning to direct marketing (see Table 2). As more magazines, newspapers, television stations and radio stations are launched, the ability of marketers to reach large numbers of people cost-effectively is reduced. Direct marketing offers them an alternative means of reaching their prospective customers.

Finally, progress in computer technology has enabled customer lists and other useful information to be stored and classified more easily and efficiently, making direct marketing a more viable proposition for many companies.

Over the next few years, the main influences on the industry's development will include further changes in technology and in companies' attitudes towards direct marketing as part of their overall marketing mix. Government attitudes towards confidentiality and consumer protection will also be important.

The move towards the single European market in 1992 will also be a force for growth. With the removal of internal barriers to trade within the EC, large numbers of small and medium-sized companies may be expected to take advantage of the direct mail opportunities offered by a market of 320 million consumers. In the continent-wide market of the USA, direct mail in 1986 represented about 20% of total advertising, considerably more than in the major markets in Europe. Its share may grow substantially as the EC market takes on the dimensions of the USA.

However, other factors bode less favourably for direct mail. The growth of media opportunities throughout Europe may help to slow the rise in the cost of advertising, while the increase in the number of publications and TV channels will help increase the opportunities for specific targeting in the main media. Nevertheless, direct marketing is in a major growth phase, with mass marketers looking at the medium more seriously for reasons of cost and precision targeting.

One significant development for the future is the progress of interactive television. The growth of fibre optic cable networks, of videotex and, consequently, of home shopping and home banking, will be important for the future of the industry.

A critical issue will be the laws and regulations affecting the industry, arising from problems of confidentiality and personal privacy which are seen by many as being threatened by the growing numbers of computerized mailing lists.

The pattern of response from the direct marketing industry has generally been to urge self-regulation, permitting the industry itself to set up programmes that will work to the benefit of the consumer. Most of these laws and regulations are in a state of flux, as the industry is at the early stages of development. The way in which these are tackled will be an important influence in the future as the industry matures.

Industry structure

Apart from the companies using direct marketing services, which cover most sectors of industry, from those selling highly specialized goods and services directly to other companies all the way to retailers selling goods though mail order, the direct marketing industry itself can be segmented into a number of areas:

- Mailing houses provide list-broking services, often helping with addressing, labelling, inserting leaflets into envelopes or brochures, processing orders and redeeming coupons. Many also help with other production functions such as storage and provision of materials including envelopes and leaflets.
- Computer bureaux are used for such functions as helping to classify and segment lists or general population data into categories. They also offer word-processing (of letters and envelopes) and

postcoding as well as printing facilities tailor-made to clients' requirements.

- Telemarketing companies may be used at various stages of a direct marketing campaign.
- Agency direct marketing services primarily cover the areas of consultancy, planning and creative work, using outside mailing houses and computer bureaux as and when necessary. Some companies combine one or more of these functions. The agency services market is fragmented, tending to be dominated by advertising agency subsidiaries, indicating the degree to which advertising and other marketing services are related.

Aside from these functional divisions, the industry can be broken down into three types of companies: business specialists, consumer specialists and non-specialists, who operate either in both areas or in other parts of the industry such as list broking.

The shortage of trained, skilled people is the only impediment for a company wishing to enter the direct marketing industry. In many countries, the market is still underdeveloped, with many traditional advertisers still reluctant to embrace the direct marketing concept.

The bargaining power of buyers of direct marketing services is increased both by the fragmentation in the industry and by the simplicity with which the results of any campaign can be measured. Suppliers of services, such as computer bureaux and mailing houses, are largely commodity businesses and have little bargaining power; on the other hand, experienced staff are in very short supply and can demand high compensation packages.

Telemarketing

Telemarketing (TM) is a rapidly growing element within the total direct marketing industry. The obvious distinguishing features of TM is that the communication medium involved is the telephone. The calls can be outbound, where the seller initiates the call, or inbound, where the consumer initiates the call. Though telephone may be the sole medium of contact, very often it is used in combination with other direct marketing media (such as print material, personal calls, etc.).

The calls are generally:

- selling calls designed to result in an actual sale to the person or organization called, either immediately as a result of the call, or in the near future as

a result of additional follow-up activities (e.g. by arranging a visit from the selling organization);

- database calls, the objective of which is to compile, update or enrich a list of sales prospects. Such a list may then be used exclusively by the organization making or commissioning the database calls; or it may be made more generally accessible.

In addition, the telephone is also for:

- other forms of customer service and market development calls;
- publicity calls, to publicize an organization, product or service in order to build up support and customers over time (e.g. retailing group promoting the idea of shopping at its stores).

Although TM is now a well-established part of direct marketing, it is still less widely used than direct mail. The study by the Services postaux européens (which does not cover direct-response media advertising or inbound TM) indicates that in 1987, across the sample of companies in the 10 countries surveyed, 44% used addressed direct mail to consumers, 27% used unaddressed direct mail to consumers, 13% used outbound TM to consumers, 61% used addressed direct mail to businesses, 8% used unaddressed direct mail to businesses and 22% used outbound TM to businesses.

There are now over (probably well over) 1 000 telemarketing service bureaux in Community countries, but only a minority of these are well-established and of any substantial size. The rapid growth of the industry means that there are many new and small companies whose quality and future are uncertain — the requirements for running an efficient and effective telemarketing service bureau are very demanding. A key problem is the shortage of trained and experienced staff.

Direct marketing as a whole has benefited from recent trends affecting the cost-effectiveness of the major advertising mass-media. Telemarketing has additionally gained through its particular strengths of immediacy and impact; but its main future will continue to be as a marketing tool which is used in combination with other forms of direct marketing or advertising.

Hardly any reliable information is available about the present turnover of the TM industry in Europe. Some estimates, of varying precision and quality, have been made in some countries.

These suggest that the total TM industry turnover in the EC could be about ECU 3 to 6 billion. Any estimate of course becomes out-of-date very quickly because of the industry's speed of growth. Claimed growth rates for different countries range between 10% and 50% per annum (even higher in one or two cases), but the average rate of growth appears likely to be at least 30 to 40%, i.e. at least doubling turnover every two years.

Outlook for telemarketing

TM is not only growing fast, it is changing fast. Some of the more interesting and important trends are:

- the use of toll-free call systems is likely to develop very quickly indeed as these become more widely available and effective;
- outbound calling to comprehensive customer databases is likely to increase further, in response to the growing need for more efficient ways of contacting specialized target groups (the interest in so-called 'lifestyle' databases in the UK is one example of this general trend);
- the growing exploitation of new technology: TM is becoming 'hi-tech' in its use of new types of equipment and technical opportunities;
- teleshopping (combining the use of television advertising with telephone or videotex ordering) is already established in certain countries such as France and seems likely to spread more widely and grow steadily in importance;
- many telemarketing service bureaux (smaller ones in particular) are likely to develop increasingly in specialized fields of activity rather than aim to be broad-spectrum generalists. There are analogies with the computing industry in this connection;
- there is likely to be a growing volume of international (transborder) TM despite some constraints imposed by the issue of language. Such activity already exists, although at present there is no indication of its volume. Two examples of the kinds of operation involved are:
 - (i) a reported USD 900 000 TM campaign by Dow Chemical for thermal insulation across 17 European countries, through a French telemarketing service bureau,
 - (ii) a programme run by Harrods store in London inviting US shoppers to place toll-free transatlantic orders for British products,

- a general trend towards the greater use of direct marketing, and of TM within this, as a key element in companies' total promotional budgets, and as a result the closer integration of TM into companies' overall marketing thinking and strategies (more widely than at present);
- the associated growth of TM consultancy.

Employment

Very little company information is available on the direct marketing sector of the EC advertising industry. The UK Direct Mail Producers' Association listed 4 592 employees among its members in

1987, giving a total of approximately 300 000 to 350 000 items mailed per employee in the country. If this measure of productivity were projected across other EC countries for which volume data are available (assuming productivity to be equal in all countries), total employment in direct marketing is likely to be between 25 000 and 30 000.

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SALES PROMOTION

Summary

Sales promotion is the management of the physical context in which the consumer encounters a product, in order to maximize sales. Contrary to media advertising, sales promotion consists in 'pushing' the product to the consumer, rather than 'pulling' the customer to the product. This market was about identical in size to the advertising market in 1987, at about ECU 31 billion, just under 1% of the EC's total gross domestic product, but was developing more rapidly than the advertising market. Because of the many synergies between advertising, direct marketing, sponsorship and sales promotion, most of the large advertising agencies are now getting involved in sales promotion activities.

Functions of the sales promotion industry

In the NACE, sales promotion is not separated from 'advertising' and thus falls under category 838.

Whereas media advertising 'pulls' the purchaser to the product or brand, sales promotion 'pushes' the product to the consumer. As such, sales promotion is concerned with location, timing, physical environment, merchandizing, added value, pricing and other circumstances conducive to the sale of a product. It is not only about direct communication with the consumer, but also communication with the trade and the sales force as the people most directly responsible for creating the right buying context. Promotions are an important marketing tool for obtaining scarce shelf-space and in-store support from retailers.

The major participants in the industry, apart from the marketers themselves, are the sales promotion consultancies. The range of services offered by these consultancies varies from the simple supply of sales promotion strategy advice to the provision of a full range of communications, graphic design, new concepts, finished artwork and photography services.

There are problems in defining the term 'sales promotion'. A survey by the Institute of Sales Promotion in the United Kingdom found that activities such as trade competitions, consumer coupons, special promotional packs, cash refunds, and gift vouchers are generally thought of as 'sales promotion' activities. The survey also found wide (but not general) agreement that activities such as door-to-door

distributors, short-term trade discounts, free sampling, special sizes and trading stamps should equally be counted as sales promotion. But the survey also found considerable disagreement on whether or not activities such as point-of-sale material, sports sponsorship, public relations activity in support of a promotion, or catalogues and price lists should be defined as sales promotion.

Current situation

Although no authoritative data are available for the EC market as a whole, it is widely believed that the sales promotion market, broadly defined, is worth approximately the same as the advertising market, valued at approximately ECU 31 billion in 1987. Industry observers estimate growth rates to have been of the order of 15 to 20% per annum in Europe over the past few years.

Like all forms of marketing outside mainstream media advertising, sales promotion has benefited from the very high cost increases in television and print advertising. In addition, the increasing pressure on companies to achieve short-term results has prompted a move into areas such as sales promotion, which offer immediate measurable returns on money invested. Coupons, rebates and pricing discounts all come under this heading. Thirdly, deregulation in a number of industries such as airlines and financial services, as well as increasing competition generally, has stimulated the need for competitive incentives in order to build market share.

The movement of large agency groups such as Young & Rubicam, Saatchi & Saatchi and J. Walter Thompson into sales promotion has given the industry a greater degree of respectability in the marketing community. Further benefits will come as these groups introduce new clients to sales promotion as a marketing tool. With the largest advertising agency groups now involved in sales promotion, the industry's links with direct marketing, sponsorship and advertising are likely to continue to grow.

Examples of the synergy between these different forms of marketing include the use of customer lists for direct mailings, culled from entries to a promotional competition, or contest prizes in the form of trips to sponsored sports events or concerts. An inte-

grated marketing package will encompass all these different activities.

Industry structure

In general, sales promotion consultancies are structured to deal with all aspects of a sales promotion campaign through creative and account management teams. Creative teams devise and create a campaign, whereas account management teams are responsible for planning and implementation, as well as coordination with the client. Specialized services such as print, production, graphics, design and photography are either undertaken 'in-house' if the consultancy is large enough or, more commonly, sub-contracted out to other companies.

Consultancies operate on one or other of three payment methods: retainer fees, project or *ad hoc* fees, and commission on supplying premiums and other services. Fees are usually paid in two stages, the first for advice on proposed promotional strategies to

solve clients' marketing problems, the second for organizing and executing these proposals.

The entry of the large advertising agency groups into the sales promotion market has emphasized the dividing line between the large, often multinational consultancies, and the smaller local companies. The larger consultancies are increasingly linking up with other elements in the marketing mix, such as direct marketing and sponsorship, in order to devise and implement integrated marketing campaigns, often in several countries. The move towards the single European market means such pan-European promotional campaigns will become increasingly common. The barriers to entry for newcomers to the industry are therefore considerable if they want to become major participants in the industry, providing other marketing services in addition to sales promotion.

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PUBLIC RELATIONS

Summary

The public relations services sector has developed rapidly since a growing number of companies view public relations as an effective means of influencing opinion and have included it in their corporate strategy. No reliable figures for the EC market exist. The global turnover (including non-public relations activities of EC companies involved in public relations) reached nearly ECU 400 million in 1988. At the same time, as the market is expanding, consultancies themselves are improving their expertise and professionalism and anticipate an increase in their market share.

Description of the sector

The public relations sector is covered by NACE category 839.1. However, the market research and management consultancy sector are also classified under this heading. This being the case, NACE statistical data do not permit the separate identification of this sector.

The purpose of public relations is to project a favourable impression of a person, product, company or organization. The objective of public relations is to win and deserve public confidence and approval. As a result, public relations involves communication with a variety of individuals, organizations, and with the general public. It can be carried out by independent individuals, specialized companies or in-house public relations units.

From the point of view of the customer company, public relations campaigns can be directed towards 'external' targets (competitors, customers, the government, etc.) or 'internal' targets (personnel, unions, other party members, etc).

More specifically, public relations can be seen as the combination of three distinct but unseparable elements. Though each taken in isolation may constitute a separate discipline, the three considered jointly define the public relations profession:

1. A behavioural ethic: The PR's objectives are such that it can be assimilated to the rules of a social game, a way of behaving and acting which preserves each individual's dignity. If the ethic

component is discarded what remains is not PR anymore.

2. A method to apply human sciences to the study of individual and collective behaviour:

(a) analyse behaviour, trends, opinions within a group (a company for example), identify its causes, predict its consequences and elaborate a strategy or an adequate action plan;

(b) analyse the communication channels, the networks of relationships which together constitute the backbone of the group and whose structure and quality enable one to define the degree of cohesion and to appreciate the risks and opportunities given the socio-economic environment.

3. A strategy as well as action and communication techniques: taking account of the information that was collected, of the opinions and expectations registered during the social meeting and the functional analysis, the PR professional will define a consistent action plan, which would enable the public (both inside and outside the company) to have a better knowledge or a better comprehension of its activities and targets, of what the company does to meet their expectations, and more generally create a favourable climate for the company to have the support of those whose contribution to the company's future and expansion is important.

Current situation

The end-product of public relations activity is not easily evaluated. Whether it is measured in terms of media coverage, political action or on the basis of the company's share price, public relations is not a service that can be accurately valued. Measures of the total size of the industry cannot include the substantial amount of public relations activity undertaken in-house. Figures presented here are based solely on fee income earned by public relations consultancy firms.

Furthermore, fee income by independent consultants or small firms, which are not required to publicly disclose their revenues, is not included. Finally, many advertising companies (which have moved

into public relations in recent years) do not as a rule identify public relations fee income separately from other income sources in their financial statements.

Table 1 presents an overview of the estimated number of public relations consultancy firms in each EC country (where available), the number of employees and their turnover in 1988. Because of the difficulty in distinguishing between public relations and other activities of many of these companies, only overall turnover figures could be presented. Turnover from public relations activities is not available for most of the EC countries.

Table 1
Enterprises, turnover and employment
in public relations agencies, 1988

	Number of enterprises	Turnover (million ECU)	Employees
Belgium	19	23.4	220
FR of Germany	40	50.0	280
Greece	6	N/A	N/A
Spain	25	17.0	185
France	34	110.0	550
Ireland	5	5.6	65
Italy	42	N/A	N/A
Netherlands	9	16.5	130
Portugal	10	3.5	70
United Kingdom	130	130.0	850
EC 10	320	356 (1)	2 350 (1)

(1) EC 8.

Source: CERP.

The global turnover of public relations companies in the EC was estimated by the professional associations at nearly ECU 400 million in 1988, and was generated by more than 300 companies. Because of the problem in identifying this sector in the official NACE statistics, official figures on the market size do not exist in the EC, nor in the US and Japan.

One agency involved in the sector estimated that the value of the US market represented some ECU 2.4 billion and the Japanese market some ECU 241 million in 1986. These figures should be interpreted as rough indications only.

Employment and market entry

The professional background of those employed by public relations organizations has expanded to include professionals such as lawyers and bankers. This has increased the degree of professionalism and expertise in dealing with the details of certain public relations campaigns.

As with other marketing services, the key resource of the public relations industry is staff. Employees often leave and take clients with them. One response to this by smaller companies is to offer equity or partnership in the company.

Table 1 shows that there are, at present, very few employment data available for the public relations sector in the EC. The professional association of public relations professionals (CERP) currently estimates more than 15 000 professionals in 16 European countries, including the 12 EC countries.

Entry into local markets is relatively easy, with little need for significant capital investment: people are the key asset. On the other hand, the barriers to building an international network of consultancies are much greater, given the nature of the industry. 'Good' acquisition candidates are difficult to find in such a small, fragmented industry; and key people may be reluctant to work for a large organization once they have owned and run their own business.

In the US, the market leaders in the public relations industry are owned by advertising agencies, which have international networks and regional spread. Outside the US, locally based companies dominate. A key factor in the development of the EC market will therefore be the extent to which large groups continue to expand or develop.

Table 2
The big 10 public relations agencies in the EC, 1988

Name	Turnover (million ECU)	Employees	Country
1. Shandwick Group	19.6	417	UK
2. Charles Barker Group	10.7	191	UK
3. Burson Marsteller	10.5	169	UK
4. Valin Pollen International	8.0	167	UK
5. Dezwe Rogerson	7.0	136	UK
6. Hill & Knowlton	6.9	141	UK
7. The Grayling Group	6.2	102	UK
8. Streets Financial Strategy	4.9	65	UK
9. Daniel J. Edelman	4.8	95	UK
10. ABC Presse-Information GmbH	4.1	65	D

Source: CERP.

Growth of the sector

The number of public relations companies, as well as their size, has increased rapidly in recent years. Much of the growth has come from companies employing external public relations consultancy experts (in situations where they would have handled their own public relations before) due to the growing complexity of the business. A 1988 UK survey by *Marketing Week* magazine showed that larger companies still operate their own in-house

public relations services, but middle-ranking companies increasingly use outside consultancies.

Part of the reasons for the move away from in-house operations towards professional consultancies has been the growing interest of large advertising groups in public relations and the inclusion of public relations services as part of a 'package' of marketing services for their customers.

Apart from these 'internal' or supply-side factors, four 'external' or demand-related factors can be identified that have fuelled the growth of public relations companies:

- **Cost-effectiveness**

The cost of public relations 'mistakes' or inefficiency has escalated. When an aircraft crashes or a ship sinks, critical and uninformed media coverage can cause a heavy loss of business, which can be countered through effective public relations activities. Many politicians have gained or lost elections due to good or bad public relations campaigns.

- **Strategic planning**

Public relations is not only used for *ad hoc* or crisis management. It can have favourable long-term effects too. Many public relations companies are involved in the preparation of contingency plans for their customers, 'if need be'. Long-term involvement in the parliamentary legislation process and 'guiding' bills through this process are another growing area for public relations companies. Such contacts can also keep companies informed of government thinking on their industry in general.

- **Cost reduction**

The cost of reaching small numbers of key opinion-makers, decision-makers or customers through gen-

eral advertising and marketing campaigns is in many cases prohibitive. Concentrating public relations campaigns on a small group of people through a personalized approach can be much cheaper and more effective than reaching indiscriminately for the masses, especially in cases where detailed and complex information has to be communicated.

- **The increase in the number of media vehicles**

When the number of media vehicles (newspapers, magazines, television, etc.) increases, so do the number of opportunities to influence people's opinion and the complexity of such activities. This amplifies the need for public relations experts with wide but also detailed knowledge and experience so that every possible avenue can be explored.

Developments in the media and in the technology of communication also demand increased attention to the presentation of a corporate image. As a result, a new service has developed rapidly in recent years in the grey area between public relations, marketing and advertising: corporate advertising.

This has been used more as a complementary strategy rather than a competing alternative to public relations. Only a limited amount of information can be conveyed by a general advertisement. Public relations consultancies are able to concentrate on imparting more detailed and relevant information to members of key target groups in the knowledge that the climate of public opinion will in this fashion be favourably influenced with reference to a particular issue.

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MARKET RESEARCH

Summary

The EC accounts for more than one-third of the world market for market research. The Esomar (European Society for Opinion and Marketing Research) directory has full registration of 395 research organization institutes in the EC (from a total well in excess of 1 000). Five of the top 10 world market research companies have their head office in the EC. More than half of all EC market research is bought by manufacturers, and only 15% by the service sector. The trend in consumer goods research is downwards, compared to other research in other industries. The market research sector employs over 23 000 permanent employees and over 100 000 interviewers. The outlook for this sector points to continued growth.

Description of the sector

Market research is covered by NACE category 839.1, but is distinct from management consultancy.

Marketing research consists of analysing the markets for products and services of all kinds. It identifies the links between consumers, customers, the general public and the market and is used by marketeers to:

- identify opportunities, threats and problems,
- initiate, modify, evaluate and monitor marketing activity,
- improve understanding of marketing processes.

It enhances economic efficiency by enabling companies and other organizations to provide the goods and services that customers want, by investigating their needs, beliefs and behaviour, rather than see companies waste resources in developing and producing what is not wanted or communicate the benefits of their goods and services inadequately.

Social and political issues have also long been covered by market research, which has thus come to play an important role in the democratic process.

As an activity based firmly on the application of such aspects of scientific method as hypothesis generation and testing, experimental design and the use of statistical and sampling methods, market research combines many elements of academic rigour with the characteristics of both a profession and a key sector of the business services industry.

Current situation

In 1988, the market research market was ECU 1.66 billion in the EC for 36% of the world-wide expenditure on market research.

Table 1
Market research markets, 1988

	Turnover (million ECU)	%
Belgium	53	3
Denmark	26	2
FR of Germany	375	23
Greece	10	1
Spain	76	5
France	323	19
Ireland	11	1
Italy	207	2
Luxembourg	1	N/A
Netherlands	116	7
Portugal	8	N/A
United Kingdom	452	27
EC 12	1 658	100
Other Western Europe	200	4
Western Europe	1 850	40
USA	1 780	39
Japan	420	9
Other	550	12
World	4 600	100

Sources: Esomar; national trade associations and PR societies; Advertising Age; Context.

There are well over 1 000 market research companies and consultancies in the EC, including the headquarters of several of the world's largest. Additionally, two of the world's three major market research chains (networks of independent companies) have their headquarters in Europe.

Although there are a few major players in the EC, the industry is, nevertheless, characterized by considerable fragmentation and intense competition. Barriers to entry are low except in the high tech/high investment areas of market and media measurement (around 35% of total market research expenditure). Pre-tax margins have historically been modest (an average of around 5 to 6% on turnover for *ad hoc* research organizations) and perhaps a little higher more recently. Substantially higher margins have been earned by research companies with multi-customer services and a contractual customer base.

Table 2
World top 10 market research companies, 1988

Research company	Turnover (million ECU) (1)	Countries with office	Head office	Ownership
1. A.C. Nielsen	748	28	USA	Dun & Bradstreet, USA
2. IMS International	306	42	UK	Dun & Bradstreet, USA
3. Arbitron/SAMI/Burke	272	2	USA	Control Data Corp, USA
4. Pergamon AGB	173	21	UK	Maxwell Foundation (2), UK
5. IRI	110	4	USA	Public Company, USA
6. GfK	98	15	D	Public Association, D
7. Research International	88	20	UK	WPP Group (3), UK
8. Video Research	68	1	J	Public Company, J
9. MRB Group	64	7	USA	WPP Group, UK
10. Infratest Burke Group	61	7	D	Private Company, D

(1) Excluding associates.

(2) Registered in Liechtenstein.

(3) Acquired the Ogilvy Group, the previous owners, mid-1989.

Sources: main research companies; Advertising Age; Esomar estimates.

Traditionally, manufacturers of consumer packaged goods were the main buyers and users of market research. In recent years, a much wider range of businesses and non-commercial organizations (including public sector and government) have used market research to help their decision-making. In the consumer area, companies which market services (finance, leisure, etc.) have become a sector of growing importance to market research suppliers.

The market research market has been growing rapidly since the 1950s, when it first became firmly established in Europe. Its origins date back to the 1930s and earlier. Only the oil crises of the mid and late-1970s caused some temporary stagnation. While hard figures are difficult to produce on a pan-EC basis (particularly since the distinction between market research/information, marketing consultancies and related disciplines are increasingly blurred), the past five years have probably seen annual real growth in excess of 10%. Broadly, the most rapid growth has been in Southern Europe (20% or greater), particularly in Spain and Italy and, to a lesser extent, the UK. Growth has usually run well ahead of inflation in the Northern European countries too.

There are no signs of a deterioration of this situation yet, while developments associated with the single European market/1992 will probably reinforce the growth trend.

Industry structure

The market research product can be classified on the basis of the type of client and type of study performed.

The manufacturing industry (particularly consumer products) still dominates the client portfolio, as Table 3 shows.

Table 3
Source of revenue for EC market research organizations, 1988

	%
Manufacturers	53
Service industries	15
Advertising agencies	8
(Quasi-) governmental	6
Retailers/wholesalers	4
(Other) research organizations	4
All others (including media owners)	10

Source: Esomar.

The most complete time series comes from annual studies organized by the Association of Market Survey Organizations in the United Kingdom, but one would generally expect the trends shown to be mirrored elsewhere in the Community. Their studies show that expenditure on consumer-goods research has declined (relatively) from 52% of total expenditure in 1982 to 40% in 1988. Within this expenditure category, the decline appears to be almost entirely due to the fall in research expenditure on food and drinks (from 23% to 16%), household products (from 6% to 2%) and tobacco (from 4% to 2%) with the other consumer goods sectors (health, beauty aids, durables and alcohol) remaining more or less constant.

Over the same period, market research expenditure by other clients, outside the consumer goods sector, increased from 48% in 1982 to 60% in 1988. Here, the upswing was due to increased spending by the media

sector (from 5% to 10%) and public and financial services (from 4% to 12%).

Among its main users in the EC, market research can be roughly split into two-thirds consumer research and one-third all other types of research (this excludes research conducted 'in-house' by marketing companies and other 'user' organizations or by non-commercial organizations, which may lead to an under-representation of non-consumer research).

Market research in the form of continuous measurement (consumer panels, retail audits and distribution/price checks) accounts for well over one quarter of all expenditure, with a further 15% being allocated to other forms of continuous or regular measurement such as advertising tracking.

Accordingly, altogether, over 40% of the research budget of these major corporations is earmarked for predominantly ongoing contractual services, leaving around 60% for *ad hoc* or custom projects. Consumer quantitative studies (24%) and qualitative research (17%) (i.e. group discussions and depth interviews) account for most of these.

Information on the six main categories of research bought by the major EC research buyers shows that usership, attitude studies and product testing head the budget-allocation list.

Various forms of advertising research (development, evaluation and tracking) account for another large block of expenditure as do the continuous market measurement services of retail audits and consumer panels.

Table 4
Number of research organizations in EC member countries, 1988

Belgium	23
Denmark	15
FR of Germany	80
Greece	11
Spain	18
France	54
Ireland	5
Italy	52
Luxembourg	2
Netherlands	41
Portugal	7
United Kingdom	87
EC	395

Source: Esomar Directory.

NB: Only those with full listing in Esomar Directory; total number in EC well over 1 000.

Not only is there a wide range of research suppliers that clients can select from in EC countries (see Table 4), but this buyer power is also well exploited because buyers usually employ more than one institute on a regular basis.

Trade

Over 90% of EC market research is conducted by research organizations for local (national) clients, although these are frequently subsidiaries of multinational corporations (both Community and foreign-domiciled). Subcontracting to foreign research organizations when coordinating international (single or multi-country) studies accounts for around 5% of research companies' business.

Table 5
External trade, by value

(%)	Client origin for EC research organizations		Subcontracted by research organizations to foreign research suppliers
	National	Foreign	
Denmark	70	30	5
France	97	3	4
Ireland	85	15	2
Netherlands	88	12	N/A
United Kingdom	92	8	6

Source: Trade associations and estimates.

There are no hard data either on the source of foreign clients or the destination of subcontracted revenues. However, industry reports suggest that the proportion of intra-Community research is increasing.

Employment

The market research industry in the EC has over 23 000 permanent employees and offers freelance employment to over 100 000 interviewers, as well as freelance qualitative researchers, data-processing bureaus and other self-employed consultants and subcontractors.

Formal training is particularly well developed for graduate client-service executives and beginning interviewers, who are well provided for in terms of skill-acquisition programmes of short duration. Some of the major research companies run their own graduate trainee programmes, as well as more senior courses. Esomar, national societies and specialist market research associations offer a wide range of training and experience-sharing courses and sem-

inars at all levels, covering research in many business sectors.

Table 6
Employment in EC market research industry, 1988

	Permanent employees	Freelance interviewers
Belgium	900	1 000 to 5 000
Denmark	500	1 000 to 5 000
FR of Germany	4 900	more than 30 000
Greece	400	1 000
Spain	1 200	1 000 to 5 000
France	3 700	10 000 to 20 000
Ireland	200	1 000
Italy	2 100	10 000 to 20 000
Luxembourg	10	less than 1 000
Netherlands	2 200	10 000 to 20 000
Portugal	400	1 000
United Kingdom	6 700	more than 30 000
EC 12	23 200	more than 100 000

Source: Esomar Directory and estimates; trade associations.

As a service industry that has only really developed since the 1950s, there are few, if any, employment prejudices or restrictive practices. Many people in their thirties and forties are in senior positions. Women are found in roughly equal numbers to men at all professional levels and are involved in the senior management of many research organizations.

Investment

In a predominantly 'people' business, capital investment has historically been a relatively insignificant component, apart from the continuous research sector. The main exception has been the computer equipment that major research companies have bought or leased, particularly from the late 1960s onward, revolutionizing market research.

More recently, the advent of micro-computers has reduced the competitive advantage of the major companies, as small research firms can also afford ECU 1 000-2 000 for a powerful PC.

Changes in data-collection methods have, however, increased investment needs. In particular, computer-aided interviewing (especially by telephone) has involved the commitment of substantial sums to the installation of facilities typically comprising 20 to 100 telephone booths with appropriate telecommunication and computing equipment.

In the continuous research sector, single-source data from panels that record product purchase and media exposure have required considerable investment in scanning devices, 'people meters' to record televi-

sion viewing and other expensive electronics. Data thus derived (as well as data from other sources) are increasingly forming part of computerized databases for marketing management information systems (decision support systems) — a further, significant investment.

Over the past decade, more European research companies in the *ad hoc* sector have begun to emulate American research firms in the standardizing and branding of research products. This, too, involves investment, although typically in the time of first-rate research technologists and innovators. Significant investment in designing, testing and validating new research techniques, and subsequent marketing investment in communicating benefits of these techniques to customers is only possible if the costs can be amortized by the application of the same techniques across many countries and over time.

Structural change

Market research is a young industry. Few companies were founded before the 1950s and many have started life in the 1980s.

One of the problems in defining the market for market research is that one and two-person research consultancy businesses spring up all the time, even in adverse economic conditions — as staff leaving major companies often immediately proceed to set up their own business.

At the other end of the spectrum, a number of mergers and acquisitions have been taking place — often as part of the creation of major marketing services corporations. This is illustrated by recent changes in ownership of the top 10 research companies operating in the EC, as shown in Table 7.

One effect of this development has been to reduce the level of American ownership of Community research businesses. Of the top 10 EC market research organizations, only the first two are now under non-EC ultimate ownership.

The other major structural-change process is horizontal specialization. Increasingly, market research organizations throughout the Community are setting up specialist divisions or operating subsidiaries that concentrate on key business sectors (e.g. media, health care, automotive sector, finance, industry) or research specializations/problem areas (e.g. qualitative, advertising). Up to 10 or more such entities can be found in many of the larger full-service market research companies in the EC.

Vertical integration has always been a feature of the European market research industry. All but the smallest companies have combined a client service function with a data handling 'facility' (data collection, preparation, processing and printing). However, there are signs that this vertical integration is beginning to be questioned by some companies, especially where personal interviewing fieldwork is concerned. The US market has long been characterized by an ownership separation of research companies from fieldwork suppliers.

Geographic features

The gross structure of the market research industry is remarkably similar across the Member States. Generally, the market can be split into three parts:

- Market and media continuous measurement,
- *Ad hoc* research by multinational research companies,
- *Ad hoc* research by local, unaffiliated companies.

There is, however, something of an evolutionary, maturing process in any given market. When a national research market is first developing, there is heavy reliance on omnibus studies, brand barometers, qualitative and small-scale quantitative research.

When a critical level of marketing activity is achieved, there is a quantum change in which a retail audit and/or consumer panel (together with media research services — especially television audience measurement) are established. These syndicated con-

tinuous services, generally offered by one or two dominant suppliers, then claim a significant proportion (often 50% to 60%) of investment in market research. This leaves relatively little for the *ad hoc* research sector, which is more geared to problem-solving and the identification of opportunities.

When a market reaches a certain size and stage of maturity, an equilibrium sets in, in which continuous research captures about one-third of total expenditure. Other regular services (e.g. advertising tracking, quality-of-service monitoring) can then add a further (semi-) contractual sector, partly substituting for *ad hoc* studies and partly reflecting overall growth in the market-information market.

Other geographic variations stem from broader economic and marketing influences. In smaller countries, less research on new product development is undertaken as the major R&D activities and corporate headquarters are located elsewhere. This leads to more research involving the screening of concepts, products or communications approaches that have been developed and more thoroughly researched in the larger EC markets.

Market research has developed from consumer marketing origins and tends to be relatively less widely used in those countries where the emphasis is more on industrial products. There have been different patterns in the post-war evolution of markets and of marketing. Restrictions on television advertising (and, hence, related research) in a number of countries have also contributed to this differential use of market research across the Community, as have the varying levels of retail trade concentration (broadly, more concentration in the north than in the south).

Table 7
Top 10 market research organizations in the EC, 1988
Recent changes of ownership/mergers

Research company	EC market research turnover (million ECU)	Acquired by/merged with
1. A.C. Nielsen	240	Dun & Bradstreet, USA, 1984
2. IMS International	127	Dun & Bradstreet, USA, 1988
3. Pergamon AGB	100	Maxwell Foundation, UK, 1988 (acquired AGB Research)
4. GfK Group	88	no change (public association), D
5. Research International	60	The Ogilvy Group, USA, 1987
6. Infratest/Burke	56	WPP Group (acquired TOG), UK, 1989 Infratest acquired Burke in Europe, D in 1980 (Infratest is private corporation); proposed merger with Inter/View (NL) abandoned in 1988
7. Cecodis	42	no change — closely held corporation, F
8. MRB Group	25	WPP Group (as part of JWT — previously US owned — acquisition), UK, 1987
9. Taylor Nelson/MaS Group	25	Addison Consultancy, UK, 1986
10. NOP Group	20	MAI, UK, 1989

Sources: major research companies; Esomar estimates.

The overall effect of these, and other, factors is that, compared with the level of economic activity in the country, the market-research market is particularly well developed in the UK and the Netherlands and somewhat less so in the FR of Germany and France.

Table 8
Shares of EC Member States (1)

(%)	Market research expenditure	Advertising expenditure	Gross domestic product	Population
Belgium	3.2	2.5	3.3	3.1
Denmark	1.6	2.0	2.4	1.6
FR of Germany	22.6	24.0	26.2	18.9
Greece	0.6	0.6	1.1	3.1
Spain	4.6	9.1	6.7	12.0
France	19.5	16.2	20.5	17.2
Ireland	0.7	0.5	0.7	1.1
Italy	12.5	12.2	17.7	17.7
Netherlands	7.0	6.5	5.0	4.5
Portugal	0.5	0.6	0.8	3.2
United Kingdom	27.3	25.8	15.7	17.6
EC 11	100.0	100.0	100.0	100.0

(1) Except Luxembourg.

Source: Esomar, *Context* newsletter.

There is considerable cost and price variation between the EC countries, largely reflecting differences in salaries and social costs.

Table 9
Price variation across EC countries, 1988

	All <i>ad hoc</i> market research (average of six categories)	Quantitative studies (average of four categories)	Qualitative studies (average of two categories)
Belgium	76	77	74
Denmark	105	101	114
FR of Germany	129	136	115
Greece	55	59	48
Spain	96	97	94
France	120	114	131
Italy	123	127	117
Netherlands	94	85	112
United Kingdom	98	95	106
EC 9 average	100	100	100

Source: 1988 Esomar study of market research prices.

Other factors include:

- degree of competition in local market,
- the enhanced efficiency that comes with greater experience in certain types of research,
- mix of research and data collection methods,
- geographic dispersion of population.

Price indices, around an EC mean of 100 (for the nine countries surveyed), are shown in Table 9.

Outlook

The growth rate of about 10% in recent years across the Community as a whole, will continue (although perhaps more slowly) with the possibility of lower growth in the FR of Germany and the Netherlands, which will be more than compensated by the strong surge in southern Europe (particularly, in absolute terms, in Spain and Italy).

The increased demand for market information resulting from (potential) client companies addressing the 1992 situation will add to this underlying momentum.

There are also a number of industrial and commercial sectors that have only recently started using market research systematically (e.g. finance, retail and utility sectors). They will be likely to add further impetus to market growth.

A recent study among the biggest buyers of research in Europe suggests that expenditure on most types of market research is likely to increase rather than decline over the next five years. This will be markedly so in the case of such main areas of research activity as usership and attitude studies, product testing, advertising and concept development and evaluation, customer satisfaction and (ad) campaign tracking.

However, there are some warning signs for consumer panels and retail audits.

Table 10
Growth in total market research expenditure

Users' estimations	Past five years (%)	Next five years (%)
Much above inflation (+5)	36	21
A little above inflation (+4)	36	42
About the same as inflation (+3)	19	26
A little below inflation (+2)	6	10
Much below inflation (+1)	3	1

Source: Esomar client study.

Formal forecasts of total market research growth are rare although AMSO, the main British market-research trade association, has forecast a growth of 12% in 1989.

Esomar: European Society for Opinion and Marketing Research.

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INDUSTRIAL CLEANING SERVICES

(NACE 501.5, 921, 923)

Summary

Contract cleaning services is one of the lesser known sectors of the service industry. It represents a market of some ECU 13 billion in the Community and is experiencing expanding demand in most Member States. Around one and a half million workers are employed in the sector. Cleaning has become the business of specialists with increasingly sophisticated technical and organizational skills based on computers and with recourse to more efficient equipment and cleaning products.

Description of the sector

The service activity dealt with in this chapter consists mainly of the cleaning, by specialized firms, of the inside and outside of buildings of all kinds, whether used for industrial or commercial purposes, for offices or by public authorities (schools, hospitals, etc.). Closely linked services such as cleaning of furniture, of effects (textiles), of public spaces, tidying around buildings and general sanitation services are also included but not activities such as gardening and painting.

Contract cleaning broadly corresponds to section 92 of the NACE classification defined as 'Cleaning services' such as window cleaning, chimney sweeping and units specialized in cleaning industrial, commercial and government premises. Most large firms in the sector also sell some of the services which come under NACE 921 covering sanitary services (refuse disposal, disinfection, fumigation, trash and waste collection, restoration after disasters, etc.). Cleaning (but not restoration) of exterior walls of buildings classified under 501.5 is also covered as well as hire of clean towels and industrial clothing (NACE 981). On the other hand, personal services such as those offered by laundries and launderettes, dry cleaning, pressing and dyeing of clothing are not normally part of the activities of contract cleaning firms and are therefore not covered.

Current situation

Some firms have specialized market niches and larger companies tend to set up separate divisions to cover specific services such as those rendered to

nuclear plants, semi-conductor manufacturers (rooms with controlled dust levels), etc.

The demand for cleaning services is growing only slowly and is not cyclical although the overall level of economic activity will have some effect on total demand. Among the factors that influence this demand are rising standards of living with a related emphasis on quality of life, changes in methods of production (e.g. in relation to pollutive activities) and consumption (throw-away packaging), changes in occupational patterns (shifts from manual to white collar jobs), improvement in the quality of buildings and the ease of cleaning, improvements in cleaning technology, labour costs, etc.

Even if total requirements of cleaning only expand slowly, the demand for the services of general contract cleaning businesses has been growing, mainly due to the increasing contracting out of this service away from less productive in-house cleaning i.e. cleaning done by directly recruited part-time or full-time labour. Currently, in the more advanced economies, companies and even public authorities in search of improved cost efficiency increasingly contract out of their cleaning services to specialists.

Consumption trends

The total EC market contracted out to cleaning firms is estimated at some ECU 13 billion, with each of the larger Member States accounting for some ECU 2 billion. The growth in demand for these services has been rapid, but recently the pace of progress has slowed in some Member States. In the Federal Republic of Germany, the turnover of contract cleaning firms quadrupled between 1970 and 1986; in France the rise has been 6 to 10% per annum. In Belgium, after a long period of rapid growth, in recent years there has been some stabilization in the market, partly due to cost-cutting policies of client firms. No figures are available for other Member States such as Italy or Spain, but available indications show a rapidly expanding demand.

Cleaning firms now account for over 40% of the total cleaning market in Belgium and France — compared with 25% in 1970 — with widely ranging percentages for the various market segments. In France, contract cleaning covers 82% of the market for large

retailers, two-thirds of real estate, transportation, financial establishments and food industries, and about half of the hospitals. Of total demand, about half is accounted for by commercial and administrative premises. In the UK, private contractors cover something like 20 to 30% of the total market.

The major clients of this service industry are the public authorities at all levels, which use contract cleaning firms for their buildings and equipment such as schools and universities, hospitals, airports, museums and cultural centres, railway coaches, etc. Other important customers are industrial, commercial and service companies. In the economically more advanced Member States (with the exception of the United Kingdom) a large part of the cleaning market of such activities is already contracted out; in the other Member States there is still much greater scope for the expansion of the activities of cleaning firms since in-house cleaning remains the rule at present. In Spain, for instance, only 10% of hospitals, shopping centres and administrative entities resort to outside help for their cleaning. The British Institute of Cleaning Science has estimated that in the UK, roughly one-third of the total demand for cleaning comes from the private sector and two-thirds from the public sector. Private contractors are estimated to cover over half of the private market but a much smaller proportion of the public sector market. The situation has been changing over the last few years as the UK Government has obliged some of the public authorities to tender for cleaning and related activities such as refuse collection, ground maintenance and laundering (e.g. in hospitals). In Belgium, public authorities of various kinds represent about 40% of the contract cleaning market.

Structural changes

The cleaning service industry is characterized by a few very large companies, mostly multinational groups, some medium-sized companies and a vast number of small firms. This partly atomistic structure is probably due to the fact that entry into the business is relatively easy and requires little capital.

In the northern part of the Community, including France, there has been a trend towards concentration mostly through acquisitions, less frequently through mergers. In the south (Italy, Spain, Portugal, Greece), large firms are still few, but an evolution is taking place. Although in the Community overall, the vast majority of firms are still small, there is a tendency towards reorganization and polarization; the number of medium-sized firms seem to be dimin-

ishing, whilst the number of small and large firms is increasing.

Table 1
Cleaning services, 1987

	Number of enterprises	Turnover (million ECU)	Employment	Hourly work cost (ECU)
Belgium	2 564	375	27 787	9.9
Denmark	3 645 (1)	349 (1)	20 000	10.3
FR of Germany	13 878 (2)	3 843 (2)	400 000	9.6
Spain	3 900	1 825	160 000	5.3
France	6 513	2 164	160 247	7.7
Italy	8 784	1 964	350 000	11.1
Luxembourg	16 (1)	17 (1)	1 282 (1)	5.4
Netherlands	2 100	721	110 000	8.7
Portugal	120	47	12 000	1.3
United Kingdom	3 840	1 723	250 000	3.8
EC 10	45 360	13 028	1 491 316	

(1) Data for 1985.

(2) Data for 1986.

Source: Eurostat; FENI.

Geographic features

In France, two-thirds of the firms employ less than six workers, one-quarter between six to 50, and one-tenth over 50 workers, with a few companies employing over 1 000 workers. The largest firm (ONET) has 24 000 employees working on cleaning jobs inside the country. Small enterprises, although numerous, only cover a small part of the total market. The number of firms (and artisan entrepreneurs) is still rising (70% over the last 10 years). In the UK, the situation is similar. The four largest companies account for close to half the domestic market. The 10 largest together employ over 100 000 persons, i.e. almost half of the total workforce in the sector; one group (OCS) has over 35 000 employees in the UK. In the Netherlands, six large firms cover almost three-quarters of the market; while in Belgium, roughly half of the workforce in the sector is employed by fewer than 10 companies with five firms sharing over half of the market.

In Italy and Spain, the concentration process is less advanced and the number of firms still rising. Close to 90% of the contract cleaning enterprises in Italy are small or medium-sized, and mostly family-owned; fewer than 50 companies employ over 200 workers. In Spain, there are even fewer large firms.

Large cleaning companies are increasingly multinational with business outside the national market representing a significant part of their sales and profits.

Since cleaning has to take place *in situ*, there is no scope for cross-border trade in contract cleaning and the activity therefore takes place through foreign establishments. In the UK, for example, Hawley Group Ltd, the largest cleaning firm, was acquired by the US group ADT in 1987. At the time of this acquisition, the British group derived 80% of its sales from overseas and a large part of its profits from North America.

Large companies have been diversifying into additional associate services in order to make best use of their technical and organizational expertise but with the correlative danger of a loss of direct contact with the client. Multi-services for buildings, as they are called, include security services, energy-saving services, building repairs and even building transformation ranging from the renewal of walls, ceilings and ground covering to carpet refurbishing and applied software for cleaning. General Office Maintenance (GOM), active in Benelux countries in cleaning and a host of other related services, is adding a specialized unit for building transformation and renovation, providing all that is necessary to modernize buildings (but not painting) through its 'Breijer Construct' subsidiary. Another subsidiary, Teleguard, manufactures electronic custodial services providing building security equipment.

International Service Systems (ISS) from Denmark, probably the largest cleaning company in the world, is active all over western Europe and in the western hemisphere. With 83 000 employees and 53 subsidiaries (not all in cleaning), spread across 15 countries, it is constantly extending the range of its activities. Its overall turnover comprises one-third in Denmark, one-third in the rest of western Europe, and the remainder in the US and Brazil. The German company Pedus cleans offices in Brazil and provides city cleaning in Saudi Arabia and the Gulf States. In Belgium, the top five companies are multinational (Dutch, Danish, American and French).

As many firms are involved in a range of activities going well beyond cleaning, company data, where available, often do not distinguish those related to cleaning proper, even when they furnish some disaggregation of results. This segmentation, depending on the convenience of the firms, can vary from year to year.

Cost structure

Approximately four-fifths of the total costs of cleaning firms represent wages. The rest comprises cleaning products, machines, transportation equip-

ment (vehicles), administrative costs — including telecommunications, computers — and profits (a net 1 to 4% of turnover). Equipment and purchase costs of outside services represent some 10% of turnover. Next to cost of office premises, the other heavier outlays are vehicles, cleaners and scrubber-polishers and computers with specialized software for managerial and accounting purposes.

Table 2
Major firms in the Community

Belgium	Cemstobel (+ Roeske) ISS Servisystem Belgium TSI (Temco, Euroclean, Oneg, Perlav, Asso)
Denmark	ISS
FR of Germany	Pipenbrock Pedus
Spain	Taski Johnson
France	Onet Abilis General Service France Entreprises Ferroviaires
Luxembourg	Pedus
Netherlands	Hodon (Cemsto + De Zon + Kord, etc.) Hago GOM (General Office Maintenance)
United Kingdom	OCS Group Ltd ADT (Hawley Group including Pritchard Services Ltd, Provincial Home Counties and Mediclean)

Source: ESIF.

Contract cleaning is not capital intensive and the return on capital seems to be well above the industrial average. However, profit margins are low and under pressure because of intensifying competition.

Technological aspects

Contract cleaning, at least the cleaning performed by larger companies, has become a specialist business with recourse to sophisticated work patterns and techniques and modern equipment and cleaning products.

The input of equipment (macro-brushes, injection/extraction machines), of more efficient cleaning products, 'cleaning friendly' interior design and building construction patterns (new materials, more glass), is helping productivity. Robotization has begun and is expected to continue in future.

Productivity expressed in terms of m² cleaned per person/hour has been improving in recent years. According to some industry figures, performance for office cleaning in well-run businesses has gone up from some 100 m² per hour in the early 1970s to over

230m² in recent years and up to 500m² in specialized markets.

In France, a commission on the improvement of labour conditions has drafted a complete system of classification and labelling of cleaning products, a glossary of cleaning terms, and a handbook on vacuum cleaning. The modern requirements of cleaning in the construction of buildings were taken care of in a 1987 guidebook on recommendations for architects. The Danish firm ISS has created special interior designs which are easy to clean.

Competition has stimulated productivity, however, in some cases, it has unleashed a descending spiral of price and quality, with firms occasionally wanting to get a foothold in a market by quoting very low prices. To help monitor quality, the Dutch Federation for Cleaning Research has set up objective criteria to measure the quality of cleaning. Rigorous measurements of a scientific character are applied for some cleaning jobs, e.g. in computer rooms, chips and compact disc production facilities and surgery rooms in hospitals.

Employment trends

With four-fifths of costs representing wages, cleaning is a labour intensive activity. Employment in this business service sector of the Community, estimated at some one and a half million jobs, is rising rapidly in most Member States. In France, for example, employment increased by 50% over the last 10 years; however, in Belgium, growth was only 11% over the last six years, with a rapid increase in the proportion of part-time workers with relatively few working hours per week.

Increased employment mostly reflects the increased contracting out of formerly in-house cleaning (including the public sector). Thus total employment in cleaning activities has certainly not risen as much as employment in contract cleaning firms. With higher productivity and a slowly rising volume of cleaning, overall employment appears to be almost static. However, the shift to contract cleaning has been transferring workers out of the parallel economy into the formal one with an ensuing reduction in official unemployment and improvement in social conditions. There is a greater resort to contract cleaning in the economically more advanced regions of the Community, because externalization of services in general has proceeded faster. In Belgium and Spain, less than half of the employees are part-time workers; in Germany and Italy, this figure is close to three-quarters and in the UK four-fifths. In

Germany, part-time workers mostly work 10 hours or less per week since this is the threshold below which workers are exempted from social security and income taxation, with employers paying 10.7% for tax and social security. In the UK, half of the part-time female employees work less than 16 hours per week. Again, this is the threshold below which various social benefits do not accrue. On the whole, wherever possible, cleaning firms prefer to employ full-time workers because this tends to lower administrative costs, to reduce turnover of personnel and to improve the quality of the work.

Most part-time workers are female, over 90% in the UK, 75% in Germany and Italy and 70% in Belgium. In France 60% of the employees are female, with wide regional variations (50% in the Paris area, but over 80% in the Auvergne). In some Member States, there is a tendency for the number of male workers to increase, in particular for night work and specialized assignments (for example refuse collection).

The cleaning service industry employs some 60% of foreign workers in France and about 40% in Belgium; in the Netherlands this figure is close to 10%. There are of course wide regional variations. For example in Belgium, in the Brussels region, some 70% of the workers are immigrants compared with only 5% in the Flanders region.

Managers, professional and clerical staff including supervisors can be estimated to represent some 2 to 4% of employment in contract cleaning firms.

Social conditions and salaries

Even if not the lowest paid category of workers, cleaning is amongst the poorly remunerated occupations. Female workers tend to earn even less.

In Germany, Belgium, France and Italy, social conventions are negotiated between employers and labour unions. In Germany, this is done on a regional basis, with wage levels varying according to regions. Wages are about ECU 4.7 (DM 10) per hour for interior cleaning, whilst specialist cleaners earn around 40% more. In Belgium, 90% of workers are affiliated to labour unions. In France, the conventions have set up a national classification of types of jobs which takes into account levels of qualification, minimum salaries, periodic adjustments, etc. Actual salary levels above the minimum are freely negotiated within individual firms. In 1986, a guarantee of job tenure for the majority of the workforce was negotiated in cases of takeovers of cleaning firms; this constitutes a barrier to takeovers. In Italy, the

social conventions are also regional and various types of cleaning tasks have been categorized.

Most of the contract cleaning is done in the evening or in the early morning. Offices of public authorities or of private companies where working hours start relatively late, can be cleaned in the early morning hours. Hospitals are cleaned during the day; for factories the situation varies.

Training and education

As in all service industries, human resources are the key element and the most decisive competitive asset. Large companies are therefore devoting effort and resources to training and educating their employees, both the actual cleaners and the managerial and operational executives. In a number of Member States this is done in collaboration with the public authorities (France and the Netherlands), or with the assistance of national cleaners' federations (Belgium). Germany has well-known schemes for apprenticeship; in addition, organized training courses lead to a degree allowing graduates to set up contract cleaning firms. In France, the national federation of cleaning firms set up the 'Institut National de l'Hygiène et du Nettoyage Industriel' (INHNI), which collects a levy of 1.7% on salaries and organizes training and education in collaboration with the Ministry of Education. There are several curricula which lead to various types of officially recognized qualifications as well as

schemes for periodic improvement of these qualifications. In Denmark, the company ISS has created a special institute for training through lectures, seminars and conferences. In Italy and Spain, as yet there is no official or systematically organized training.

Outlook

Contract cleaning is a dynamic service industry which can be expected to continue to grow rapidly. Even in the economically more advanced Member States, only slightly above one-third of the general cleaning work is at present being contracted out, thus leaving plenty of scope for further expansion, particularly in the public sector. The net job-creating effects are not likely to be substantial but workers joining cleaning firms may thereby be brought into the formal economy.

Among the difficulties which contract cleaning firms encounter in their operations, the most frequently mentioned are: high turnover of personnel, shortage of qualified workers in urban areas, heavy tax regimes and social regulations. As the quality of actual cleaning performances is not easy to assess, there is a tendency towards fierce price competition with adverse consequences on quality of cleaning and profit margins.

Edited by DRI/Europe based on information published in *Panorama of EC Industry 1989*

SECURITY SERVICES

(NACE 839.3)

Summary

The private security services sector is not yet covered by the NACE classification system. Hence, all the data presented in this monograph are from the professional association itself. In 1988, this sector realized a turnover of ECU 6 280 million in the EC excluding Ireland, and employed about 290 000 persons. Manned security services are the prime source of revenue for security firms, followed by installed alarm systems. Growth prospects are excellent since security services are expected to be more widely used in many sectors of the economy.

Description of the sector

At present, the security services sector is not defined as such in the NACE classification system. Public security organizations are covered by NACE category 913 'Public security', but this excludes private organizations.

Industrial and commercial private security services, as described in table 1, could be defined as follows. Traditional forms of security services consist of the installation of locks and safes, the provision of sur-

veillance guard patrols, and store detective services (permanent and mobile). The main risks protected against are theft, water damage, vandalism, arson and many other kinds of hazards. The manned service concerns mainly administrative and commercial buildings and plant facilities, but it also extends to the provision of security at public gatherings or sports events and of bodyguards for the protection of persons.

From activities such as armoured car transportation of cash and valuables such as fine art, security companies have branched out into supplying various services to banks including counting and packaging of banknotes and coins, and security of air and sea transport.

In addition to the above-noted 'manned' security services, security and safety are increasingly making use of a host of electric, electronic and other devices. This equipment competes with manned services in the same market. However, it calls for installation, maintenance, operation and surveillance and thereby stimulates employment. In addition, all these services not only help to control the access to buildings and fire and water hazards, but are also used to monitor the utilities in buildings such as

Table 1
Turnover and employment of surveillance agencies, 1988

	Turnover (1 000 ECU)					Employees
	Total	Manned services (1)	CIT (2)	Alarms (3)	Miscellaneous	
Belgium	109 598	109 598	N/A	N/A	N/A	6 000
Denmark	134 102	46 581	N/A	81 453	6 068	3 400
FR of Germany	965 812	965 812	N/A	N/A	N/A	60 000
Greece	13 150	5 479	1 918	5 479	274	1 900
Spain	945 512	491 667	94 551	340 384	18 910	41 100
France	961 008	494 637	211 987	211 987	42 397	60 000
Italy	1 275 834	621 560	N/A	654 274	N/A	30 000
Luxembourg	1 636	879	229	482	46	845
Netherlands	256 411	98 291	42 735	98 291	17 094	6 075
Portugal	74 358	74 358	N/A	N/A	N/A	11 000
United Kingdom	1 542 736	427 338	493 675	478 248	143 475	70 000
EC 11	6 280 157	3 336 200	845 095	1 870 598	228 264	290 320
EFTA	1 024 211	606 533	N/A	417 678	N/A	32 400
USA	10 256 410	5 128 205	854 701	4 273 504	N/A	N/A
Japan	4 387 009	2 646 154	314 530	1 426 325	N/A	131 700

(1) Manned services include beat (mobile) patrolling services and static (permanent) guarding services.

(2) CIT include transportation of cash and valuables in specially built vehicles.

(3) Alarms figures shown represent value of alarms installed only by LISS members.

Source: LISS

heating and ventilation and industrial processes (refrigeration temperature). A number of such systems are described below.

Access control, intruder detection and fire alarm systems with closed-circuit television (CCTV) and perimeter lights are offered with appropriate software to drive them. Access control devices consist of modular solutions ranging from cheap single-access systems to networks of numerous gates, all monitored and controlled by a host computer, which simultaneously collects and analyses management data and monitors building services.

The larger security companies have set up central alarm communications stations, which allow them to monitor and respond to alarms in their customers' buildings, whose premises are equipped with devices designed to detect or react to various hazards, intrusions, environmental conditions or industrial operations. Each device is connected by telephone line to the central station, which is permanently staffed. Links with mobile surveillance units, local police or fire units accelerate intervention. Some such stations have over 40 000 connections.

Retail stores are being equipped by security firms with devices to prevent shoplifting, back-door and staff theft. Retailers are spending heavily on services such as CCTV and electronic article surveillance (EAS), by which magnetic or radio transmission security tags are affixed to goods. This sector is now growing at over 20% per year in most Member States.

So-called social alarms are being installed with the help of local authorities and social services to serve as emergency communication for the elderly and the sick in the event of accident, sudden worsening of health, etc. This is a rather recent development which is expected to spread in future due to the ageing of the population and the need to contain rising hospitalization costs by developing home care.

The most recent and sophisticated area of security service is data security, which aims at protecting data on electronic files or during transmission — including electronic movement of funds throughout the network — against 'hacking' (i.e. unauthorized access) and fraud. The protective devices against computer crime range from the most simple 'ignition key systems', coding and control of access to computer and storage premises against intruders, to sophisticated data encryption systems with special software, anti-radiation and radio-interference, call-back telecom systems. Some firms such as Analytical Instruments of Cambridge specialize in preventing unauthorized access through, for example, the development of entrance codes and signature checking

systems. Others specialize in the safe storage of computer tapes.

Some security companies carry out sweeps of premises for firms concerned about bugs leaking sensitive information. These companies also sell secure telephone systems.

Whilst all security firms naturally offer advice on security matters in the course of their business, some firms specialize in counselling services with respect to the design of security systems, both procedural and physical, even at the stage of planning building of plants (in the UK, Control Risks Prevention Services). Others offer 'full protection packages' to business travellers, with information on risks (e.g. kidnapping) in different parts of the world as well as bodyguards and security awareness courses of executives (Shield International, UK; and Interseco, Netherlands). There are also companies specializing in consultancy on data security (the French company Matra, and in the UK, Guardata and the Racal-Chubb Group).

Whilst advances in technology have been helping to fight crime, as soon as a new security technology is found, criminals attempt to circumvent it so that the spiral continues. Notwithstanding the progress in the use of electronic security devices and in communication, the quality of security services continues to depend largely on the quality and integrity of personnel. This in turn requires exacting selection processes, training and supervision.

The clients of the security services industry can be divided into three broad categories:

- household/residential
- public/institutional
- commercial, including industry and services.

Up to a decade ago, many of these clients were providing security in-house; now, however, they are increasingly contracting out the security function to firms which have the experience, equipment and trained personnel. This ensures professionalism, helps to control costs, and avoids recruitment, training, supervision and overstaffing problems. It also helps companies to comply with public regulations where they exist and to meet insurance company requirements.

Current situation

The data presented in this monograph have been collected by the LISS amongst its members. Since this collection of data has only started recently, the chro-

nology is as yet limited. Furthermore, data for a number of countries are still missing, notably for employment.

Table 1 presents total turnover and number of employees for three different types of security services: manned patrol and guard services; transport services and installed alarm systems; miscellaneous services. Figures are presented for 1988 for each of the EC Member States, the European Free Trade Association (EFTA) countries, the US and Japan.

Total turnover for the security services sector in the EC (excluding Ireland) in 1988 is estimated by LISS (Ligue internationale des sociétés de surveillance) at ECU 6 280 million. The UK and Italy are the market leaders within the Community, certainly relative to the size of their economy in the EC.

Manned services are, in general, the most important source of revenue for security services firms, representing about 53% of their total revenue. In the EC, the 1988 turnover from manned security services is estimated at ECU 3 336 million.

Next in importance are installed alarm systems. This type of security service generated about ECU 1 871 million, or 30% of total turnover in 1988. However, in Italy and the UK, the turnover realized in the latter category actually exceeds the turnover from manned services.

Figures on turnover from transport and miscellaneous services are not available for all EC countries. But in general they represent less than 18% of the total turnover of security services firms.

Employment

The quality and integrity of the personnel engaged in the security services industry are naturally of paramount importance for ensuring effective security. Reputable companies therefore exhaustively check the history of prospective employees, whether destined for manned services or for installing and servicing security devices. Under the British BSIA vetting system for example, employment background is checked back for a full 20 years, or since leaving school, and applicants must give authorization to check all records.

Employment in the EC security services sector has been estimated at 290 000 persons in 1988. Detailed types of security service are not available at present.

Data for the EFTA countries and for the US and Japan are added for purposes of comparison. Relative to the size of its economy, the US is characterized by a deeper penetration of security services than the EC, even after the differences in the level of

criminality. This indicates that there is room for further penetration in the EC. The structure of services in non-EC countries is quite similar, with emphasis on manned services and alarm systems in second place.

Work conditions such as salaries, social benefits and duration of work are negotiated periodically between labour representatives and national federations of security businesses or, where such federations do not exist, with major companies which set pattern for the national security service industry. Such nation-wide conventions are negotiated in all Member States except Greece.

Regulatory environment

In a number of Member States, very strict rules govern the establishment and operation of security firms. Where such public regulations exist (Belgium, Denmark, Germany, Spain, France and the Netherlands), the Ministry of the Interior is responsible for their administration. The UK has opted for self-regulation of the industry rather than seeking control through legislation: private organizations such as the BSIA (British Security Industry Association) exercise regulatory functions under their own codes of conduct and standards with procedures for vetting and monitoring their members. In Greece, Portugal and Luxembourg no specific regulations apply to the operations of security companies.

At the international level, several multilateral organizations — in addition to promoting the collective interests of their members — aim at maintaining standards of competence and probity in the security industry. The Ligue internationale de sociétés de surveillance is the oldest and most representative of these organizations.

Since it is recognized that in modern societies governments cannot provide total protection against crime, individuals as well as private businesses and organizations have been encouraged to take sensible precautions to protect property and prevent losses. Conversely, the growth of the security services industry has induced the police forces of some Member States, hard pressed by rising crime and shortage of manpower, to relinquish some services which they previously offered to their citizens. For example, whereas originally intruder alarms were mostly connected directly to police stations, some Member States have decided not to allow this any longer. Hence the role of the private sector in providing security has been enhanced.

Links with other service industries

Insurance companies play a key role in the security industry, mainly by linking policy coverage and premium levels to the observance of specified conditions and standards. They advise their clients on the best course of action to prevent and limit loss or damage. Before writing certain policies, insurance companies now often stipulate that their clients take (and act on), advice from security before insuring against computer crime. Notwithstanding the close interlink between security and insurance premium, only very few insurance companies seem to have financial interests in the security services industry. One example is Assurances Générales de France which has a stake in the French company SPS.

Few security services companies — mostly only the older ones — have diversified into other services such as cleaning (notably of bank vaults, museums), and courier services. Group 4 Securitas International is one example; this company has courier services and cleaning activities in Belgium, Greece, Ireland and Portugal. It is much more common for other services to expand into the security business. The security company ISS (Denmark) diversified from cleaning into security and building management systems, which together now represent some 15% of its turnover; ADIA (Switzerland) diversified from temporary services into security; and Randon of the Randstad/Vedior Group (Netherlands) expanded beyond both cleaning and temporary labour into the security business.

Cost structure

Cost structures of security services firms vary according to the type of service provided. In the sector of guard personnel, over 90% of total costs are connected to labour (salaries and social charges). For armoured car transport, the breakdown is roughly 25% for vehicles, security and safety equipment, 10% for insurance and 60% for personnel. Costs of ensuring security of data are mostly related to hardware and software (access controls, security software and encryption devices).

In the economically more advanced Member States, average turnover per employee occupied in the more traditional security activities is around ECU 20 000 to ECU 25 000 per year. Even if salaries for guards

and patrolling personnel are rather modest in terms of overall wage scales in these Member States, they still seem to be higher than, for example, in the USA. The well-run European firms have attempted to improve their competitiveness through organizational and managerial skills which may place them ahead of their counterparts in the rest of the world.

Industry structure

Inside the Community, the leading firm present in practically all the Member States is Group 4 Securitas based in the Netherlands. It employs almost 10 000 people in 17 countries around the world.

Community firms maintain a strong position in home markets and a few have managed to gain a significant presence in world markets, mostly through direct foreign investment. Foreign firms only play a small part in the EC security services market but are strong in certain product lines (e.g. Japan for cheap CCTVs and the USA with pattern-recognition systems).

Outlook

The market for private security services is expanding rapidly in most of the EC countries. Originally started in the financial sector for the protection of high-value transports, bank buildings, etc., these services are now available in virtually every sector in the economy. Indeed, insurance companies often oblige their customers to engage private security services before agreeing to insure key buildings and high-value transports.

Comparisons with, for instance, the US show, however, that there is still considerable potential for development of security services to further penetrate the economy.

The development of security services is expected to continue at an annual increase of over 10% per year over the next few years, a growth rate well above macroeconomic growth in the EC countries and even above most other sector growth rates.

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TEMPORARY WORK SERVICES

(NACE 8393.2)

Description of the sector

The essential characteristic of this service is that temporary work businesses (TWBs) hire temporary workers and put them at the disposal of a third party (triangular relationship). It is essential in this setup that the workers receive their salary from the TWB but their work orders on assignments from the third party. Basically a TWB is a local business. Most companies operate through a network of local offices. The national federations of TWBs are organized internationally through the Confédération internationale des entreprises de travail temporaire (CIETT). Temporary work business has NACE code 8393.2 (Labour recruitment and provision of personnel).

History

Over the past four decades, temporary work service has progressively changed into a sophisticated, professional service industry providing instruments for labour management for profit as well as non-profit and governmental organizations. The industry, which has emerged relatively recently, has turned itself not only into the main tool for helping businesses to fill temporary shortages in their workforce, but also — since temporary workers often find permanent employment through their temporary assignment — into personnel recruitment advisers.

Temporary work serves a complementary, but key economic and social role in the labour markets where it is permitted. For the temporary workers, TWBs satisfy particular individual needs and preferences. Some people are able or willing to work for only part of the year. Others want to work only now and then, or simply prefer temporary work to steady, permanent employment. This last group, however, constitutes only a minor percentage of the total number of temporary workers.

For the client firms, the services provided by TWBs are of great value in coping with temporary labour shortages caused by the absence of permanent staff on holiday, because of illness or maternity leave. These services can also be of use in cases of sudden or seasonal increases in work, unfilled vacancies or reorganizations. For the client firm, the hourly cost of temporary labour may at times be higher than that

of permanent workers, but since temporary labour is usually resorted to for short, well-defined periods or for specific tasks, the cost is borne only for effectively supplied hours of labour. The alternatives (overtime or a permanent reserve of extra personnel) would be more expensive. TWBs bear the cost of recruitment, selection, payrolling, statutory social security insurance, etc.

In addition to the traditional pattern described, a growing number of jobless workers resort to TWBs to find temporary employment, often with the expectation of finding permanent positions at a later stage. It is now estimated that on average, well over one-third of temporary workers find permanent jobs as a result of temporary contracts. The actual proportion varies widely between different EC countries.

The ageing of the European workforce and the increase in the female component have also had an effect on the temporary work business. These developments have been associated with a greater desire for more flexible and temporary working arrangements.

Current situation

Legal situation

Organized temporary work is widely practised in the majority of the Member States. There are, however, considerable differences in regulation between EC countries. Two Member States, Greece and Italy, absolutely prohibit the operation of TWBs and the conclusion of temporary work contracts. In those countries where TWBs are forbidden, illegal practices are known to exist. In Spain, although TWBs are officially forbidden, they are tolerated in practice. Discussions are going on between the government and employers' organizations and trade unions about the possibility of legalizing temporary work businesses. There are two federations in Spain and the number of agencies is estimated to be over 200. In Portugal, regulations are being changed and may result in a more liberal climate for TWBs. Several multinational TWBs have already opened offices in these two countries or are planning to do so.

Several countries restrict the use of temporary workers in one or more business sectors. Denmark main-

tains a general prohibition except for the commercial and administrative sectors. The Netherlands and the Federal Republic of Germany prohibit temporary work in some areas (blue-collar workers) in the building and construction industry. Belgium has the same rule for that industry as well as for furniture removal and storage. France maintains some limitations in sectors under medical surveillance.

A number of other restrictions and requirements are common to most regulations in Member States, the most important being:

- registration of TWBs;
- limitations on the conditions under which temporary work is allowed;
- limitations on the duration of contracts (from 3 to 24 months or no restriction);
- requirements for wage levels and social security conditions.

A summary indicating the degree of regulation is shown in Table 1.

Table 1
Degree of regulation

Liberal	Restricted	Prohibited
Belgium	Denmark	Greece
France	FR of Germany	Italy
Ireland	Portugal (1)	Spain
Luxembourg		
Netherlands		
United Kingdom		

(1) Specific regulation as per October 1989.

Sources: CIETT; Bakkenist Management Consultants.

Social and economic role

The importance of temporary work can be shown by two statistics. One is the number of people who gain

Table 2
Employment, 1988

	Number of people per year	Person-year equivalent	Person-year equivalent as percent of active population
Belgium	108 000	25 000	0.7
Denmark (1)	21 300	1 580	0.1
FR of Germany	250 000	69 000	0.3
Spain (2)	150 000	9 500	0.1
France	1 500 000	260 000	1.2
Netherlands	420 000	91 300	1.7
United Kingdom (2)	2 500 000	400 000	1.6
USA (2)	6 500 000	850 000	0.8

(1) Data for 1987.

(2) Estimates.

Sources: CIETT; Bakkenist Management Consultants.

valuable work experience through temporary work, thus increasing their chances of a permanent job. The other is the person-year equivalents of temporary work as a percentage of the person-years worked by the active population. Both of these are given in Table 2. From these figures it is possible to deduce that the TWB-market is best developed in the Netherlands, the UK and France. On the whole, it is estimated that over a million persons a day work through temporary agencies.

Turnover and growth

The temporary work business is growing in most countries. The estimated growth in turnover for the world market in 1988 was around 14% compared to 1987. Total turnover in the world is around ECU 27 billion. The total market for the EC is estimated to be around ECU 12.5 billion (approximately 45% of the world market). Most of the business is done in just five countries: Belgium, France, Germany, the Netherlands and the United Kingdom (Table 3).

Growth, however, varied greatly from country to country. Germany, France and Belgium showed the largest increase, whereas the Netherlands recorded only moderate growth. Only Denmark experienced a decrease in hours billed.

Market structure

The six largest TWBs in the EC are: Adia (CH), Blue Arrow (UK), BIS (FR), ECCO (FR), Randstad (NL) and Vedior (NL). Their estimated total market share in the EC is 35%. In the USA, where it is estimated that the four largest companies hold 30% of the market, the industry is only slightly more concentrated. TWBs of EC origin account for well over 80% of the EC market.

Three of the companies mentioned operate on a world-wide scale. In total, Adia operates in 20 countries, Blue Arrow in 32 and ECCO in 12. So far, Randstad and Vedior operate in EC countries only.

Many TWBs operate under more than one name in the same market. Some have the same management; others operate more or less independently. Franchising is known to be practised by Manpower and Adia.

A relatively new phenomenon is the emergence of cost-based government TWBs, notably in Belgium (T Interim) and the Netherlands (Start). They have gained a considerable share of the market. At the same time, their operation has proven to be benefi-

cial to the acceptance of organized temporary work in these countries, and thus to market size.

Table 3
Turnover per country, 1987-88

(million ECU)	1987	1988	Growth rate (%)
Belgium	363	470	29.5
Denmark	N/A	60	N/A
FR Germany	1 100	1 450	27.3
France	3 820	4 530	18.6
Netherlands	1 150	1 260	9.6
United Kingdom	4 050	4 650	14.8
EC 6	N/A	12 500	N/A
USA	10 900	12 600	15.6

Sources: CIETT; Bakkenist Management Consultants.

Cost structure

It is estimated that the wages of temporary workers represent between 70 and 80% of total turnover. The salaries of TWB staff in permanent employment represent another 7 to 10%. Other costs account for around 10% of turnover. Depending on the competitive situation in the country concerned, the profit margin before tax may vary from less than 4% to as much as 10% of turnover.

Number of establishments

The number of establishments can serve as a basis for market coverage calculations and concentration figures, as shown by Table 4. This table indicates clearly that TWB is the most concentrated in the Netherlands — far more concentrated than in Belgium, the second-ranking country in this respect.

Table 4
Data on establishments, 1988

	Number of establishments	Number of establishments per TWB	Active population per establishment
Belgium	327	4.2	12 900
Denmark	100	1.3	29 000
FR of Germany	1 486	1.2	19 000
France	3 610	3.9	6 700
Netherlands	1 220	11.9	4 900
Spain (1)	More than 200	N/A	69 000
United Kingdom	6 000	2.4	4 400
USA (1)	10 000	3.1	11 200

(1) Estimates.

Sources: CIETT; Bakkenist Management Consultants.

Market coverage in terms of active population per establishment is highest in the UK. Every TWB branch there serves 4 400 head of active population. Compared to the estimated 69 000 persons a branch office has to serve in Spain, this is quite a different figure.

Profile of temporary worker

• Type of work

The fields in which temporary workers fulfil their assignments tend to differ between countries. In Belgium, France and Germany, the majority of temporary workers are blue-collar workers. In the UK and the Netherlands, temporary workers work primarily in the administrative or commercial sectors, as in the USA.

Table 5
Temporary workers by sector

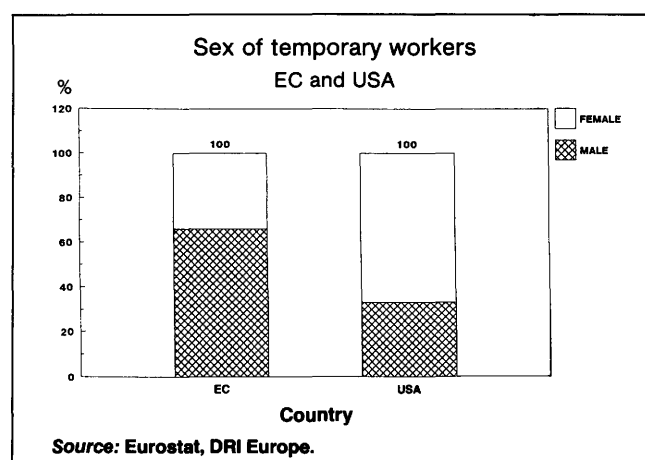
	D	F	NL	UK
Agriculture	N/A	0	1	0
Industry	78	51	35	24
Construction	0	24	4	24
Commercial services	22	N/A	51	50
Other non-profit making & governmental	N/A	N/A	9	2
Total	100	100	100	100

Sources: CIETT; Bakkenist Management Consultants.

• Sectors

In Germany and France, most temporary workers find employment in industry, whereas in the Netherlands and the UK demand is mainly from the commercial services (Table 5).

Figure 1



- Sex

Temporary work is male business in the EC: almost two-thirds of temporary workers are male. The only countries to deviate from this pattern are the UK and the Netherlands, where the proportions of male and female temporary workers are fairly equal.

The USA figures show exactly the opposite: almost two-thirds of the temporary workers there are female.

- Age

Temporary work tends to attract primarily those from a younger age group. In most countries approximately two-thirds of the temporary workers are under 30 years of age.

- Salary level

In most countries where temporary work is allowed, salaries tend to be equal to or higher than fixed contract salaries. In France, for instance, the TWB has to pay a temporary worker an insecurity bonus upon termination of each assignment. This amounts to at least 15% of total gross pay, or 10% if the agency renews the contract within three days of the expiry of the old one.

- Cross-border activities

Cross-border activities can take two distinct forms: a TWB hires a foreigner to work in the country where the TWB is established, or a TWB hires out a domestic temporary worker to a client abroad. To date, this type of activity has not played an important role in temporary work services. In a number of Member States, such as France and the UK, around 1% of temporary workers serve their assignment abroad. In the Netherlands, the TWB has to report any temporary assignment abroad within three days. Foreign assignments are to be found with oil firms, sea transport, health-care activities (Middle East), courier services, etc.

- Education and training

Most of the TWBs now provide education and training for their temporary workers. Typing courses, word-processing training and low-level technical courses are forms of training that figure regularly in their programmes. Specific training tailored to the individual or to the job is also common. In most countries, this training is paid for wholly by the TWB, with the exception of the Netherlands, where temporary workers also bear part of the costs involved.

Structural change

In the past years TWBs — and particularly the larger groups — have diversified into less related services such as security, contract cleaning and maintenance, language services, business information and financial services.

The present trend is more focused on efficiency and upgrading, while expansion is strongly geared to services related to personnel management and internationalization.

In their efforts to improve the efficiency of their operations and the quality of their services, TWBs are investing heavily in computer systems and networks.

The second trend (upgrading) is illustrated by the fact that many TWBs are shifting towards temporary workers with higher educational qualifications and more experience.

The major TWBs are expanding their businesses internationally. Internationalization not only takes place in EC countries — whether or not by acquisition — but also outside the Community, notably in the USA and the Far East (including Japan).

Expansion into personnel management areas is to be found in services such as personnel management for small and medium-sized enterprises, recruitment (including head-hunting) and training of personnel. This trend is triggered by the fact that the distinction between permanent and temporary employment is becoming less pronounced (the contract of well over one-third of temporary workers is turned into a permanent contract).

An emerging trend in the USA is 'employee leasing', i.e. leasing of a complete workforce. Growth rates of this type of service are thought to be between 30 and 40% per year. (1) In view of the differences between the social systems in the USA and the EC, a similar phenomenon is not expected to develop in the near future in the EC.

The impact of '1992'

A positive development can be expected from the mutual recognition of certificates of education. In those countries where temporary work is most highly developed, there tend to be shortages in some categories of personnel, especially those requiring

(1) AMA Management Review, April 1989.

higher qualifications. Once the certificates of education are recognized internationally, TWBs will in principle be able to draw from a larger pool of temporary workers to meet their clients' needs. How this will turn out in practice will largely depend on the geographical mobility of temporary workers.

The impact of the guidelines and regulations to be introduced in the course of '1992' is hard to estimate, since the members of the European Council have not yet reached agreement on the social covenant.

For the time being, national regulations will to a great extent determine further developments in temporary work services.

Outlook

The expectations for growth vary from country to country. Growth over 1989 is expected to be in the range of 15 to 20% in most countries with mature markets and could be even higher in countries with emerging markets, especially if less restrictive regulations come into force. In general, it is clear that the industry is heavily dependent on the growth of the

economy. Both economic recession and full employment tend to reduce turnover, which seems to thrive best in a climate of moderate or brisk general economic activity.

In those countries where TWBs are well developed, the most important growth sectors are to be found in high-tech industries such as robotics, informatics, biochemistry, etc.

Medium and smaller-sized enterprises are making more and more use of temporary workers at the moment and this trend is likely to increase in the future.

In those countries with a liberal regulatory regime, a shortage of qualified temporary personnel is becoming a major obstacle to growth. This shows the importance of education and training, which are now provided by an increasing number of TWBs.

Research concluded in July 1989 by Bakkenist Management Consultants, Amsterdam, The Netherlands.

CIETT: Confédération internationale des entreprises de travail temporaire
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EXPRESS SERVICES

(NACE 790)

Summary

An express industry can best be defined as the rapid, reliable, and carefully monitored, door-to-door transportation of time-sensitive hard copy communications parcels and commercial shipments. It is a highly competitive market servicing a wide range of commercial and industrial sectors within Europe and throughout the rest of the world.

The demand for express services has grown dramatically over the past decade. This growth has been accompanied by substantial developments in the nature and range of services provided by the industry. Though growth has recently slowed down, the market, which is estimated to be worth between ECU 700 million and ECU 1.05 billion, is still growing at 20 to 40% a year. The completion of the EC's internal market by 1992 is now greatly exciting the industry. This process is expected to act as a catalyst to even higher levels of growth.

Description of the industry

Express services are part of the infrastructure of communications and transportation services. Since it is new and changing rapidly, no standard definition of the 'express industry' has yet gained universal acceptance. However, the one outlined above is favoured by the International Express Carriers Conference (the trade association of the largest international private companies) and by the Customs Cooperation Council.

This definition includes the following types of express companies: those using passengers on commercial flights ('air couriers'); express companies with dedicated air-and-ground distribution networks ('integrated carriers'); door-to-door services organized by commercial airlines (e.g. British Airways, Air France) or railroads, traditional freight forwarders who have established exceptionally rapid and controlled door-to-door networks and door-to-door specialized services provided by national post offices (EMS). Despite different origins, all of these services compete with one another, and most large express services companies make use of more than one mode of transport.

The express industry operates national, international and worldwide on-demand pick-up and delivery networks. Traditionally, the majority of these shipments were time-sensitive documents such as cheques, financial papers, tender offers, blueprints, shipping and engineering documents, legal papers, tapes, etc. — in general, items whose economic value depends on rapid on-time delivery.

Increasingly today the industry is, however, transporting more and more dutiable items such as samples, spare parts, computer equipment, periodicals and news media, etc. In so doing, the service plays a key role in facilitating the close coordination of activities in widely separate geographic locations, and in particular the activities of other service industries such as banking, trade, shipping, and professional services.

It is important to appreciate that the core of service provided by express transfer does not lie in long-haul transport as such, but in the totality of services provided throughout the journey: high-quality, on-demand collection and delivery, rapid tracking and tracing, unified administrative control from end to end, and service over a large matrix of geographic points (not only point-to-point).

For analytical and historical reasons, the express services industry in Europe can be divided into three categories:

- international or extra-EC shipments from a point in the EC to a point outside the EC or vice versa;
- cross-border or intra-EC (shipments between two points within the EC that cross at least one national boundary);
- domestic (shipments between two cities in the EC that do not involve crossing a national boundary).

Shipment within the same city (intra-city) would generally not be regarded as 'express' services shipments in the same sense as inter-city shipments because the level of organization and administration required for intra-city delivery is qualitatively different from inter-city service, at least over a matrix of many cities. In general, as a matter of commercial practice, these two levels of operation are provided by different types of commercial organizations.



For historical, economic and regulatory reasons, it is practically impossible to compare the companies involved in the above three sectors. In the first category, international companies with worldwide networks naturally predominate. The substantial transportation and communications resources necessary to operate such a service have given these companies a distinct competitive edge. Now, as the single market nears completion, these companies are bringing their worldwide experience to the establishment of new operations in the two latter categories. Within the third category, specialized express domestic services did appear in Europe where market sizes (volume, geographic) and business needs required them (the United Kingdom, France and the Federal Republic of Germany). Most, however, remained operating within their home market and did not consider or achieve international expansion even at a European level. With the completion of the single market, these companies will have to consider such expansion more strongly although they will face a very competitive market.

Current situation

To date, there is very little data available to measure the express industry's size and performance.

Some market research has been conducted from time to time but nothing consistent. Nevertheless, estimates have been made by specialist consultants for international and cross-border express shipments — express being understood for this purpose as a reliable (even guaranteed) next day (morning if possible) delivery service for domestic and cross-border documents or parcels of up to 50 kilograms in Europe.

Table 1 presents rough estimates for the number of shipments handled by express services in 1988. These estimates have been developed from limited data by B and Co (F) on behalf of the International Express Carriers Conference. They have been worked out from studies of the OEST (F), DTI (UK) and private surveys on the German market for domestic traffics and IECC sources for international ones.

A 1984 survey on the key characteristics of the express services industry by Cresap, McCormick & Paget identified the following as the major customer groups of the express industry, in declining order of importance:

- financial institutions (banking, insurance),
- engineering and construction,

Table 1
Estimated number of express shipments, 1988

(million)	1987	1988		
		Total	Intra-EC	Extra-EC
Belgium	1.2	1.5	0.7	0.8
Denmark	0.3	0.4	0.2	0.2
FR of Germany	2.5	3.1	1.1	2.0
Greece	0.4	0.5	0.2	0.3
Spain	0.8	1.0	0.4	0.6
France	2.0	2.7	1.0	1.7
Ireland	0.3	0.5	0.2	0.3
Italy	1.9	2.4	0.9	1.5
Luxembourg	0.2	0.3	0.2	0.1
Netherlands	1.6	2.0	0.8	1.2
Portugal	0.2	0.3	0.2	0.1
United Kingdom (1)	5.3	6.6	2.5	4.1
EC 12	16.7	21.3	8.4	12.9

(1) Including Datapost traffic.

Source: IECC.

- professional services,
- oil, shipping, electronic and heavy manufacturing,
- import/export trade,
- other.

Table 2
Estimated number of international express shipments

(million)	1981	1983	1985	1988
Belgium	0.1	0.3	1.2	1.3
Denmark	0.0	0.0	0.3	0.4
FR of Germany	0.1	0.6	2.5	3.1
Greece	0.0	0.1	0.4	0.5
Spain	N/A	N/A	0.8	1.0
France	0.1	0.3	2.0	2.7
Ireland	0.0	0.1	0.3	0.5
Italy	0.1	0.5	1.9	2.4
Luxembourg	0.0	0.0	0.2	0.3
Netherlands	0.1	0.3	1.6	2.0
Portugal	N/A	N/A	0.2	0.3
United Kingdom (1)	0.6	2.0	5.3	6.6
EC 12	1.2	4.4	16.7	21.3

(1) Including Datapost traffic.

Source: 1981 and 1983 Cresap, McCormick & Paget, IECC.

In short, the express industry is, to a large extent, a service industry to the service industries. Although no more recent global industry survey has been completed, this breakdown of customers remains reasonably accurate. However, more limited market surveys conducted by some integrated carriers indicate a strong trend by manufacturing industries to satisfy their logistic needs for just-in-time supply and delivery by the increasing use of express services.

Table 2 shows the growth of total international express shipments generated in Europe during the past decade. The 1981 and 1983 data are taken from

the Cresap, McCormick & Paget study. The two sets of data are not completely comparable, so Table 2 must be understood as indicating a general trend only.

Turnover and employment

Table 3 presents estimates of turnover and employment associated with international (extra + intra-EC) services in 1988. These estimates are developed from limited data by the International Express Carriers Conference (IECC).

Table 3
Estimated turnover and employment, 1988

	Revenue (million ECU)	Employment
Belgium	18	1 300
Denmark	7	200
FR of Germany	103	1 100
Greece	9	100
Spain	26	320
France	83	950
Ireland	13	200
Italy	78	1 050
Luxembourg	3	40
Netherlands	39	700
Portugal	7	80
United Kingdom	180	2 100
EC 12	566	8 140

Source: IECC.

The discrepancies between correlative revenue and employment in some countries such as Belgium or the Netherlands are explainable by the fact that they host the 'hubs' (central European sorting systems) of some major express companies.

Degree of integration and internationalization

By their nature, express services have a globally oriented outlook and management. The essence of express service is to provide tightly coordinated administrative control over door-to-door shipments carried to a variety of domestic or international points. This means that national or international express companies have developed operational structures and information systems allowing them to monitor and follow up step-by-step the forwarding of any single shipment from shipper to consignee. Headquarters implement and carefully control standardized operational procedures, marketing policies of financial movements.

Structure of the industry

In this industry, the categorization of firms as 'European' or 'non-European' is misleading if understood to reflect revenue out-flows. Of the revenues earned by the express industry in the EC, a substantial amount is paid out in current operational expenses. The largest share (about 33%) is paid to employees (virtually all of them are EC citizens) and social charges. The second category of expenses is transportation costs (about 25%). The third largest cost (about 15%) is administrative overheads, which are paid to European organizations i.e. telecommunications, administrations, post offices, advertising media, etc. Thus, the European operations of an American or Australian express company are 'European' in much the same sense that European post offices are 'European' despite the fact that they make use of international 'express mail' concepts and procedures originally developed by non-EC postal organizations (including the Universal Postal Union).

With the caveats noted in the preceding sections, Table 4 lists the major international express organizations operating in the EC along with the main domestic companies in the three major markets and their headquarters.

Growth trends

At least at the inter-city scale and above, express services are increasingly becoming a worldwide industry. In relation to express services, it appears that modern trade requires a higher degree of administrative coordination than is achievable through a set of loosely related organizations providing local or national services only. Thus, by its nature, the operational and institutional focus of the express industry is global, or at least, regional in scope.

Factors affecting the business

The evolution of the worldwide express industry has been heavily influenced by regulatory laws which were originally designed to accommodate industries predating the express services sector. Such regulations include the national postal monopoly, international postal treaties, national customs laws, and national and international transport laws.

Although some progress has been made in the last few years, the future growth of the industry will greatly depend on the degree to which these laws can be adapted to the unique characteristics of the express service business, and, in particular the extent

to which national legislation can be harmonized to permit consistent domestic and international operations. A prominent feature of express operations is the central sorting of shipments; this procedure means that the regulatory requirements of dozens of countries must be satisfied for tens of thousands of urgent shipments in a few hours.

Table 4
Major private firms operating in the EC

	Headquarters	
	Location	Country
International companies		
Air Securicor	Sutton	IRL
DHL International	Brussels	B
Emery Worldwide Services	Maastricht	NL
EMS (postal services)	Brussels	B
Federal Express	Brussels	B
Jet Worldwide Courier	Roissy	F
Overseas Courier Services	Brussels	B
TNT-Skypak	Windsor	UK
United Parcel Service	Cologne	D
World Courier	Brussels	B
Domestic companies		
Kuhne & Nagel		D
TNT		D
UPS	Cologne	D
Jet Services	Lyon	F
SFMI (postal subsidiary)	Paris	F
TAT Express	Tours	F
Elan	Birmingham	UK
Red Star (British Rail)	London	UK
Securicor	Birmingham	UK
TNT		UK

Source: IECC.

Two major new trends have emerged recently, reflecting new customer needs, to sustain the growth of the express market:

- the increasing need for just-in-time deliveries of regular sales of manufacturing items as an alternative to holding costly stocks of items in different places/markets;
- by the industry creating new products and services which innovatively utilize their integrated international delivery mechanisms more effectively, for example the commercial cooperation between express companies and some national post offices has introduced the concept of 're-mail' services — large mail users who make use of express services to identify the post offices providing the highest quality of international distribution of mailings at the lowest price. Continued, economically sound development of this market depends upon the adoption of a more cost-based, competitively neutral, international postal agreement (Universal Postal Union).

On the other hand, major challenges for the industry come from the fact that fixed costs are high. Indeed, an extensive physical infrastructure is required for large-scale operations, and there is a need to invest continuously in information technology to provide a high-quality service.

Outlook

The experience of the express industry in the United States, an economy roughly equal to the EC, suggests that there is substantial room for growth in the intra-EC express industry. If the air-freight market growth has an annual rate of 7 to 8% then the European express industry will grow at an annual rate of 25% for the next five years. To put comparable figures on this projection in 1988, more than 350 million domestic shipments were transported by the air express industry in the USA. Of course this figure

should be compared not only to EC cross-border traffic but also to the unknown total quantity of EC 'domestic' express traffic. Nevertheless, the magnitude of the difference shown in Table 1 strongly suggests that the EC express market can expect at least this level of continued growth.

The EC's single market will need efficient, effective and competitive express services to be universally and equally available throughout the Community. The cost-efficient development of such services requires significant regulatory changes in both the postal and custom's areas. Without such changes, the ability of the express industry to facilitate the resurgence of economic activity in Europe will be significantly constrained to the detriment not only of the industry itself but more importantly its customers.

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THE EUROPEAN AUDIOVISUAL INDUSTRY

(NACE 971, 972, 973 and 974)

Summary

1989 has been a year of change and ferment in the European audiovisual sector. The tide of deregulation has continued to sweep across the Member States, opening opportunities to new and existing organizations alike. The successful launch of the Astra and DFS-Kopernikus satellites has encouraged development of language-specific channels broadcasting to territories in which they may not have been able to secure a licence under existing national law, and there has been further development of the existing tendency for large organizations to invest in related audiovisual operations outside their national boundaries.

At the same time, there is still no real order in the development of satellite services, with rival standards of transmission and up- and down-link arrangements creating difficulties for would-be entrepreneurs, and it seems probable that some new companies will be unable to secure the levels of return on their investment that might originally have been hoped for.

Description of the sector

Audiovisual products can be defined as images and sounds stored, recorded or transmitted for entertainment, information and education. The product may take the form of a film, a television programme or a video cassette. In this chapter, we look at the characteristics of film production (NACE 971), distribution (NACE 972), cinemas (NACE 973) and radio and television services (NACE 974). Films, cinemas and television are interdependent to a great extent. A product that begins its life as a film is likely to be transmitted by television at some time, and also has the possibility of being released to the public on video cassette.

It is more common to produce films for the cinema and television markets than to produce them solely for video distribution, although there is an important sector devoted to the production of training, educational and promotional videos.

The economic importance of the industry in the EC economy

No accurate figures appear to exist for the overall value of the European audiovisual industry. In the broadcasting sector in 1987, Saatchi & Saatchi/Booz Allen Hamilton reported that total revenues from all sources in the four largest economies were, in round figures,

- United Kingdom: ECU 3 250 million
- Italy: ECU 3 050 million
- France: ECU 2 200 million
- Federal Republic of Germany: ECU 2 000 million

Relative importance of the different elements

The dominant forces in the European audiovisual sector are the film and television industries. The important factors in the recent growth of the European television industry are:

- deregulation, allowing more channels to be established in competition to existing public or private monopolies and duopolies;
- technological developments, opening up new terrestrial and satellite channels to relieve pressure on crowded spectrum space and allowing opportunities for private sector investment in areas previously closed off by national regulation. ScanSat in Sweden, SKY Television in the United Kingdom and Ireland, TV10 and Veronique in the Netherlands and Galavision in Spain are examples of commercial services broadcast outside the regulated framework in the territories to which they are directed. Technological developments include the use of satellite and microwave multiple distribution systems (MMDS) and the use of broadband cable systems allowing up to 32 channels to be delivered to the home at one time.



It does not yet appear that the growth of television channels will necessarily lead to an explosion of demand for programme material. New stations established in the past four years have tended to invest heavily in library and archive material (often from the United States) and thereby raise the price commanded by such products, and have in general waited until their second or third year of operation before commissioning any significant new work outside the fields of light entertainment and popular drama.

However, effective competition with existing services with high levels of original independent production can require newer competitors to invest either by direct production or by co-production in the creation of new works of drama.

For example, Fininvest, the parent company of RetelItalia in Italy, which operates three commercial channels, has met competition from the national broadcaster RAI by investing substantially in film and television production over the last three years, but has shifted the balance of investment toward television fiction, as shown in Table 1.

Industry structure

At first glance it appears that the European audiovisual industry is constructed on national lines, with a small number of companies dominant in each national market. However, there is a marked growth in multinationalism and an increase in the participation of leading operators in one country in related activities in other countries.

Table 1
Development of RetelItalia investments in cinema

	1986	1987	1988
Number of films (incl. pre-purchases)	40	70	50
Investments (million ECU)	130	220	230
Production of fiction			
Production of TV fiction (hours)	60	120	200
Investments (million ECU)	73	175	310

Source: Fininvest, 1/89.

The size of the capital investments required means that the price of entry to the audiovisual market is

beyond the means of all but the most well-financed new players: the ECU 1 100 million capital requirement of British Satellite Broadcasters, which is licensed to offer five DBS (Direct broadcast by satellite) channels to United Kingdom viewers, indicates the levels of resource needed.

The levels of profitability believed to exist in the audiovisual industry have led to organizations outside the traditional audiovisual sector seeking to become involved, and taking advantage of the climate of deregulation to buy shareholdings in both existing privatized organizations (TF1: the Bouygues Group) and in new entrants to the field (BSB: Bond Corporation of Australia). It is particularly noticeable that French water companies, of which the Générale des Eaux and the Lyonnaise des Eaux are the most important, have invested heavily in the cable and diffusion sector both in France and elsewhere.

Within the EC, the presence in every Member State, except Luxembourg, of a national public service broadcasting organization (or organizations) has militated against the establishment of strongly dominant positions by individual companies. As deregulation continues in most Member States, existing media operators in the newspaper or non-licensed audiovisual fields are extending the range of their activities (Bertelsmann, News International, Hersant, Hachette) and newly created audiovisual companies are taking advantage of their entry to the industry to extend their range of activity (Canal Plus, Fininvest, Carlton Communications).

Possibilities of domination of the sector as a whole

An examination of the major players in the audiovisual sector in Europe reveals that while several of them are substantial companies in any terms, not one of them is yet in a dominant position in the European audiovisual market as a whole. There is at present no cohesive legislative provision in the Community governing concentration of ownership in the audiovisual sector. The state of legislation in the Member States is set out in Table 2.

It is a particular feature of the European audiovisual scene that the existing national public service organizations, by their entrenched position and size, effectively block the establishment of dominant positions in their territories by organizations from outside their national borders.

In terms of newspaper, magazine and audiovisual investment, Bertelsmann AG is the second largest media concern in the world, but is nowhere near a position of dominance of the whole European market in audiovisual products.

The same can be said of Fininvest and CLT, the other two organizations with significant interests in audiovisual media in countries outside their national base.

For 1989, the trend has been for companies seeking to invest outside their country of origin to present themselves in their new markets as partners (or largely owned and controlled subsidiaries) of existing or new national concerns.

Table 2
An overview of anti-cartel legislation

	B	DK	D	E	F	IRL	I	NL	UK	EC (2)	A	CH	S	USA	
Anti-cartel legislation	+	(1)	+	(1)	+	(1)	+	(1)	+	(1)	+	+	—	+	+
Separate provision to control anti-cartel legislation	—	—	+	—	+	+	—	—	+	—	—	—	—	—	+
<i>A priori</i> information duty on mergers	+	—	+	—	—	+	—	—	—	+	+	—	—	—	—
<i>A posteriori</i> information duty on mergers	—	—	+	+	—	/	—	—	—	/	0	—	—	—	—
Press merger legislation	—	—	+	—	+	+	+	0	+	—	—	—	—	—	+
Media cross-ownership legislation	—	—	—	—	—	—	—	—	—	—	—	—	—	—	+

+ = present

— = not present

/ = not applicable

0 = no information available

(1) EC Treaty of Rome, Arts 85 and 86 are applicable.

(2) According to the adopted EC Directive.

Source: EIM.

Among the groups most actively engaged in this kind of expansion are:

Fininvest (Italy), the holding company of ReteItalia, which controls three national channels in Italy and owns the Publitalia advertising sales company. Outside Italy, Fininvest is a substantial minority partner in La Cinq (France), Telefünf (Germany) and the newly authorized La Cinco in Spain.

Canal Plus (the majority of whose shares are held by Hachette), is a member of a successful bidder for a new licence in Spain, and is already preparing to launch its pay television service in Belgium under the name Canal Plus Belgique.

CLT (Compagnie Luxembourgeoise de Télévision) enjoys a monopoly of television and radio broadcasting in the Grand Duchy. For many years almost the only privately owned broadcaster in continental Europe, CLT has taken advantage of the new deregulatory climate to extend its operations in the form of part-ownership of new television services in France (M6), Belgium (TVI-RTL), and Germany (RTL-Plus), and participation in the satellite-delivered Télé-Veronique service to the Netherlands.

Trends in television programming

The importance of films as a staple of television programming clearly emerges from Table 3, and is reinforced when we examine the content of programming in prime time (the evening hours when the greatest audience is attracted to view television). Table 4 shows the programme mix in prime time for the eight largest European markets, together with Austria and Finland.

For the remainder of their programmes, broadcasters around the world are hungry for 'family' programmes — dramas intended for adults but suitable for children as well, for example, *Neighbours* and *Little House on the Prairie*.

Language and cultural barriers have so far meant that there has been little, if any, truly European programming with the same broad appeal as the American and Australian programmes mentioned above, although it is also true to say that in general European audiences give their first preference to locally produced news and fiction programmes, most of which find a less willing audience in other countries.

The successful experiments of such programmes as *Traffic* and *Euro-Cops* represent an important breakthrough in the European television market, and the earlier acceptance in a number of countries of the German series *Heimat* and *Das Boot* seems to indicate that European audiences are willing to accept programmes made for other Europeans if the quality and presentation are right.

While American action-adventure shows such as *Miami Vice*, *LA Law*, and *Starsky and Hutch* still rule the market place, reality-based programming, ranging from live rock concerts to popular, and in some cases sensational, documentaries, appears to be increasing where local law allows it to be presented.

As far as comedy is concerned, it is a truism that comedy does not travel. There are some exceptions to this rule: the American *Cosby Show*, which dominates the ratings in the US market, has gained good acceptance among Scandinavian, French and Australian audiences, but has curiously failed to make the same impact on the English-speaking public in the United Kingdom and the Republic of Ireland.

There has been, surprisingly, some increase in demand for cultural programmes or documentaries, as a result of more television channels and hours of transmission in both the USA and Europe.

Trade

An interesting trend began in 1987, when for the first time domestic production on European private television services outstripped the use of imported (and primarily American) programming. In 1986, less than half of the output on Europe's private channels was produced domestically. In fact, substantially more programming came from the USA than from the broadcasters' own countries. By 1987, these stations had become far more dependent on their own productions than in previous years.

Table 5 sets out the national origins of programming in 12 selected European countries in 1987.

Trends in film production and distribution

In film, the market is dominated throughout Europe by the American 'Hollywood majors', a term used to describe the largest film studios. In television the ownership of the stations is still in European hands

Table 3
Total hours and composition of television programming in Europe, 1987

Country	Output	Total fiction	% fiction of output	Films broadcast (hours)	% films of total fiction	Total Domestic	Non-film fiction %	Foreign	%	
Belgium	8 684	2 372	27.3	955	40.3	1 417	328	23.1	1 089	76.9
Denmark	2 600	962	37.0	442	45.9	520	78	15.0	442	85.0
FR of Germany	13 146	3 927	29.9	1 207	30.7	2 720	1 460	53.7	1 260	46.3
Spain	8 632	2 441	28.3	664	27.2	1 777	295	16.6	1 482	83.4
France	29 588	10 125	34.2	1 680	16.6	8 445	733	8.7	7 712	91.3
Greece	7 436	1 853	24.9	732	39.5	1 121	380	33.9	741	66.1
Ireland	3 774	1 648	43.7	415	25.2	1 233	25	2.0	1 208	98.0
Italy	35 724	17 257	48.3	4 877	28.3	12 380	1 023	8.3	11 357	91.7
Luxembourg	3 744	2 246	60.0	636	28.3	1 610	0	0.0	1 610	100.0
Netherlands	6 606	1 593	24.1	386	24.2	1 207	188	15.6	1 019	84.4
Portugal	8 424	2 792	33.1	265	9.5	2 527	412	16.3	2 115	83.7
United Kingdom	25 116	7 692	30.6	2 665	34.6	5 027	2 640	52.5	2 387	47.5
EC	153 474	54 908	35.8	14 924	27.2	39 984	7 562	18.9	32 422	81.1

Source: *Cinema d'oggi*, Anno XXIII, No 9, 11 May 1989.

Table 4
Prime time programming by channel and country (1)

		News and current affairs	Other 'serious' programmes	Sport	Films	Mini-series and series	Variety and game shows
Belgium	BRT 1	20	20	3	20	16	21
	BRT 2	14	25	14	19	19	9
	RTBF	28	24	4	32	3	9
	RTL TVI	12	1	0	47	34	6
Denmark	DR	16	24	1	11	16	32
FR of Germany	ARD	19	19	3	40	12	7
	ZDF	25	20	7	2	23	23
	RTL +	11	3	1	50	14	21
	SAT 1	12	1	1	38	47	1
	3 SAT	22	24	2	9	9	34
1 PLUS	7	28	1	29	20	15	
Spain	TVE 1	26	21	0	6	18	29
	TVE 2	6	18	45	11	11	9
France	TF1	21	0	1	20	25	33
	A2	23	14	4	29	4	26
	FR 3	27	6	0	19	28	20
	Canal +	4	0	3	46	3	44
	LA 5	13	5	1	16	21	44
M6	5	0	0	27	57	11	
Italy	RAI 1	26	4	1	27	0	42
	RAI 2	13	0	22	42	18	5
	RAI 3	24	14	11	14	28	9
	ITALIA 1	0	0	1	43	54	2
	Rete 4	0	0	0	36	32	32
Canal 5	4	0	0	18	16	62	
Netherlands	NL1	17	28	2	14	23	16
	NL2	13	16	13	18	5	35
United Kingdom	BBC 1	22	10	0	6	26	36
	BBC 2	3	50	10	16	9	12
	ITV	17	5	2	21	26	29
	CH 4	21	32	6	7	23	11
	SKY	2	1	31	5	55	6
Austria	FS 1	19	22	14	19	10	16
	FS 2	22	26	8	10	24	10
Finland	MTV 1	23	16	3	16	24	18
	MTV 2	27	26	8	10	19	10
Norway	NRK	20	24	10	17	15	14

(1) Figures in % and taken from peak viewing times.

Source: Horizons Media International 9/88.

but the content of the programming relies to a varying degree on imported materials. Although television exports are on the increase, so is original production. US dominance of the export market may have helped to encourage the proposals to impose more severe quota restrictions on US imports after 1992. In Europe, almost every country has established support mechanisms for the film industry: these mechanisms, and the amount distributed by them in 1988, are listed in Table 6.

The importance of the film industry in terms of first-run distribution to cinemas is declining in the face of the growth of television and video. Related to this decline is the need for greater investment in individual film production if costs are to be recovered at the box office: the American film and television weekly *Variety* reported (April 1989) that in the previous year only those films whose production cost exceeded ECU 21 million had recovered their total investment at the box office, while among

Table 5
Percentage of television hours in 12 countries occupied by programmes of European and other national origin (1)

Country	Dome- stic	UK	FRG	F	I	Nordic coun- tries	Bene- lux	Other WE	West Europe total	USA	East Europe	Others	Total imports	Dome- stic and imports
Belgium														
BRT 1	81/75	6/9							6/9	10/4		3/2	19/15	100
RTBF	84/79	4/8		5/10					9/18	7/3			16/21	100
Denmark														
DR	62/80	7/3		3/2	2/3	14/6	1/1		27/15	9/5		2	38/20	100
FR of Germany														
ARD	80/71	3		1					4	15/29	1		20/29	100
ZDF	86/90	2/3		2	2				6/3	7/7		1	14/10	100
Spain		1												
TVE 1	82/90	2	1		1				4	12/10		2	18/10	100
TVE 2	66/68			3/2					3/2	19/20		12/10	34/32	100
France														
TF1	80/78	1			4/3				5/3	15/19			20/22	
A2	91/94	1/1			2				3	5/5		1	9/6	
FR3	80/81	8/2	1/3						9/5	11/14			20/19	100
Italy														
RAI 1	80/76	2					2/4		4/4	16/20			20/24	100
RAI 2	72/48	2	6/27	1/3					9/30	19/22			28/52	100
RAI 3	91/90	2							2	7/10			9/10	100
Netherlands														
NL1	70/77	1/3		1		2/2			4/5	23/18		3	30/23	
NL2	73/60	9/23			2		1/1	3/5	15/29	8/16		4/5	27/40	100
United Kingdom														
BBC 1	87/87			1					1	12/13			13/13	100
BBC 2	87/78									12/16		1/6	13/22	100
ITV	91/95										6/5	3	9/5	100
Channel 4	65/74					1/1		1	2/1	29/9		4/6	35/16	100
Austria														
FS 1	68/77	3	14/17	2	2				21/17	8/6		3	32/23	100
FS 2	53/52	3/2	11/17		5/2				19/21	23/25		5/2	47/48	100
Finland														
YLE 1	53/51	8/12	1		3/2	7/5	3/5		22/24	17/17	4/4	4/4	47/49	100
YLE 2	55/56	10/17	5/4	2/4	3	7/5		2/1	29/31	11/12	4	1/1	45/44	100
Norway														
NRK	63/70	11/9	2	1	1	4/3			19/12	15/12	1/2	2/4	37/30	100
Sweden														
STV 1	78/67	5/11	9/12	3/4	2/4	2/2		1	22/33				22/33	100
STV 2	71/70	4/4	2/1	1/2	2/4	1			10/11	14/15	2	3/4	29/30	100
Total (2)	74								12	12		2	26	100

(1) The data are based on one week in September 1986. Where one figure only, it covers all hours; where two figures the one to the right is prime time, i.e. 6.30 pm to 10.30 pm.

(2) Estimate.

Source: Transnationalization of television in Western Europe: Preben Sepstrup 12/88.

lower-budget films those costing ECU 12 million or less had recovered only 50% of their cost from the sales of tickets in the cinema.

These figures indicate the importance for the film industry of sales to television, and has led to a growth in the involvement of television stations and outside financial interests in the production of films destined eventually for television showing and video distribution, with the result that it becomes increasingly difficult to separate out the contributions made by each part of the audiovisual system to the overall total.

In all countries, the decline in cinema box office has led to the closure of cinemas and the consequent

reduction in the number of opportunities for films to earn appreciable box-office revenue: this is offset to a small degree by the practice of replacing earlier single or two-screen cinemas with 'multiplexes', offering up to 24 screens in one location. The bulk of the investment in multiplex cinemas in Europe has tended to come from American-owned companies (Warner Brothers, Cineplex Odeon, Paramount).

Table 7 shows the trend in cinema admissions since 1988. It is notable that a slight upturn has been experienced in several countries, but this may be attributable to the success of individual films such as the Australian production *Crocodile Dundee*, and it is still too early to discern a definite trend.

Table 6
State film aid

Country	Support by	Total in ECU	Period	Year	Other forms
Belgium	Ministries of Cultural Affairs (French and Flemish languages)	5 642 561	Annual	1986	
Denmark	Danish Film Institute	12 531 328	Annual	1987	or up to 80% of budget
FR of Germany	Filmförderungsanstalt (Referenz-/projektfilm)	6 490 840	Annual	1988	
	Filmförderungsanstalt (industry subventions)	10 576 923	Annual	1988	
	Federal Interior Ministry	5 432 692	Annual	1987	
	Kuratorium junger deutscher Film	985 576	Annual	1989	
	Länderförderungsfonds				
	Baden-Württemberg	961 538	Annual	1989	
	Hesse	817 307	Annual	1989	
	Bavaria	10 865 384	Annual	1988	
	Hamburg	5 288 461	Annual	1988	
	North-Rhine-Westphalia	1 298 076	Annual	1989	
	Saarland	max 144 230	Annual	1989	
	West Berlin	33 798 067	Annual	1989	
	Lower Saxony	1 682 692	Annual	1989	
France	Centre Nationale de la Cinematographie	46 448 863	Annual	1988	
Greece	Ministry of Culture (Greek Film Centre)	3 500 000	Annual	1988	
Ireland	The Irish Film Board was abolished in 1987. Subsidy replaced by tax incentive of ECU 1 282 797 if 75% of production made in Ireland.	direct investment in film production			
Italy	Banco Nazionale del Lavoro	508 729 or max. 972 094	2-year	1988	up to 70% of budget up to 30% of budget
Netherlands	Stichting Productiefonds voor de Nederlandse Films	max. 1 136 363			up to 60% of budget
Portugal	Portuguese Film Institute				Submission of films to major film festivals
United Kingdom	British Screen Finance (National Film Development Fund)	3 030 303	Annual	1988	
Austria	Österreichischer Filmförderungsfond	4 383 561	Annual	1988	
Norway	Public funds Film Production Board and Norsk Film				55% of box-office takings up to 90% of budget
Sweden	Swedish Film Institute	5 757 575	Annual	1985	
Switzerland	Federal Government	36 363	Annual	1985	
	Department of the Interior	290 697	Annual	1985	
	Swiss Broadcasting Corporation	4 651 162	3-year		

The figures for cinema box-office receipts reveal the dominance of the United States in the sector. In 1988 in Italy, France and the Federal Republic of Germany only three films among the top 10 box office successes were produced domestically, while in the United Kingdom only one national film was able to make the top 10 listing in its home market.

Technological developments

The term 'new technologies' is ill defined, and is often used to describe any development or advance in the mechanical or electronic techniques used in the audiovisual industry. For the purpose of this article, we will confine the definition to include:

1. New technologies of production: principally the development of light-weight cameras recording to video tape rather than film, the digital processing of the signals and the reduction in necessary personnel to produce an image of high quality.

2. New technologies of distribution: principally the development of video cassettes for sale or rental to home viewers, the growth of wide-band cable systems and the development of satellite transmission for distribution of audiovisual materials either direct to the home or to cable head-ends for onward transmission.

3. New technologies of reception equipment: the development of low-cost satellite receivers and the ability of receiving sets to convert between different transmission standards; the addition of the ability to

receive 'added value' services such as teletext and other data services.

There have been substantial advances in technology in recent years in all the categories under consideration, and the pace of development shows little sign of slowing down. However, in important areas there is still no agreement even among Community members as to standards to be adopted, and in the world market agreement on universal standards for transmission, distribution or display seems unlikely at the present time.

The compatibility issue breaks down into three parts:

- Intra-network compatibility (ability of new equipment to be used alongside and in association with existing equipment). This arises mainly in questions of the number of lines and fields used for the image, the technical specification for chrominance and luminance and the treatment of the sound information. For production or broadcasting organizations, this problem will be at its most acute during a changeover to a significantly more advanced and incompatible technology, such as that from monochrome 405 lines to PAL 625 lines, or from PAL or Secam to one or other of the MAC family of standards.
- Inter-network compatibility (ability of a separate organization or location to make use of the images received from elsewhere). This arises in the context of relays of programmes or the use of recorded materials prepared using a different standard. While standards conversion equipment

Table 7
Index of cinema admissions

	1980 (1)	1981	1982	1983	1984	1985	1986	1987	1988
Belgium	100	93	95	99	88	83	82	78	83
Denmark	100	102	90	87	74	71	72	72	72
FR of Germany	100	98	87	87	78	72	73	75	76
Spain	100	100	94	88	82	80	70	84	77
France	100	108	115	114	109	100	96	76	69
Italy	100	89	81	67	54	51	51	45	45
Netherlands	100	96	79	77	62	55	53	55	56
Portugal	100	98	89	79	61	62	60	55	N/A
United Kingdom	100	86	64	64	53	70	72	76	82
Finland	100	95	92	92	77	68	64	66	69
Norway	100	94	86	84	73	74	63	71	N/A
Sweden	100	92	82	80	71	75	72	N/A	N/A
Switzerland	100	101	101	112	117	129	127	123	123
Turkey (2)	N/A	N/A	N/A	N/A	N/A	N/A	100	111	123

(1) 1980 = 100.

(2) 1986 = 100.

Source: Saatchi & Saatchi, 1989.

is widely available, the eventual converted product will almost never be enhanced, will generally be poorer in quality and in every case will be more expensive than it would have been if it had not been subject to the conversion process.

- **Retro-compatibility** (ability of existing equipment to display the image and sounds created in the new standard, and of new equipment to handle the signals transmitted on the older standard, to at least the same degree of quality as was available from the old). The obvious example of retro-compatibility is the ability of a monochrome television set to display colour transmissions in black and white, and of a colour set to receive and display monochrome transmissions.

Transmission standards

Standards currently in use for television broadcasting

In television transmission, European broadcasting is largely dominated by the PAL standard, used throughout Western Europe except in France and Luxembourg, which use Secam, although there is a growing penetration in both the Secam markets of television receivers capable of receiving both standards.

A television set designed for one standard will not correctly display all elements of the picture transmitted under another standard, and may lose colour, sound or both. The NTSC system is sufficiently different from PAL or Secam as to be impossible to display on sets designed for either, and within the PAL and Secam definitions there are incompatibilities of sound handling which mean, for example, that a television set in the United Kingdom can receive a signal from the Netherlands but cannot present both the picture and its accompanying sound without an internal technical adjustment which may not always be possible.

However, it is worth noting that dual-standard PAL/Secam, or even three standard PAL/Secam/NTSC television receivers are available on the market, and enjoy a small but significant sale both to travellers and in border areas where signals in two different standards are received.

The European industry is strong in the supply of television receivers to the domestic market: Booz Allen & Hamilton estimated (mid-1988) that European companies supplied 85% of colour television sets sold within the EC.

At least part of the reason for this strength lies in the European ownership of the patents on which Euro-

pean television set design is based. The original PAL patents were the property of Telefunken, which assigned UK rights to Thorn EMI and retained the rights for the rest of Europe itself. Both companies restricted licensing of PAL technology to Far Eastern companies, and used the patent rights as a lever to encourage Far Eastern companies to establish, or take over, manufacturing capacity in Europe.

These rights are now expiring (and most of the rights to Secam have already expired). Cable & Satellite Europe reported (June 1988) that a similar control was being established for the MAC patents (see below).

Second generation standards: MAC family and HDTV

Early satellite broadcasting on low-power satellites (FSS: Fixed service satellites) such as Eutelsat, Intelsat and the original experimental OTS) was carried out using the PAL, and subsequently also Secam, standards in Europe. The choice of standard was determined by the broadcaster's perception of the standards in use in the target countries.

More recently there has been a move to adopt the MAC family of standards (MAC: Multiplexed analogue components), and the French TDF1 direct-broadcast satellite, as well as the ESA Olympus direct-broadcast satellite, are using the D2-MAC variant of this standard. The British BSB satellite will, however, use the D-MAC version of the MAC standard.

It is important to recognize that the transmission standard is not an inherent function of the kind of satellite in use. While most of the programmes transmitted by the Astra satellite are in PAL, the ScanSat TV3 service is in D2-MAC, which has certain technical advantages from the point of view of the satellite operator in that less power is required to establish a given quality of signal. The decision, by SKY Television, to use PAL is a commercial, not a technical one based on the identification of the market as the United Kingdom and the Republic of Ireland and the fact that this market is universally equipped with PAL compatible receivers.

Compatibility issues among MAC standards, and between MAC and PAL/Secam

There are three basic versions of MAC: C-MAC, D-MAC and D2-MAC. The essential difference among the three is the band width needed to convey the signal. C-MAC requires a band width of 27MHz, and would be impossible to relay on most existing cable systems, which have a channel separation of

between 7 and 8 MHz. D-MAC requires 10.5 MHz, and D2-MAC requires 7MHz. There is little technical problem in designing receivers to respond to any one or all three of the MAC family of signals.

The consumer of television will therefore have the choice of:

- buying a television set capable of receiving and displaying MAC family signals delivered either by cable or satellite;
- buying an adaptor to convert MAC signals into PAL or Secam for display on an existing television set, although at the cost of the enhanced picture and sound quality of which MAC is inherently capable.

At the time of writing, the supply of D2-MAC decoders for the domestic market is so small as to be almost non-existent. Combined with the technical difficulties being experienced by high-power satellites such as TDF-1, and the earlier failure of the German TV-SAT, this lack of available reception equipment on the home market has serious implications for broadcasters relying on the MAC-packet family of standards to deliver their services to the market-place. Current projections call for the delivery of substantial numbers of D-MAC and D2-MAC decoders by early 1990, and their assured supply will be a prerequisite for the successful establishment of a number of new services planned to begin at that time.

High definition television (HDTV)

High definition television is a broad description used to cover a range of possible standards involving a changed aspect ratio (2:1 or 5:3 or 16:9 instead of 3:4), a greater number of lines in the displayed image and possibly a change in the field frequency (the number of times per second a complete image is displayed).

There is as yet no agreement on a European, let alone a world, standard for HDTV, and technical debate continues over the number of lines (from 1 050 to 1 250) and the number of fields. In Europe this work is concentrated in Eureka, whose members have been progressing towards the definition of a common European standard for HDTV, of 1 250 lines at 50Hz, under the name EU95. There is at the time of writing only one HDTV service broadcast in the world, by the Japanese DBS using 1 125 lines/60Hz, but the signals are for display and demonstration only and no receivers have been sold into the private market.

The two main rival systems currently being developed are the Japanese, described above, and

the European EU95 standard being processed as part of the Eureka programme. This standard, which will use 1 250 lines at 50Hz, is incompatible both with the Japanese system and with the experimental 1 050 line/60Hz systems demonstrated in the United States. The forecast sales of HDTV receiving sets, as projected by BIS Mackintosh, are shown in Tables 8 and 9.

Table 8
Consumer HDTV receiver sales

(million)	US	W. Europe	Japan	Rest of world
1990	—	—	0.02	—
1991	—	—	0.08	—
1992	—	—	0.15	—
1993	—	—	0.26	—
1994	—	—	0.35	—
1995	—	—	0.45	—
1996	0.08	—	0.62	—
1997	0.10	0.05	0.80	—
1998	0.25	0.15	1.00	—
1999	0.50	0.30	1.20	0.10
2000	1.00	1.00	1.60	0.70
2001	1.60	1.50	2.00	1.20
2002	2.60	2.40	3.00	1.90
2003	4.90	3.00	3.50	2.50
2004	6.50	4.30	4.50	3.40
2005	6.70	5.00	5.00	4.00
2006	6.80	5.50	5.00	4.70
2007	6.90	6.50	4.80	5.30
2008	7.90	7.00	4.00	5.50
2009	8.90	8.00	4.50	5.80
2010	11.00	8.50	4.50	6.00

Source: BIS Mackintosh.

HDTV is more significantly developed in the production industry, where its ability to deliver signals comparable in quality to 35mm film opens the possibility of real savings in production cost for the same ultimate quality of the image.

The first such production studio equipped for HDTV (on the Japanese standard) was Captain Video in Boulogne, France, which uses the technique mainly in the production of short commercials and promotional films. The quoted cost savings in 1988 over 35mm film were of the order of 10 to 18 %.

Since the opening of Captain Video, RAI of Italy, CBC/SRC of Canada, the BBC in the United Kingdom and other producers have experimented with feature film production in HDTV, with a view to transferring the finished programme both to 35mm film for cinema use and also to standard PAL tape for eventual broadcast by television. In either case, the costs of production and transfer will still be lower than would have been the case shooting directly on 35mm film, and this trend can be expected to continue as HDTV equipment becomes more widespread.

Digital recording

A separate but related issue in high definition television, as in television standards at large, is that of digital recording, which offers the possibility of manipulating the image in ways not available using analogue recording, such as the 'colorization' of black and white films or the correction of errors and blemishes in recordings, and has the unique feature that indefinite copies can be taken without any degradation in quality.

Table 9
Worldwide consumer HDTV receiver sales

	Sales (million)	Total growth %	Total (million)	Cumulated growth %
1990	0.02	—	0.02	—
1991	0.08	300.0	0.10	400.0
1992	0.15	87.5	0.25	150.0
1993	0.26	73.3	0.51	104.0
1994	0.35	34.6	0.86	68.6
1995	0.45	28.6	1.31	52.3
1996	0.70	55.6	2.01	53.4
1997	0.95	35.7	2.96	47.3
1998	1.40	47.4	4.36	47.3
1999	2.10	50.0	6.46	48.2
2000	4.30	104.8	10.76	66.6
2001	6.30	46.5	17.06	58.6
2002	9.90	57.1	26.96	58.0
2003	13.90	40.4	40.86	51.6
2004	18.90	36.0	59.76	46.3
2005	20.70	9.5	80.46	34.6
2006	22.00	6.3	102.46	27.3
2007	23.50	6.8	125.96	22.9
2008	24.40	3.8	150.36	19.4
2009	27.20	11.5	177.56	18.1
2010	30.00	10.3	207.56	16.9

Source: BIS Mackintosh/SD.

No standard yet exists for high definition digital video recording, and developments in computer technology will be needed before a satisfactory standard can be defined, probably in the mid-1990s. Digital video recording in 525 or 625 lines has already established a world standard (4/2/2) and there is a growing penetration of digital video-tape recorders since the announcement in 1987 of the first Sony professional digital recording machine.

The different elements in the audiovisual chain

The audiovisual industry is a complex structure comprised of cinema, television and video, with boundaries that are often blurred in specific instances. The product may start as a cinema film, a television programme or a video production, but may find exposure in either or both of the other sectors of the industry. However, the main activities common to all

sectors in the audiovisual chain can be identified as commission, production and distribution. Each are described in turn.

Commission

The commission is the decision to create an audiovisual work, either within the organization responsible for the idea, or by engaging an outside organization to create it. The principal players in this area are the broadcasting organizations, the film companies, the finance houses and the commercial/advertising organizations.

The proposal for the creation of the work will come either from an individual or group of individuals who will seek financial support for an idea, or will be generated internally in an existing commissioning organization which will then seek to identify individuals capable of carrying out the creative tasks involved.

Commissions in the cinema

In the cinema, the project will normally start with a script or a treatment setting out the broad outlines of the proposed film, which will be submitted to a producer. The submission of scripts or treatments arises either out of the activity of an agent promoting his or her client; out of the activity of a freelance writer looking for a commission or out of a commission given by the producer. The producer of the film is responsible for assembling the financial backing required and arranging for the creative talent to realize the ideas contained in the script or treatment. The producer may take an option on an existing literary work and commission a film script or treatment from a writer: it is not uncommon for film producers to take options on a wide range of published and unpublished works, not all of which will appear as finished cinema films.

The film rights in literary works are often extremely valuable and form a large part of the amount the author receives for the work. Alternatively, the author may agree to assign all or part of the film rights in return for a share of the eventual profits of the film, so reducing the amount of money needed by the producer to start production. *Star Wars*, by George Lucas and Steven Spielberg, was partly financed by the agreement of its writers and actors to accept a share in the profits instead of a flat fee or a royalty payment based on the number of screenings.

Productions made for television or video are almost never shown in cinemas, with the occasional exception of single plays or episodes of series and serials shown in art cinemas as part of a retrospective covering the work of an individual writer, actor or

director. Far less work is commissioned for video than for television and cinema. In fact, original productions made for video form only a small part of the video market: by far the largest part is taken up with films and television programmes. While the video market is important in the revenue structure of the production, the commissioning aspect is no more than a commercial decision to offer an existing programme to the market.

Some cinema films may find a market on video cassette without being released in cinemas: this is particularly the case with ethnic minority films or films in unfamiliar languages.

Commissions in television

Traditionally, the production process in television has been led by the broadcasting organizations themselves who have commissioned specific works to be produced either by members of their own staff or by freelance independent producers, in either case paid for from the resources of the broadcasting organization.

However, over the last decade this structure has greatly changed, and there is now in most of Europe a far greater use of independent productions in the existing national television organizations and on the newer private channels.

While the majority of independent television productions are pre-sold to a broadcasting organization, there is a significant amount of production that is made without a guarantee of transmission, with the production being marketed to the broadcasters either after a pilot episode has been made, or a first series completed. In such cases the commissioning will be a function of the production company in the first instance rather than the television broadcaster.

The rising costs of production have led to a far greater use of co-production and co-financing. This may take the form of *ad hoc* groupings formed for the purposes of a single production, or a longer lasting co-production grouping formed with a view to carrying out a number of projects over a period of time.

Production

This covers the creation of the audiovisual work by a team of professional workers, using specialist skills and equipment. The principal players in production are the broadcasting organizations, film companies and independent production houses. In the case of independent producers, and to a growing extent the broadcasters as well, facilities houses are often used. Facilities houses provide a full range of technical

skills for the execution of the production from initial script work through to the preparation of the complete package. Some production companies (Blackrod in United Kingdom is one example, Captain Video in France another) allow other companies to use their production facilities to maximize return on the capital invested.

Those involved in the actual creative process will include:

- performers (musicians, actors, artists, writers), usually referred to in the industry as the creative talent and represented commercially by agents and industrially by trade unions and guilds collectively described as the talent unions. They are most likely to be freelance workers engaged for a particular production.
- technicians (camera, lighting, sound, editing), sometimes employed as staff, particularly by broadcasting organizations, but very frequently working freelance, often as small teams of individuals accustomed to working together.

Production in cinema

Cinema production is almost invariably managed by *ad hoc* teams of specialists brought together for the purposes of the production. With the occasional exception of 'series' films such as the *Carry On* series or the Hammer 'Horror' productions, or the units assembled around a specific director, the creative team will be dispersed at the end of the production. It is increasingly common in the film industry for studios to be rented out to the producers on a 'bare walls' basis, which means that the producer has secured the use of the space and the ancillary facilities, which will be staffed by a team of his or her own choice.

This has led to the development of a number of specialist service companies in the cinema production field, concentrating their expertise on such specifics as titling, special effects, sound mixing, commissary, contracts, etc. In many cases the companies are founded on the skill and reputation of an individual.

Production in television

The borderline between television and cinema production is blurred in the case of large productions intended for an international market, but it is generally true to say that television production enjoys a smaller budget than cinema production, is more likely to be shot directly on video tape in Europe (as opposed to the common use of the more expensive 35mm film in the United States), and will in most cases be completed over a shorter period. Production techniques in television differ as a result of the small

screen size and the different circumstances in which the programme is viewed, and the reduced budgets mean that there is less money available for expensive special effects, location shooting and original costumes and music.

Changing structures within the broadcasting industry mean that it is no longer true to say that television programmes are always produced 'in house' by teams employed on the staff of the television broadcasters. A growing amount of television programming is produced under contract by companies set up specifically to meet the demands of the contract on offer: in many cases such teams are former employees of the television organization concerned.

Distribution

Once the work is completed it will be distributed to its audience either by broadcast (including satellite and cable) or release to the cinema or video cassette. A work may be distributed in all three forms (cinemas, broadcast, video), and there is an increasing tendency for audiovisual works, particularly films, to follow a calendar of releases allowing each sector to maximize its part in the exploitation of the work. The principal players in this area are the broadcasting companies, film companies, film renters, cinema chains and video distributors.

The time-scale for release of material into the market is not standardized in the different Member States of the Community. Table 10, below, gives a broad outline of the rules governing release of first-run cinema productions in the market in six countries.

This table clearly shows both differing national preconceptions and the different structures obtaining in national television services and has implications for the single European market in that material released legally in one country on video might not be available for release on video in another Member State with a longer delay between first theatrical film release and subsequent issue on video. At present, the language exclusivity of markets has tended to minimize this apparent problem.

Co-productions

A co-production is an audiovisual work in which the responsibilities for the production, along with the financial support needed for its completion, are shared among two or more partners. There is no standard European model for co-production agreements: the tasks involved in producing each programme are divided according to the available

resources and percentage share taken by the co-producing partners.

Table 10
Chronology of film release in six selected European countries

	Video	Pay TV	Open TV
FR of Germany	6 months (only FFA films)		2 years
France	1 year (1)	1 year (2)	3 years (3)
Italy	6 months		18 months (RAI) 2 years (private channels)
Netherlands	6 months		40 months (24 months for co-productions)
Portugal	2 years		
United Kingdom	3 to 6 months		3 years (but one year for cable TV)

(1) This period can be adjusted according to the box office performance of the film.

(2) Occasional exceptions for Canal Plus (for example, *Rayon Vert*) allowing transmission on the encrypted service of Canal Plus before release to cinema.

(3) Until 1990, for La Cinq the delay is two years. Co-productions with any of the television channels may in some cases be allowed to be transmitted after two years.

Source: EIM.

It is usual, though not inevitable, for co-producing partners to secure exclusive rights in the product for their own territory, and these rights often form part of the anticipated reward for taking part in the co-production. Co-productions are normally individually contracted between a leading partner and a number of other participants.

The increasing cost of audiovisual production has meant that almost all television broadcasters in Europe are interested in securing co-production arrangements. There is no centralized register of co-production agreements made, nor any standard formula for such agreements. The most common form for co-production is by contract among the partners, occasionally in the form of a separate operating company whose share capital is divided among the participants. The European Economic Interest Group, which came into force on 1 July 1989, would seem to be an appropriate vehicle for co-production groupings, but as yet the formulation is too new to have been accepted by any of the co-productions identified in our research.

Table 11 sets out the number of co-productions involving the main broadcasting organizations in the four largest European countries. The table is compiled by the European Institute for the Media from industry sources and is not exhaustive, but rather indicative, of the amount of activity.

Note the predominance of the United States in United Kingdom productions. This partly reflects the common language, but also the historically high interest of the American companies in the UK market.

Co-productions for the American market

The mounting cost of American production, and the fact that the revenue received from the American networks for first-run transmission (the 'licence' payment for use of the programmes) no longer covers the production costs of many series, has led American producers to attempt co-production deals with European organizations in the hope of sharing the costs.

The most notable such co-production has been *A Fine Romance*, co-produced for broadcast on the American ABC network by London Weekend TV (UK), New World Television (USA) and Phoenix Entertainment/Indieprod (USA). Each episode cost ECU 1 200 000 to make, but ABC was willing to pay only ECU 700 000 for the 'licence' to broadcast it.

This series opened in the 1989 American 'fall season', and has not been accepted by the American viewing public: ABC has removed the programme from the schedule. An earlier attempt, also involving London Weekend Television, was *Dempsey & Makepeace*, co-produced with Tribune Entertainment. That series was equally unpopular with American viewers and was not renewed after its first year in 'syndication', the American market technique of selling programmes to individual television stations outside the times allocated for broadcasts provided by the networks.

Current opinion in the American television industry is that the American viewer is reluctant to accept entertainment programmes shot outside the United States. According to Mr Ted Harbert, senior vice-president in charge of entertainment at ABC, 'Viewers have traditionally rejected shows with foreign locales'.

The narrower fields of documentary and nature series, much in demand in European television, are less likely to find a place in the American network schedules. Fox/Lorber Associates (USA) is co-producing a nature series: *Search for the world's most secret animals* with TélÉImages of France and Westbridge Films of Australia. However, the director of Fox/Lorber Associates, Richard Lorber, believes that the series will be shown on American cable systems rather than on any of the major networks, reflecting the lack of interest among US viewers in this type of programming.

While the question of cultural differences between Europe and America remain unresolved the most probable outlet in the United States for European co-productions with American partners is the cable network. However, the revenue from this form of broadcasting (essentially programmes are distributed by satellite to cable head-ends which then sell the service on to their subscribers as part of an overall package) is much lower than that potentially available from the networks.

Sample 'licence' fees paid by the larger American cable networks are:

- Disney Channel, ECU 300 000 for a telefilm costing ECU 1 000 000;
- USA Network, ECU 700 000 for a telefilm costing ECU 2 500 000.

Language transfer

The remaining hurdle to be overcome by European co-producers hoping to enter the American market is that of language. Programmes originally made in Spanish find some acceptance among the important Spanish-speaking minority in the United States, but the opinion of the American television industry is that all other European languages (including British or Irish English) are not widely accepted by their viewers, while programmes dubbed or subtitled are never shown on national broadcast networks.

The president of Harmony Gold, a major American producer, was quoted (*Variety*, 8 to 14 February 1989): 'I have to convince my French partners that we cannot shoot it in French and later dub it into English because Americans are just not used to dubbed TV shows.'

Export policies of the Community's competitors

The European Community faces substantial competition in the provision of audiovisual product from countries outside its borders, most notably the United States but increasingly Australia, Japan, Brazil and Mexico.

The competition is made more intense by the fact that there is a greater demand for audiovisual product than can be met at present by domestic European production (in part because as much as 80% of European domestic production is not seen outside the linguistic area in which it is produced) and in part because audiovisual product from other countries can often be offered in the European market for less money than the competing European product, which may appear to be less attractive.

Table 11
Current European co-productions in four countries in May 1989

Country/TV organization	Number of productions	Hours	Nationality of partners (1)	Type of production
FR of GERMANY				
Kirch Gruppe/Taurus TV	1	19.50	France (2)/Italy/Spain	13 episodes
	1	3.00	Germany (2)/Austria/Spain/Australia/Czechoslovakia	TV film
	1	5.50	Germany/Sweden	series
	1	2.00	Italy	TV film
	3	1.40	Italy/Germany/Austria	TV films
	1	3.00	Germany (2)/Italy/Spain	TV film
	1	5.00	EU (European Film Partners)	mini-series
	1	1.50	Italy/Austria/France/Spain/Germany	TV film
	1	1.50	Italy/Canada/European Film Partners: Austria/Germany	TV film
	1	1.50	UK (2)	TV film
	1	1.50	Germany/France	TV film
1	6.50	Spain	series	
FRANCE				
TF1	9	2.00	France/Switzerland	TV films
	1	6.00	Italy	mini-series
	10	0.90	France (2)/Italy	TV films
	1	17.00	France/Canada (3)	series
	37	0.90	France/Italy/Luxembourg	thrillers
Antenne-2	1	13.00	France/UK/Germany/Italy	series
	1	N/A	France (2)/Italy (3)	TV film
	1	4.00	France/Switzerland	mini-series
	1	4.50	France/Italy (3)	mini-series
	1	6.00	EU (European Co-production Association)	mini-series
	1	8.00	EU (European Co-production Association)	series
	1	6.00	France/Germany/Luxembourg	mini-series
FR3	1	5.00	France/Germany/Luxembourg	mini-series
	1	4.00	France (3)/Italy/Germany/Belgium/Switzerland	mini-series
	1	36.00	France/UK/USA	series
	1	6.00	France (2)/USSR	mini-series
	1	6.00	Canada	mini-series
	1	13.00	France/Germany/Switzerland/Poland	series
	1	9.00	France/Italy/Germany	mini-series
	1	6.00	France (2)/Spain/Italy	mini-series
	1	4.00	France/Germany	mini-series
	1	6.00	France/Spain/Italy	mini-series
	1	6.00	France/Italy	mini-series
	1	4.00	France (2)/Brazil	mini-series
	1	7.00	France (3)/Germany	mini-series
	1	4.00	France (2)/Germany	mini-series
	1	2.00	France (2)/Spain	TV film
	1	6.00	France/Poland	mini-series
ITALY				
RAI	1	3.00	Germany (2)	TV film
	1	3.50	Germany (2)	TV film
	1	4.50	Germany	mini-series
	1	2.50	Germany/France	mini-series
	1	3.00	Germany/France/USA	TV film
	1	7.50	Germany/Yugoslavia	mini-series
	1	11.00	Bulgaria	mini-series
	1	10.00	France (2)/Austria/Germany (2)	mini-series
	1	11.00	Germany (2)/UK/Austria	series
	1	1.50	USA/Germany/France	TV film
	1	3.50	Germany/France/Spain	TV film
	1	3.50	Germany/Canada/France/USA	TV film
	1	9.00	France (2)	mini-series
	1	N/A	Italy/France	mini-series
	1	N/A	EU (European Co-production Association)	series

(1) Figures in parentheses refer to number of partner organizations.

Table 11 (cont'd)

Country/TV organization	Number of productions	Hours	Nationality of partners (1)	Type of production
RetelItalia	10	0.90	France	TV films
	1	13.00	France (2)	series
	1	4.00	France/USA	mini-series
	1	2.50	Italy (2)/France	TV film
	1	10.00	Italy (2)/France	series
	1	6.50	Italy/Spain/France	series
	6	0.90	France (3)/Italy/Germany (2)	TV films
	6	0.90	Spain/France/Germany	TV films
	1	4.00	Germany/Spain	TV film
	1	3.00	UK/Italy	TV film
	6	0.90	Spain/France/Germany	TV films
	1	3.00	Italy (2)/Spain/France	TV film
	1	6.00	Australia/USA/UK	mini-series
UNITED KINGDOM				
BBC	1	4.00	France/USA	mini-series
	1	1.50	Japan/USA	TV film
	1	1.50	USA	TV film
	1	8.00	USA	series
	1	4.00	USA	mini-series
	1	1.50	USA/UK	TV film
	1	8.00	USA/UK	series
	1	6.00	France	mini-series
	1	1.50	Czechoslovakia	TV film
	Thames TV	1	3.00	USA
1		N/A	UK (3)/USA (2)	children's feature film
1		N/A	Australia (2)	mini-series
London Weekend TV	1	12.00	UK/USA (2)	series
	1	N/A	UK/USA	series
	6	2.00	USA/Germany	TV films
	1	1.50	USA	TV film
Central TV	1	1.50	USA	TV film
	2	1.50	USA	documentary drama
	1	1.50	USA/Italy	TV film
	1	7.00	Australia	mini-series
	1	6.00	France	mini-series
	1	4.00	France (2)	mini-series
Yorkshire TV	1	5.00	USA (2)	mini-series
	6	1.35	USA	TV films
Anglia TV	1	6.00	USA	mini-series
TV South	1	4.00	USA/Italy	mini-series
	1	4.00	Italy	mini-series
HTV	1	2.00	USA (2)	TV film
	1	2.00	USA	TV film
	1	2.00	USA	studio-drama
	1	4.00	USA	mini-series
	1	6.00	USA	mini-series
	1	4.00	Canada/USA/UK	mini-series
	2	2.00	France	TV films
	1	4.00	UK	mini-series
	1	4.00	USA	Disney club
Scottish TV	26	1.20	USA	Disney club
Channel 4	2	6.00	EU (European Co-production Association)	series

(1) Figures in parentheses refer to number of partner organizations.

The European television industry's revenues in 1988 were of the order of ECU 15 000 million, of which about 1% (ECU 200 million) came from the export of programmes outside the Community. By contrast, the American television industry, which broadcasts to rather fewer homes (88 million compared to 112 million in Europe) earned ECU 33 000 million, of

which ECU 1 200 million (about 4%) came from export sales.

The United States

As in film, the world's largest exporter of television programmes is the United States, which can be explained by a number of reasons.

The Hollywood factor

The skills and experience acquired over 70 years in Hollywood (much of it from European emigrés) have created a pool of talent, experience and excellence, which is referred to here as the 'Hollywood factor'. In combination with the marketing skills of the major studios, and their ability to capitalize on their investments over many years, the importance of Hollywood and its ability to create products acceptable throughout a range of cultures should not be underestimated. By contrast, and at the same time that Hollywood was building an international reputation, the European equivalent production centres, such as Cinecittà in Italy or Ealing Studios in England were producing material that enjoyed considerable success in the domestic market but far less in other European countries.

Separation of television production and distribution

Under United States federal anti-trust laws, the broadcasting networks are forbidden to provide their own programming (apart from news and sport) or to own a controlling interest in the production companies. This has led to a strong independent production sector, dominated in part by the Hollywood majors but also containing a number of companies whose growth has depended on the demand for network programming as well as sales to the smaller non-network stations and the export markets. This is in sharp contrast to the European tradition in which monopoly or near-monopoly public service broadcasters traditionally made a high percentage of their own programming 'in house': an arrangement which has only started to change in the last few years.

Market structures

In general, an independent American company expects to recover the bulk of its investment in a programme from the network which buys the first broadcast rights to it, described as the 'licence' payment by the network for the use of the programme. Traditionally, this licence payment covered the whole costs of production, leaving the producer to make his profit from further sales either in the United States market or to territories overseas. However, the rising costs of production and the refusal of the networks to countenance further increases in the

licence payment have meant that for the 1989 American television season, few if any of the programme producers are recovering their whole costs from the first network sale.

Subsequently, the programme can be sold for network repeats, for syndication (individual sale to television stations throughout the United States) and even for barter, a process in which a national advertiser will buy a number of spots in the programme which is then offered free or for very little money to television stations, with the possibility of selling additional commercials in spots unoccupied by the national advertiser.

Coupled with the way in which the performers' rights are traditionally handled in the United States (contracts normally assign to the producers the worldwide right to the performance) this structure has meant that American companies can realistically offer their programming abroad in the knowledge that they have already covered all their costs in the domestic market.

Outlook

The adoption of the EC Directive on Television without Frontiers on 3 October 1989 sets out a legal framework for the future development of the audiovisual sector. This Directive allows the free circulation of television broadcasts throughout the Community, thereby opening up new perspectives for broadcasters and programme makers.

In terms of growth of the sector as a whole, key indicators will be the acceptance (or otherwise) of direct home satellite broadcasting, and the willingness of European audiences to equip themselves to receive the already large offer of television channels available either by purchasing a satellite dish or subscribing to a cable television service. Based on past performance, that choice is most likely to be determined by the availability of programmes in the preferred language of the viewers, and it is undoubtedly true to say that the last barrier to be overcome in European television is that of language.

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MUSIC RECORDING

(NACE 345.2)

Summary

The period 1980-85 brought the music-recording industry mixed results. Sales declined, but since 1985, the overall downward trend has been reversed, largely as a result of the growth in compact-disc sales. This trend is expected to continue, although at a more moderate pace. Private copying and piracy continue to present a major threat to the industry.

Description of the sector

Although NACE category 345.2 (the manufacture of gramophone records and prerecorded tape) normally belongs to the class of manufactured products in the electrical engineering sector, we have put it here in the chapter on audiovisual industries.

The process of manufacturing the material medium (vinyl discs, tapes and, increasingly, compact discs) is only one of the activities of the industry considered here. Manufacturing of the medium cannot be separated from the rest of the production process: composition of music, played by musicians, recorded in studios, sold in shops. The link with other elements of the audiovisual entertainment industry, such as radio and TV broadcasting (NACE 974), is also obvious.

Current situation

Since 1980, sales of singles have declined, and the 'maxi-single', which appeared on the market in the early 1980s, has not had a sufficient impact to halt

this trend. The CD single is likely to take a significant share of the singles market, in the same way as the CD long-play is currently replacing the vinyl LP.

Although LP sales had already begun to fall in the early 1980s, the arrival of the compact disc accelerated this decline. In Japan, the 1987 CD unit sales already exceeded those of the vinyl LP and a similar pattern followed in the USA and France in 1988. The value of CD sales has already exceeded, by far, that of LP sales in major EC markets such as France, the Federal Republic of Germany, the Netherlands and the United Kingdom. Some record companies have even stopped releasing some of the repertoire on vinyl LP.

Sales of music cassettes have increased slowly but steadily since 1980, although this increase far from compensated for the decline in LP sales during the early 1980s.

CDs are only the first stage of digital technology to be marketed as a mass consumption product by the recording industry. The second stage will be the digital audio tape (DAT). DATs are smaller and give a better sound-reproduction quality than the conventional cassette.

DATs are only just being launched in Europe and sales are expected to take off slowly, due to a current controversy caused by the fact that the near-perfect quality of sound reproduction is bound to increase home taping dramatically, thereby rendering the copyright unenforceable.

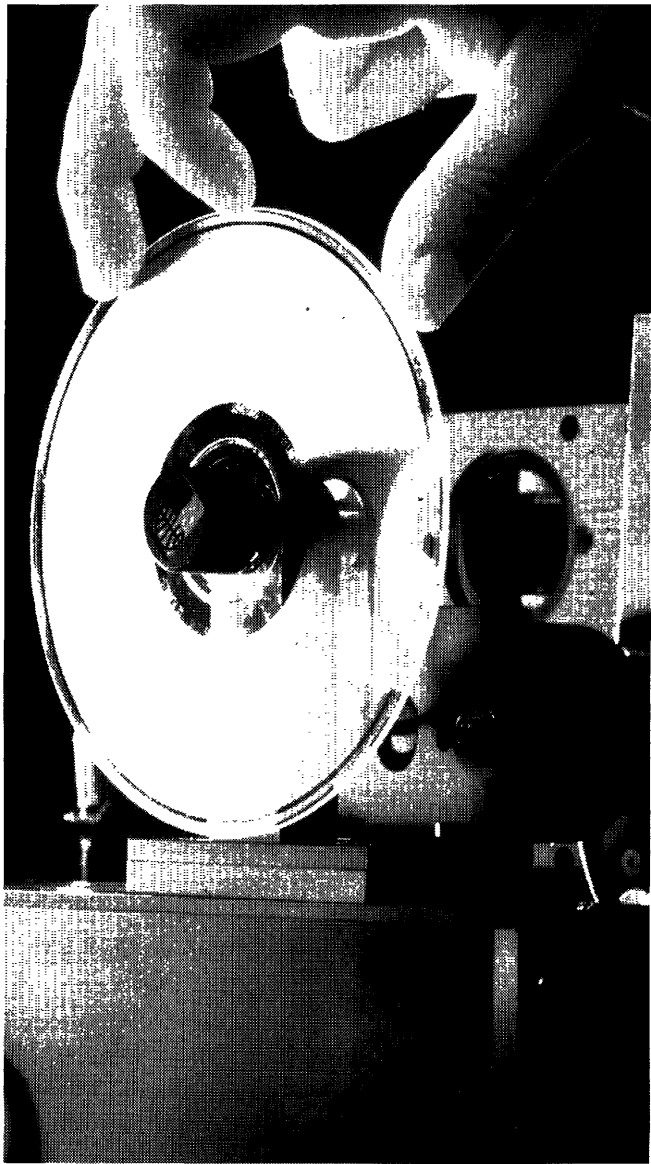
The music-recording industry has therefore reached an agreement with the Japanese and European

Table 1
Main indicators
The music-recording industry, sales and employment

(million ECU) (1)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Current value	1 786	1 931	1 949	1 874	1 902	2 080	2 192	2 511	3 175
Index	85.9	92.8	93.7	90.1	91.4	100.0	105.4	120.7	152.6
Constant value	2 492	2 454	2 269	2 050	1 985	2 080	2 111	2 351	2 988
Index	119.8	118.0	109.1	98.6	95.4	100.0	101.5	113.0	143.7
Employment (1 000)	128	125	122	118	115	111	107	103	110

(1) Ex-factory levels.

Source: IFPI.



manufacturers of DAT-hardware to ensure that copyright protection is guaranteed: one way of doing this is for manufacturers to introduce a device in the hardware designed to limit or prevent copying. At present, the repertoire available on pre-recorded DATs is still extremely limited.

Production and consumption

The EC's music-recording industry is the second largest in the world after that of the USA. In 1987 total world retail sales of legitimate sound recordings (i.e. sound recordings reproduced and sold with the authorization of the rightful owner) amounted to ECU 14.7 billion. US sales represented one-third of this amount (ECU 4.8 billion) compared with 30% for the EC (ECU 4.4 billion). Retail sales continued to grow strongly throughout 1988 and totalled ECU 5 billion and ECU 5.3 billion in the Community and the USA

respectively. World sales for 1988 are not yet available but are anticipated to exceed the 1987 level.

The EC record industry again experienced healthy growth in 1988. Sales value (at the trade delivery level — see Table 3) amounted to nearly ECU 3 billion in 1988, compared with ECU 2.5 billion in 1987, which represents an increase of around 18.2%.

Table 2
Sales in Member States by product, 1988 (1)

(1 000)	Singles/ EPs	LPs	Tapes	CDs	Value (ECU 1 000)
EC	157 900	185 000	234 900	129 400	3 174 600
Belgium,					
Luxembourg	6 200	2 966	1 881	4 497	70 983
Denmark	945	4 493	1 712	2 400	52 230
FR of Germany	31 600	58 100	59 900	39 200	695 652
Greece	N/A	4 800	3 300	200	27 617
Spain	1 598	17 800	23 292	2 487	168 641
France	42 748	19 400	31 000	25 900	534 945
Ireland	553	792	2 125	199	17 528
Italy	4 900	15 500	22 700	7 100	265 395
The Netherlands	8 400	8 400	4 800	17 800	190 000
Portugal	869	2 618	3 243	435	27 643
United Kingdom	60 100	50 200	80 900	29 200	927 727

(1) Ex-factory levels.

Source: IFPI.

Regarding unit sales, the trend described for the previous year was sustained in the EC. Unit sales of LPs and singles have continued to decline, CD sales have shown large rates of increase and tapes have experienced a steadier level of growth.

The 1988 unit sales were as follows: 158 million singles, 185 million LPs, 235 million tapes and 130 million CDs. These represented a decline of singles' sales of 13.3% and a decline of LP sales of 6.6%. Cassettes continued to increase (by 11.5%) compared to the previous year, while CD sales were up by 81.2%.

A country-by-country comparison discloses that the highest increase in sales value was recorded in France. Sales increased by more than 35% in 1988. The lowering of the VAT rate on sound recordings (from 33.3% to 18.6%) in December 1987 boosted sales and played a significant part in the huge increase in 1988 sales. The most modest (but still healthy) rate of increase (over 6%) was experienced by the Federal Republic of Germany. This may be due to the fact that, over the past few years, the FR of Germany has enjoyed a very high rate of increase and it was one of the first EC countries to recover from the economic recession that beset the recording industry in the early 1980s.

The country-by-country comparison further reveals that sales of LPs were down in every country except Italy, Portugal and Spain, where there was a small increase. Sales of singles were down in all EC markets. Unit sales of tapes were up in all countries except the Netherlands where there was a slight decline. CD sales were up again this year in every EC country. The unit growth of CD sales was very strong indeed. In France, unit sales of CDs increased by 107%; in the Netherlands the increase was 102% and in Spain 121%. The smallest improvement (58%) was recorded in Italy.

The period 1980-85 was difficult for the sector since it suffered constantly from falling sales. However, fortunes appear to have been reversed with the introduction of compact discs and digital audio tapes. CDs appeared on the market in Europe in 1984 and are proving to be an enormous commercial success. In terms of turnover, CD sales took off in 1985 and proceeded to reverse the downward trend of the previous years.

The music-recording industry reached its peak in 1978, when the number of units sold and turnover were at their highest levels ever. Trade deliveries of singles reached 265 million units and long-plays 495 million (364 million LPs and 131 million cassettes), representing a total value of ECU 1 622 million (ECU 2 000 million at 1980 prices).

In 1980, trade deliveries of singles dropped to 245 million and of long-plays to 477.6 million (329.9 million long-plays and 147.7 million cassettes). By the end of 1984, deliveries of singles had fallen by a further 3.4% compared with 1980 to 236.6 million. During the same period long-plays (232.2 million LPs, 155.8 million cassettes and 6.5 million CDs) sales fell by 17.4% (see Table 3). Even though the value of ex-factory sales increased from ECU 1 786 million in 1980 to ECU 1 902 million in 1984, in constant terms this represented a fall of 20.3%.

Since 1985 sales of sound recordings in the European Community have picked up, mainly as a result

of a rapid increase in CD sales. The value of 1987 ex-factory sales is estimated at ECU 2 509 million, which, in real terms, is still nearly 6% below 1980.

In unit terms, sales of singles and LPs continue to decrease. On the other hand, cassette sales are steadily increasing and CDs have risen sharply. Currently, the growth in CD sales more than compensates for the decline in the sales of singles and LPs. Over 1985-88 sales of CDs doubled every year; in 1985, just under 16 million units were sold in the 12 Member States; in 1986, sales rose to 35.7 million and provisional figures for 1988 show that over 129 million units were sold.

Although sales of sound recordings are increasing in the EC as a whole, the situation varies in individual Member States. In the United Kingdom and the Netherlands, turnover (in 1980 prices) started to increase in 1984. A similar upturn was observed in the FR of Germany, Denmark, Ireland and Spain in 1985, in Belgium in 1986 and in France and Italy in 1987. In Greece and Portugal, however, sales are still marginally declining. These two countries also suffer from a serious piracy problem, which makes recovery of the industry more problematic.

Major structural and geographic features

There are 22 large vinyl pressing and tape-duplication plants in the EC: three in the UK, three in the Netherlands, five in France, five in the FR of Germany, one in Greece, three in Spain and one in Italy; there are also many small and medium-sized plants. In the UK, for instance, there are a total of 27 vinyl pressing and/or tape-duplication plants.

There are 18 CD plants throughout the EC: five in the UK, seven in the FR of Germany, three in France, two in the Netherlands and one in Italy.

For many years, the Netherlands served as the manufacturing centre of sound recordings for Europe and, to some extent, for the rest of the

Table 3
Sales by product

(million units) (1)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Singles/EPs/maxi-singles	245.0	251.4	255.0	249.6	236.6	229.3	202.5	183.5	157.9
LPs	329.9	312.5	290.0	253.8	232.2	224.7	211.4	198.3	185.1
Tapes	147.7	157.0	162.5	148.1	155.8	171.4	193.5	208.5	234.9
CDs	0.0	0.0	0.0	2.1	6.5	15.7	35.7	65.3	129.4
Current value (million ECU)	1 786.1	1 931.4	1 948.8	1 874.3	1 901.7	2 080.2	2 192.3	2 510.8	3 174.6
Constant value (million ECU)	2 492.1	2 454.6	2 269.5	2 051.1	1 984.5	2 080.2	2 111.4	2 350.6	2 987.9

(1) Ex-factory levels.

Source: IFPI.

world; the three large plants in operation belong to the three big recording multinationals: EMI, CBS and Polygram. The introduction of the compact disc has dramatically changed this production pattern. At present none of the three multinationals manufactures CDs in the Netherlands. This means that, given the decline of the vinyl market, these three factories will have to restructure or discontinue their activities at some point in the future. The two CD plants operating in the Netherlands are small and together employ only 50 people. The Community's CD manufacturing centres are the FR of Germany and the United Kingdom.

Employment

Employment in the music-recording industry is strongly linked to sales patterns. Moreover, the prosperity or decline of the industry has a strong impact on other, related sectors: the music retail sector, musicians, authors, composers, performers and music publishers.

Employment in the music-recording industry peaked in 1978, when 38 000 people were directly employed in the nine Member States and a further 99 000 in the retail sector. When account is taken of musicians, authors, composers and music publishing, it is estimated that about 230 000 people depend wholly or partially on the industry.

In 1982 direct employment provided by the industry fell 22.9% to 29 300 persons (29 800 including Greece). Similarly, employment in the music retail sector fell by 9.6% to 89 500 (92 000 including Greece). Detailed statistics on employment trends only exist in France and the United Kingdom. In France, employment declined by 45% between 1978 and 1986 and in the United Kingdom by 30% during the same period. However, in the UK employment seems to be rising again, whereas in France it is still declining.

Major threats to the industry

In the past few years, the music-recording industry has devoted a great deal of human and financial resources trying to solve or at least keep under control two major problems threatening the industry: private copying and piracy.

Private copying

Private copying is the most serious problem facing the music-recording industry in Europe today.

Although many factors contributed to the slump in sales from 1980 to 1984, home taping played a major role. EC retail sales amounting to ECU 4 400 million are estimated to represent ECU 11 000 millions' worth of home-copied music. Three hundred and fifty million blank tapes are sold annually and it is estimated that most of these (90 to 95%) are used to copy copyright-protected material. Although the enormous success of the compact disc seems to have injected new life into the recording industry, the impact of private copying should not be underestimated. The recent arrival on the European market of the digital audio tape which offers quality comparable to that of the CD, means that the problem of private copying will be further exacerbated: unlike analogue cassettes, where successive copies of a sound recording result in a severe loss of quality, DAT enables successive copies of a sound recording to retain the same sound quality as the original.

Piracy

Piracy is also a serious issue facing the sector. It generally takes one of three forms:

- piracy in the strict sense, which is unauthorized commercial duplication of a sound recording, which is then packaged differently from the original legitimate product;
- counterfeiting, which is production of the unauthorized copy, which is intended to look as much like the original as possible in order that the consumer should be deceived;
- bootlegging, which is the unauthorized commercial reproduction of a live performance or a broadcast.

In most of the EC, piracy is now relatively well controlled and represents under 5% of total sales. However, in Italy, Greece, Spain and Portugal, the problem is still very serious, with piracy in 1986 accounting for 33, 35, 20 and 80% of sales respectively. Disturbingly, the 1986 figures for the FR of Germany and the Netherlands, while still low, show a significant increase with reference to 1984. Total losses in the EC market in 1986 are estimated at 23.6 million cassettes with a retail value of ECU 95 million and at 5.8 million LPs with a retail value of ECU 30.2 million.

A recent phenomenon not included in these figures is the unauthorized copying of early 'back catalogue' material. This material, which includes popular classic recordings by artists such as Cliff Richard or Elvis Presley, is generally more than 25 years old

and may, therefore, be out of copyright in some Member States. IFPI maintains that such unauthorized copies cannot be sold in markets with longer protection periods. A case between EMI Electrola in Germany and Patricia, a company importing goods from Denmark into the Federal Republic of Germany, was recently presented to the European Court of Justice. The judgment, which was given on 24 January 1989, ruled that when there are discrepancies between the duration of protection of sound recording between Member States it is possible for the right holder in the country of longest duration of protection to stop imports into his country of recording not under protection in other countries. The Court thus gave priority to national law over Article 30 of the Treaty of Rome on the circulation of goods.

The scale of the problem — which accounts for sales of several million ecus per annum — is such that urgent action is needed to harmonize the duration of copyright protection between Member States.

However, the major problem for the EC industry is not piracy in the home market. Piracy in other regions — in particular the Far East, Middle East and Africa — is taking place on a much larger scale. World-wide, the industry lost in the region of USD 1 thousand million (ECU 984 million) in 1986, and this figure does not include markets where economic and legal conditions make legitimate penetration impossible. More than 30% of the repertoire copied is owned by EC companies or features European artists. This represents a considerable loss of licensing income for the EC record industry.

Whereas progress has been made over the past few years, particularly in the Far East, where tough new laws have been adopted in Malaysia, Singapore and, most recently, in Indonesia, piracy in much of the world still accounts for over 80% of all sales. Even as traditional sources of pirate material such as Singa-

pore are cleaned up, new factories open up in other countries where protection is still weak. The Gulf States, in particular, seem likely to emerge as the new capital of piracy.

The EC record industry has invested millions of dollars in tape and record production facilities throughout the Third World. This investment could be completely wiped out, with factories being forced to close and local workforces laid off, unless action is taken at the highest level to encourage governments to adopt comprehensive and, above all, enforceable copyright laws.

Outlook

Growth in the volume of legitimate sales is likely to increase at a fast rate, although the rate of increase will be lower than the 100% increase experienced over the past five years. Sales of LPs will continue to decline at a significant rate but sales of cassettes are likely to increase moderately. Singles will continue to decline but this may be offset by a large increase in the sale of CD singles.

The DAT could change the pattern of sales of cassettes. At the moment, the DAT has been introduced onto the market of some European countries but has not yet been strongly promoted, largely due to the controversy surrounding this new medium. Moreover, pre-recorded DATs are still scarce and the price of the hardware and software is still unacceptably high. However, when pre-recorded DATs become available and when prices decline, the DAT will probably turn out to be as popular a medium as the CD.

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INFORMATION SERVICES

The economic importance of the industry in the EC economy

The information services industry has developed rapidly over the last decade, in conjunction with an equally explosive growth in telecommunications equipment, and the demand for and use of personal computers. The combined value of the information services industry (telecommunications, software, computing and electronic information) accounts for approximately one-quarter of the world market in information services, and is valued at more than ECU 110 billion, larger than the computing and telecommunications equipment industry upon which it is based.

Telecom services is the largest component of information services and was valued at ECU 70 billion in 1987. This compares with a telecommunications service of approximately ECU 115 billion in the US and, in Japan, of ECU 32 billion. The EC computing and software services sector was valued at ECU 28 billion in 1988 and the Western Europe on-line information market is estimated at about ECU 2.2 billion, small relative to the telecommunications, computing and software services, but still relatively new in its development.

Within the EC Member States, there are significant variations in the way the information services industry has developed. Differences in the number of lines, tariff levels and income have contributed to wide variations in the contribution of telecommunications services to GDP across the EC. The provision of electronic information services has been constructed largely on national lines. The computing and software services sector has also developed differently in some Member States. Package software, for example, is more strongly represented in the Federal Republic of Germany whereas in France, custom software and consulting is more highly developed.

Growth in information services has sprung from the need to tap into the capabilities of information technology and the need to use it more effectively in an increasingly competitive and global market. Telecommunications services, the largest and more

established component of information services, have been expanding at about 8% over the last several years. Computing and software services expanded at a rate of 17% in 1988 over 1987 and electronic information services have been expanding at an annual rate of 20% over the last several years.

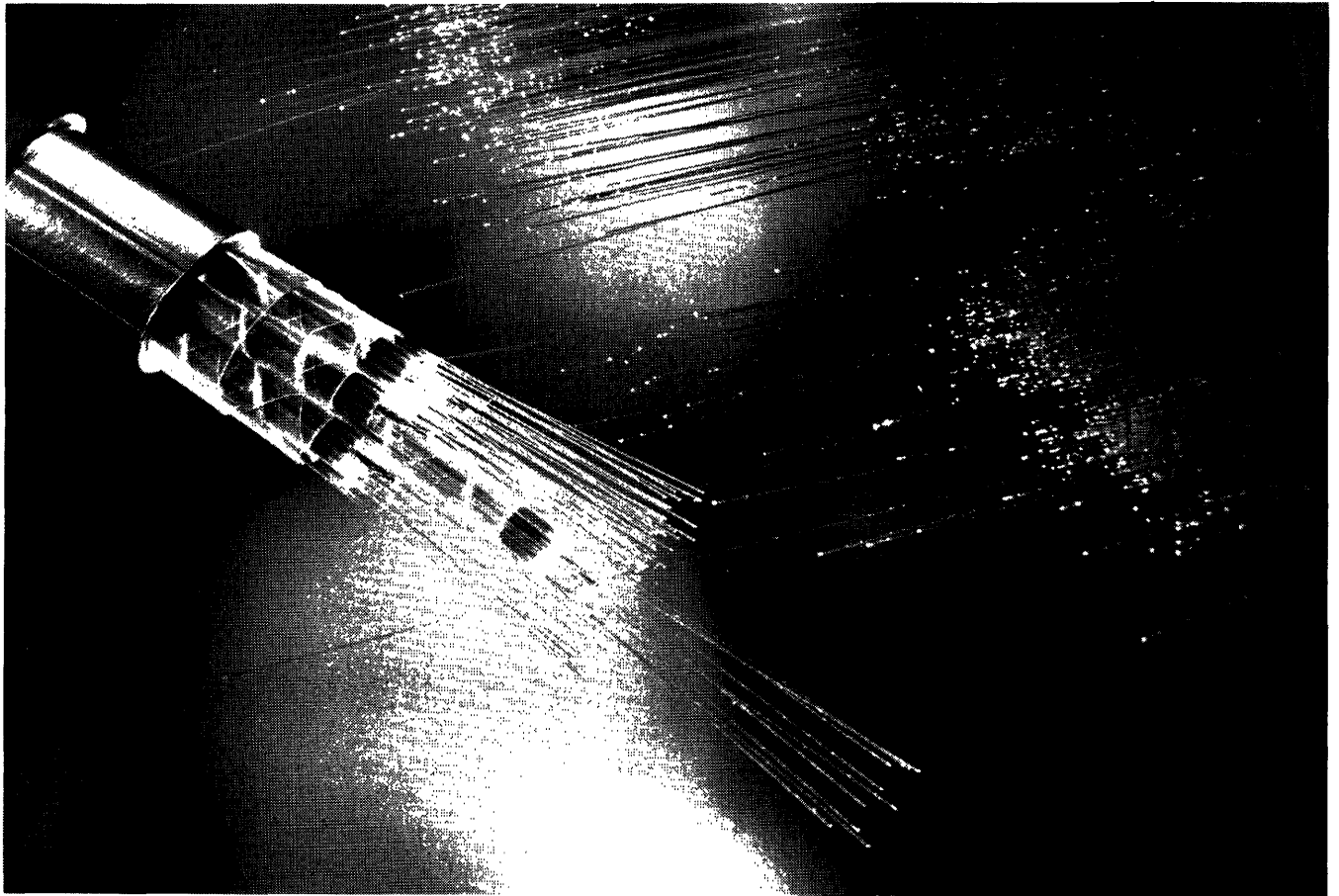
Description of the industry

Telecommunications services are covered by NACE 790, which includes both postal and telecommunications services. The sector consists of voice telephony, text services, mobile, data and image communications, videotex and ISDN.

Computing and software services include software which is sold or licensed commercially, consulting services, processing services and training. Electronic information services refer to on and off-line queries to data bases. There is very little information at the NACE level for both of these sectors and private market consultancies have provided estimates of the size of and trends in the market of each.

Industry structure

The public sector is a dominant force in the telecommunications and the electronic information services sectors, although both ownership and competition is changing throughout the Community as the regulated environment moves in a more liberated direction. Public ownership in telecommunications services varies between the Member States as does the amount of competition permitted in each. There has been a trend to separate post and telecoms services and in some cases to introduce privatization or to involve privately-owned companies in the provision of telecommunications services. In the UK, for example, British Telecom (privatized in 1984) has given regulatory and supervisory authority to a private company, Oftel. The Netherlands and the Federal Republic of Germany are restructuring their telecoms authorities, Spain has adopted a new telecommunications law and France, Belgium, Italy and Portugal are also looking at liberalizing telecommunications.



Although the public sector has also been a leading producer of data banks, much of the recent expansion in electronic information services has been a result of privately developed data banks which provide corporate, economic and legal information. By 1987, public authorities accounted for 38% of European on-line data banks compared to 45% for private companies and 17% for non-profit organizations.

Outlook

The globalization of markets, increased competition, and technological developments are all important factors in the future growth of the information services industry. Increased foreign investment in Europe and also European investment abroad will continue to raise demand for telecommunications services, in particular non-voice services such as fac-

simile machines and modem-operated data access. Technical developments such as the digitization of the network and terminal equipment will also expand the efficiency and the range of services available. As a result, the telecommunications sector is expected to evolve as rapidly over the next several years as it has in the past few and to expand at a rate of over 9% annual growth in the coming years.

Increased competitive pressure as the EC nears the completion of the single market will also increase demand for information services both as a competitive tool and as a means to improve efficiency. Coupled with the greater acceptance and use of computers in the workplace, the demand for computing, software, and electronic information services should continue to expand at rates of 20% or more over the next several years.

DRI Europe

TELECOMMUNICATIONS SERVICES

(NACE 790)

Summary

The telecommunications service sector is an integral part of the rapidly growing information services sector. The telecoms services sector alone already represents nearly 2% of Community GDP. The market is still predominantly voice traffic but technological and regulatory developments mean that data and document transfer are already significant and image transfer and mobile communications are also growing fast. The next generation of services will be dependent on digitization of the network, common access to a wide range of services (ISDN) and eventually broadband services. The Community is already well advanced in this field.

Introduction

Historically, post and telecommunications services have been provided by wholly government-owned enterprises operating in some cases under a single Ministry. In the last decade, there has been a tendency to separate these operations, introduce greater commerciality and in one instance (the UK), privatize telecommunications. Moreover, as technological advance has eroded the natural monopoly base behind telecommunications service provision, there has been a growing realization, as expressed in the Commission's Green Paper on telecommunications, of the need to separate operations and regulatory control. Even where the incumbent telecommunications service provider has remained in public ownership, there have been increased attempts to foster competition and allow market entry, particularly in new market services such as value-added services and mobile communications.

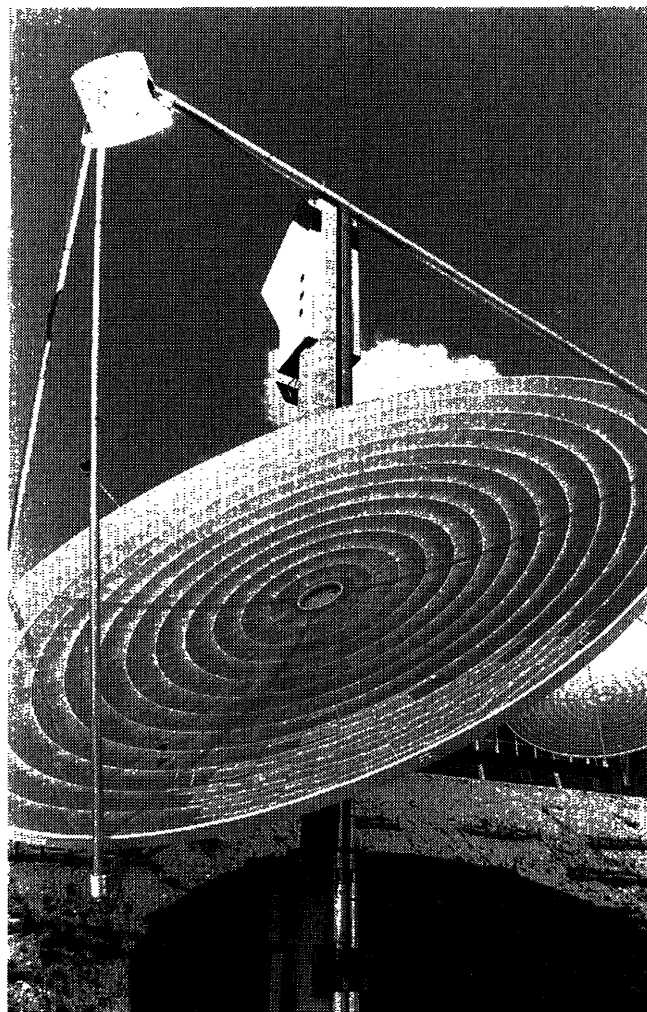
Telecommunications services are still dominated by voice traffic. About 85% of PTT revenues derive from public telephony, although a small but rapidly growing part of this (for example, fax and modem-operated data access) is non-voice. However, technical advances such as digitization of the network, decreased cost of data storage and processing and increasing use of intelligence features mean that not only are a number of value-added services being developed but that telecommunications and computer-based information services are merging and business is increasingly using the telecom network for non-voice traffic.

Sector definition

Telecoms services consist of voice telephony, text services (paper media) such as telex, teletex and telefax, mobile communications, data communications, image communications, videotex and ISDN services. Voice telephony still accounts for the major part of telecoms services and most of this passes by the public switched network. But part of the public network is leased and this may be used for voice telephony value-added services or non-voice services.

NACE 790 covers both postal and telecommunications services which are increasingly separated institutionally and organizationally.

The telecoms services market can be assessed on the basis of the revenues of the telecommunications authorities. Revenue collected by virtue of telephone subscription can in principle be distinguished from





revenue from, for example, telex, data communications and leased lines. It may also be possible to distinguish telefax revenue on the public switched network if all lines used for telefax are registered separately. However, it is technically possible to receive and send telefax messages on a privately subscribed line (as with data communications using a PC) so it is unlikely that the extent of telefax usage can be easily assessed from telecoms authorities revenue especially as voice, fax and data-processing functions increasingly merge.

Another method for assessing the telecoms services market consists of surveying service users. However, there is the problem of allocating a number of subscription charges (connection and repair costs, apparatus hire, directory cost etc.) to a wide choice of services, particularly as these do not necessarily reflect the full cost of such access to the range of services. In general, the 'revenue' approach will be used here to indicate the size and structure of the market for telecoms services.

Current situation

The total world market for telecom services was about ECU 325 billion in 1987 of which the Community share was about ECU 70 billion or 22%.

There is also a small but rapidly growing value-added services market, mostly confined in Europe, North America and Japan, and estimated at about ECU 12 billion in 1988.

The market for telecom services depends to a large extent on the established network structure as well as on the prospective demand for services amongst business and private users. The number of main lines in the Community has increased from about 55 million in 1975 to about 123 million at the end of 1987, or an average of about 38 main lines per 100 inhabitants. This compares with about 126 million in the USA (52 per 100 inhabitants). This figure applies to total existing lines rather than allocated subscriber lines. The latter is estimated at about 110 million lines (45 per 100 inhabitants). Japan counts a total of 46 million lines (38 per 100 inhabitants). Details for individual Community countries are given in Table 1.

The 1987 revenues reported by the telecoms authorities in the Community were about ECU 70 billion, of which about 86% derived from the telephone service. The remaining revenue included other services such as telex, data services, leased lines and a number of fixed charges which are not accounted with telephone revenue. Telex services accounted for

Table 1
Distribution of subscriber lines and digitization rate, 1987

	Subscriber lines (million)	Subscriber lines per 100 inhabitants	Digitization rate (1) (%)	Estimated digitization 1990 (1) (%)	ISDN commercial launch date
Belgium	3.4	34.5	1.6	31.5	1990
Denmark	2.6	52.0	2.0	25.0	1991
FR of Germany	27.5	45.6	2.0	9.0	1988
Greece	3.5	35.0	0	5.0	1993
Spain	10.2	26.2	7.0	22.0	1991
France	24.8	44.6	55.0	70.0	1988
Ireland	0.8	22.3	42.0	65.0	1991
Italy	19.0	33.3	13.0	30.7	1992
Luxembourg	0.2	45.9	12.0	23.0	1991
The Netherlands	6.2	42.7	7.4	35.0	1989
Portugal	1.6	15.8	0	20.0	1993
United Kingdom	22.9	40.8	9.6	42.0	1989
EC	122.7	38.1	17.2	35.0	

(1) Percentage of user lines linked to digital local switches at end of year.
Source: CEC studies.

just over 3% of revenue and public data transmission services for about 1%.

Table 2
PTT telecom service revenue, 1987

(billion ECU)	Telephone service revenue	Total service revenue	Telephone as proportion of total (%)	Revenue per line (ECU)
Belgium	1.4	1.7	80	500
Denmark	0.9	1.5	63	583
FR of Germany	15.8	17.9	88	650
Greece	0.7	0.8	85	222
Spain	3.4	3.8	91	373
France	12.3	15.1	81	609
Ireland	0.6	0.7	91	878
Italy	9.2	10.3	90	540
Luxembourg	—	—	91	455
The Netherlands	3.0	3.2	93	520
Portugal	0.7	1.0	68	597
United Kingdom	11.4	13.4	85	584
EC	59.5	69.4	86	566

Source: ITU.

Other data sources suggest (see Table 2) that 89% of the revenues of the telecoms authorities were derived from telephony (voice, telefax, subscriptions, etc.), the remainder consisting mainly of telex (3.4%) and data services (5%). Mobile communications still account for a very small proportion; together with image services it still accounts for less than 1% of the market.

The telecom services market in the Community represents about 2% of GDP. This proportion varies between Member States depending on the number of lines, tariff levels and income. There is no uniform connection between GDP per capital and the proportion allocated to telecom services.

By way of comparison, total reported telecom service revenue in the USA was about USD 115 billion or about ECU 100 billion in 1987 of which 89% was for telephony. This is an underestimate of the telecom services market in the USA and the true value is closer to USD 150 billion. In Japan, total reported telecom revenue was YEN 5 314 billion or ECU 32 billion in 1987 of which 85% derived from telephony.

Industry structure and regulatory development

For the most part in the Community, the telecommunications infrastructure is owned and operated by a publicly owned telecom authority. There are, however, a number of variations on the degree of public ownership, on the balance between governmental and commercial control and in the amount of competition permitted. Moreover, the regulatory environment is tending to move in a more liberal direction.

The present situation is summarized in Table 3. The general tendency has been to separate post and telecoms services, introduce greater commerciality into management and in some cases to create separate companies or organizations to run operations such as data communications or international traffic.

In the UK, competition in basic telephony has been encouraged by allowing a second wholly private company to own and operate infrastructure. The original network owner and service provider, British

Telecom, (formerly the Post Office) was effectively privatized in 1984 by selling 51% of the shares. A separate body — Oftel — was created to regulate behaviour, supervise tariffs, issue licences and ensure access for other service providers (including mobile communications) and give general guiding principles for additional liberalization.

Developments have also been taking place in most other Community countries. The Netherlands State-owned PTT acquired the status of a commercial company (NV) at the beginning of 1989, whilst remaining for the moment in public hands. From 1 July 1989 Deutsche Bundespost (DB) — Telekom will be separated from Posts, though remaining wholly publicly-owned. In the Federal Republic of

Germany, as in France, important steps have been taken to liberalize value-added services and mobile communications. Spain has adopted its new telecommunications law and Belgium, Italy and Portugal are taking major steps in the structural reform of the sector.

Legislation and developments at a Community level are also having an important impact in the provision of telecom services. Markets for terminal equipment have been liberalized and the European Telecommunications Standards Institute has been set up. Already the range of terminal equipment which is available, combined with the more commercial approach of service providers is leading to a variety of enhanced telephone services and with it increasing telephone usage.

Table 3
Regulatory and operational functions in the telecommunications sector of the EC

	Regulations and supervision	Main operators
Belgium	Ministry of Communications and PTT	Telecommunications Administration (RTT)
Denmark	Ministry of Communications Telecommunications Inspectorate	Telecom Denmark Telecom of South Jütland Telephone Companies of Copenhagen, Jütland and Fyn
FR of Germany	Ministry of Post and Telecommunications	Deutsche Bundespost — Telekom (1) Second Mobile Telephone Operator (2)
France	Ministry of Post, Telecommunications and Space Audiovisual High Council (CSA) (3)	France Télécom French Radiotelephone Society (SFR) Transpac
Greece	Ministry of Transport and Communications	Hellenic Telecommunications Organizations (OTE)
Ireland	Ministry of Communications	Telecom ÉIREANN
Italy	Ministry of Post and Telecommunications (Inspectorate of Regulation)	ASST, DCST, SIP, Itacable, (possibility of creation of a 'Super-Stet' holding company) (4)
Luxembourg	Ministry of Finance (PTT Admin.)	PTT Administration
Netherlands	Ministry of Transport and Public Works	PTT Telecom plc
Portugal	Ministry of Public Works, Transport and Telecommunications Communications Institute of Portugal (5)	Post and Telecommunications (CIT) Porto and Lisbon Telephone Operator (TLP) Radio Marconi Company of Portugal (CPRM)
Spain	Ministry of Transport, Tourism and Communications	Telefonica SA
United Kingdom	Ministry of Trade and Industry (DTI) Office of Telecommunications (Oftel)	British Telecom (BT) British Telecom International (BTI) Mercury Communications City of Kingston-Upon-Hull Cellnet Vodafone

(1) Separation to come into effect in July 1989.

(2) Consortium to be authorized in September 1989.

(3) Up to March 1990.

(4) Reform projects of April 1989.

(5) To be created end of 1989.

Source: EC Commission, DG XIII, May 1989.

In addition, discussion is under way on the liberalization of service markets (excluding basic telephony and telex) and public sector contracts in the Community. Furthermore, legislation in other specific areas such as the coordinated introduction of mobile communications and ISDN are influencing the development of telecoms infrastructure in Europe.

Value-added services and new services

Whilst the telecommunications network is still predominantly used for voice traffic, it is important to recognize the vast potential for non-voice traffic. In this respect the value-added service market, though small, is growing fast. The main service suppliers at the moment are the public network operators, particularly for data communications, and large international private companies such as Reuters, IBM and Geisco. In addition there are consortia of companies who provide information services for the banking and transport sectors etc. (e.g. Swift, Sita, Istel, Visa, American Express). Such private user groups usually have their networks in the sense that they operate their own switching systems on leased lines. These electronic information services are dealt with in more detail in a separate chapter for NACE 839.3.

To be accurate the term value-added services should be applied to situations where lines or part of network capacity are leased from the network owner and some processing of voice, text, data or image outside the public infrastructure is provided to a third party. The Commission has proposed that service provision in this area should be liberalized and opened to competition on a progressive basis. The process would begin with value-added services and then cover data-switching services and the resale of leased line capacity. A number of reserved services such as voice telephony would, for the time being, be excluded from this process.

The world (mostly North America, Europe and Japan) value-added service market is estimated at about ECU 12 billion in 1988, of which the Community share is 30%. The Community market grew by about 20% in 1987. These market figures include both the charge for transport and the charge for the information itself, where relevant.

The two main types of service in the Community are information retrieval from databases (ECU 1.5 billion) and services such as financial transactions in closed user groups (ECU 1.5 billion). The other value-added services are electronic document inter-

change and messaging and data transmission facilities.

It is also important to mention the growing videotex market which is opening the value-added service market to residential users and small businesses. The service is most developed in France which had over 90% of the installed capacity in the Community in 1987. Videotex income in France in 1987, including both transport and information supply charges, was ECU 400 million.

Trade in services

For the international telephone service, a revenue-sharing mechanism between countries exists. But the revenue to be shared is clearly dependent on telephone usage in the home country and on the tariffs that are applied, so that trade imbalances between countries can often be considerable. Payments are also due to owners of intercontinental infrastructure and satellite fees in Europe are paid to Intelsat.

The European Community had a surplus with the USA of about ECU 300 million in 1988. This balance is dependent on a number of factors. For instance, as tariff levels on international calls drop in Europe relative to the USA, then the Community surplus will tend to increase as revenue collection declines. However, to the extent that telephone usage is encouraged, then revenue collection in Europe increases and the surplus will decrease. A major effect is the propensity for residents to make international telephone calls. Given that residents in higher income countries tend to make longer and more frequent calls, there will always be a tendency for higher income countries to run deficits on the telephone service.

With respect to new services, it is even more difficult to gauge trade flows and balances. Estimates suggest, however, that the Community has a deficit with the USA, particularly in electronic information services such as databases. A 1986 study of the information service market, for example, suggested that EC exports to the US were about ECU 2.5 million while imports were about ECU 42.6 million, a deficit of about ECU 40 million.

Outlook

A number of factors, technical, regulatory and economic are effecting the development and outlook for the telecommunications service sector. Digitization of the network and increasingly sophisticated net-

work and terminal equipment is allowing greater variety, speed and quality of service provision. Technical developments combined with increasingly competitive supply are leading to a decline in the real cost of services, and the demand for improved telephone services and new non-voice services clearly exists, especially amongst business users.

The telecom services revenue of the PTTs in the Community has been growing at a rate of about 8% in recent years and this market is expected to grow from ECU 70 billion in 1987 to about ECU 120 billion in 1993, an annual nominal growth rate of 9.5%. Enhanced telephone services which comprised about ECU 0.5 billion of this 1987 total are expected to grow at about 30% per year to ECU 2.7 billion in 1993. Enhanced services comprise supplements to the traditional telephone service such as detailed invoicing, call forwarding and holding, etc.

Other services which are likely to increase at rates substantially in excess of traditional voice telephony are mobile voice telephony and paging, document transfer and information and communication services in general, although all these services are growing from bases that are quite small. In the case of document transfer and data communications, there is likely to be a shift in the mode of service. The facsimile terminals market in the Community is expected to increase at over 20% for the next few years. The installed base in Europe was already about one million machines in 1987 so that telefax and to some extent electronic mail is displacing telex usage. However, there will still be a market for telex services while these documents retain their special legal status.

In the longer term, the commercial introduction of ISDN (Integrated Services Digital Network) and eventually IBC (Integrated Broadband Communications) fostered by the RACE programme, will have a

significant effect on the way telecom services are provided and used. By the end of 1989, commercial ISDN will be in service in three Community countries, (France was the first in 1988 followed by the Federal Republic of Germany and the UK). The intended introduction dates for commercial ISDN for other Member States are given in Table 1, (see also the chapter on telecommunications equipment for developments on the Community-wide introduction of both ISDN and EDI).

The entire public telephone network can be digitized (i.e. including local connections) by adding software and electronic equipment without having to replace local existing copper wiring. In this way, it is possible to introduce a range of services (both voice and non-voice) in the same network whilst employing a limited set of interfaces. Such a development enables more sophisticated voice communication (e.g. call diversion, completion of call, call identification etc.) and provides common access to those services which are at present separated: voice telephony and the public switched telephone network, telex, circuit switched data and packet switched data.

The introduction in the second half of the 1990s of integrated broadband communications (comprising networks of optical fibres, satellite links and broadband switches) will mean that communication capacity will be larger and transmission faster and will lead to the full integration of image communications, including television, with voice and data communication.

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SOFTWARE AND COMPUTING SERVICES

Summary

In 1988, the market for software and services in the Community was valued at ECU 28.2 billion — 17.2% up on the previous year. Sales were particularly buoyant in the network services, systems integration and software products segments of the market.

Software products were the dominant market segment (41%), followed by custom software and associated services (37%) and processing and network services (22%).

Merger and acquisition activity continued unabated with the manufacturers of computers and of consumer and investment products being the most active suitors.

Sector definition

The sector comprises a variety of products and services that are supplied in a variety of combinations.

The definition includes only software which is sold or licensed commercially, but not software which is developed and used by one and the same organization (user development of software and captive sales of software).

Where software is sold with hardware, as a turnkey system or customized system, the value of software alone is estimated. Bundling is a marketing and pricing tool which conceals the respective values of hardware and software and makes it difficult to monitor the development of prices or value-added for a large portion of the software produced and traded in the Community.

Package software is sold or licensed in multiple, identical copies (on tape or disk, etc.) that cannot be modified in substance by the user. The term covers both system software and application software which is supplied together with hardware (as a computer or system) or as a separate product. System software tends to be first supplied to a manufacturer of hardware who integrates his hardware with the software.

Custom software is tailor-made in response to the particular requirements of a user or a closed user group. It may be supplied together with hardware as an application-specific processor or system, or under a separate service contract. Where the functionality

of an existing system is being integrated or extended, it is becoming the convention not to speak of custom development but of 'system integration'.

The boundary between standard and customized software is becoming blurred as the suppliers of package software are aiming for more user-friendly, personalized products, whereas the development of fully customized software solutions is relying increasingly on the standardization of development methods and the reuse of common software elements so as to raise the productivity and efficiency of the development process.

Consultancy services include, for example, information technology, management, marketing, financial or legal consultancy. In essence, their output consists of problem solutions in the form of software programs. From a supplier and user perspective, it is often difficult to segregate the consultancy and software elements which are provided at the same time. The same is true for sophisticated application packages which cannot be sold without an understanding of user requirements, ie. consultancy.

Processing services: the term covers several service activities, the majority of which are supplied from the premises of the service provider or on the premises of the client. These services include:

- the routine processing of large amounts of data or information, for example, in pay-roll, accounting or manufacturing applications;
- the (technical) management and maintenance of (corporate) information systems;
- new software-intensive, network-based business information services that add value to existing communications infrastructures.

Most companies in the latter category cannot as yet be clearly attributed to either 'software and services' or 'telecoms services' or 'information services', because they have not yet reached the point in the service life circle where a dominant activity is immediately apparent.

Training: most users require some form of general or specific training for the use of software and this applies not only to custom software, but also to complex application packages. Traditionally, software user training has been provided by software distribu-

tors, but the number of independent companies specializing in software training is increasing.

Data sources

There are hardly any official statistics for the sector at Community level. A few activity data items based on the NACE nomenclature appear to be available for individual Member States. The data which are available for the Community are several years out of date and do not do justice to the variety of activities that constitute the sector.

At present, trade in software products appears to be recorded at the value of the carrier medium or at the transaction value, where customs duty is zero as is the case for floppy disks.

Trade in services, and especially trade in 'information', is difficult to measure and, in order to gain insight, one has to identify the flow of software products and services at the supplier level, since foreign sales tend to be carried out via local branches or partner companies in the target country. However, the financial and asset situation of software companies is not generally transparent.

Private market consultancies including most notably IDC and Input, monitor the sales revenues and market shares of the leading companies in the sector and their data are used in this chapter, with their kind permission.

Current situation

The software and services market in the Community was valued at about ECU 24 billion in 1987, and

ECU 28.3 billion in 1988. Its growth (17%) was identical to that of the world market which is estimated to have expanded from ECU 96 billion in 1987 to ECU 112.4 billion in 1988 (see Table 1).

Table 1
Estimated world market for software and computing services (1) by region, 1987-88

	1987	1988	Market	
			share (%)	rate (%)
(1 000 million ECU)	1987	1988/87		
Western Europe	27.6 (2)	32.3 (2)	28.8	17.0
USA	53.2	62.1	55.4	16.7
Japan	7.8	N/A	8.1	N/A
Rest of world	7.4	18.0	7.7	18.4
Total world	96.0	112.4	100.0	17.0

(1) As far as possible, market estimates exclude the revenues for the hardware elements of systems.

(2) The size of the Community market is estimated at ECU 24 000 million — 25% of the world market.

Source: Input, IDC, OECD, other, CEC.

The sales or the apparent consumption of software and services in the United States represented more than half (55%) of the world market; in the Community, they represented one quarter. According to market analysts, the Japanese software and services market is still relatively unimportant (8% of the world total) reflecting a national preference for customized and internally developed software.

A product/service breakdown of the software and services market is provided in Tables 2 to 4 below. The tables are based on dollar revenue estimates by IDC (1986-87) and Input (1987-88) which have been adjusted for the activities and countries covered and have been converted into ecus.

Table 2
Software and computing services revenues in the Community (EC 8), by product/service class, 1986, 1987 and 1993

	1986 (1)	Market share	1987 (1)	Market share	1987/86	1993/87
	(million ECU)	(%)	(million ECU)	(%)	growth (%)	forecast (4)
						CAGR (5) (%)
Package software	7 394	36.6	9 326	39.2	26.1	21.0
Custom software and consultancy	5 937	29.4	6 838	28.8	15.2	12.0
Processing services (2)	5 927	29.3	6 459	27.2	9.0	19.0
Training	944	4.7	1 134	4.8	20.1	11.0
Total software and services revenues	20 200	100.0	23 758 (3)	100.0	17.6	16.0

(1) Data for 1986 and 1987 were collected in 1987 and 1988 respectively.

(2) Includes facilities management and network services.

(3) These revenues accrue to hardware manufacturers (35.9%), system houses (18.5%) and independent vendors (45.6%).

(4) Dollar-based forecast.

(5) Compound average growth rate.

Source: IDC/CEC.

Table 3
Software and computing services revenues in the Community (EC 8), by product/service class, 1987

(million ECU)	FR of Germany	France	Italy	United Kingdom	EC 8
Package software	2 762	1 718	1 207	1 905	9 326
Custom software and consultancy	1 404	2 235	904	1 107	6 838
Processing services (1)	1 372	1 672	746	1 115	6 459
Training	308	225	118	253	1 134
Total revenues	5 846	5850	2 975	4 380	23 757
Share (%)					
Package software	47.2	29.4	40.6	43.5	39.2
Custom software and consultancy	24.0	38.2	30.4	25.3	28.8
Processing services (1)	23.5	28.6	25.0	25.4	27.2
Training	5.3	3.8	4.0	5.8	4.8
Total revenues	100.0	100.0	100.0	100.0	100.0
Country share in EC 8 total	24.6	24.6	12.5	18.4	100.0

(1) Includes facilities management and network services.

Source: IDC/CEC.

According to IDC, the Community market (EC 8) in 1987 was worth ECU 23.7 billion — about ECU 3.5 billion or 17.6% higher than in 1986 (see Table 2). Package software was the largest and the most dynamic segment, with a growth rate of 26% and with a 39% share of the market. Processing services were the least dynamic element (9% growth) thus slipping into third position, after custom software and consultancy.

According to IDC, the French and German markets were of equal size with a share of just under one

quarter of the EC 8 market; the UK accounted for 18.4% and Italy for 12.5% (see Table 3). According to Input, the French market accounts for 28% of the Community market, thus being significantly larger than the markets of the Federal Republic of Germany (22%), the UK (20%) and Italy (13%). There is disagreement amongst sector analysts about the relative size of the national markets and in particular about the size of the French market. This indicates that market estimates for a difficult sector such as software and services have their shortcomings and should be interpreted with some care.

Table 4
Software and computing services revenues in the Community (EC 11) and Western Europe, 1987, 1988 and 1993

	1987 (1 000 million ECU)	Market share (%)	1988 (1 000 million ECU)	Market share (%)	1988/87 growth (%)	1993/88 forecast CAGR (%) (6)
Software products	7.1	29.5	8.6	30.4	21.2	22.0
Professional services (1)	8.1	33.6	9.7	34.3	19.5	20.0
Turnkey systems (2)	2.6	10.8	3.0	10.8	17.3	17.0 (8)
Systems integration (3)	0.6	2.5	0.8	2.8	33.0	26.0 (8)
Processing services (4)	5.0	20.7	5.2	18.4	4.6	6.0
Network services (5)	0.7	2.9	0.9	3.2	35.6	28.0
EC 11	24.1 (7)	100.0	28.2	100.0	17.2	
Total Western Europe (9)	27.6		32.3		17.0	19.0
USA	53.2		62.1		16.7	17.0

(1) Includes custom software (76%), consultancy (12%), training (11%) and facilities management (1%).

(2) Includes (standard) systems and applications software; excludes hardware (assumption: 50% of system value).

(3) Includes software products and professional services; excludes computers, communications hardware, etc. (assumption: 40% of system value); only contracts above USD 1 million.

(4) Includes transaction, utility and other processing services.

(5) Includes managed network services (VANs), network (e.g. EDI) applications and electronic information services.

(6) Compound average growth rate. Dollar-based forecast.

(7) Input's adjusted sector aggregate for EC 11 compares with IDC's sector total of ECU 23 700 million for EC 8.

(8) The forecast relates to the total value of the system.

(9) EC 11 and five EFTA countries.

Source: Input/CEC.

Figure 1

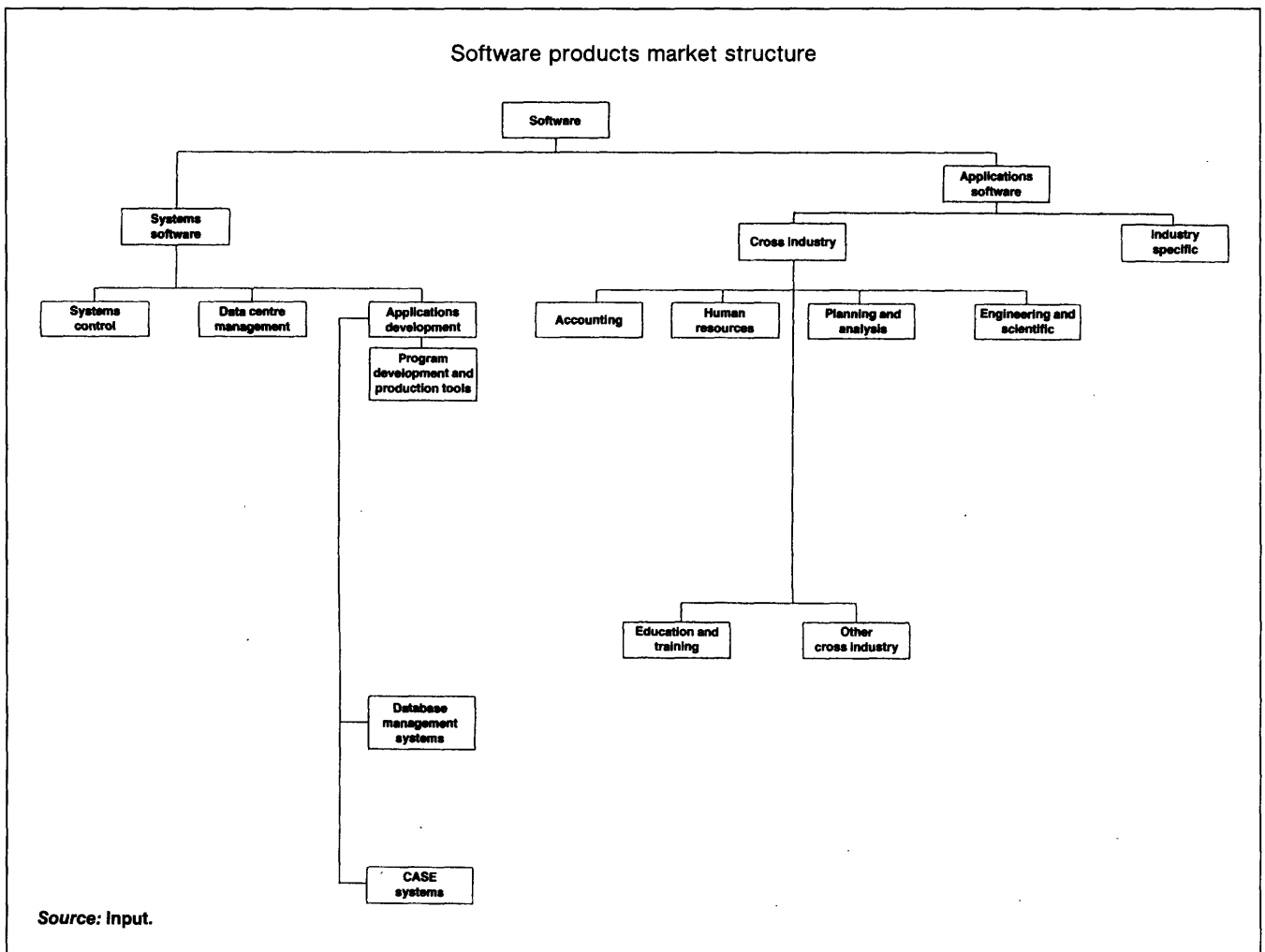


Table 3 shows the differences in the relative importance of the main product and services classes for the largest Member States in 1987. Package software, for instance, was most strongly represented in Germany (47%), but was of secondary importance in France, where custom software and consultancy is the predominant sector (38%). Processing services assume third position in all countries, and training revenues account for between 4% and under 6% of national markets.

According to Input, the software and services market in the Community (EC 11) in 1988 was worth ECU 28.3 billion — over ECU 4 billion or 17.2% higher than in 1987. Input's market segmentation includes two system categories: turnkey systems (which use software products) and systems integration (which relies predominantly on custom software). As presented in Table 4, the data exclude the estimated hardware elements of such systems.

Network services recorded the highest growth rate with over 35%, but account for only a small share (2.8%) of the market. The lowest growth rate — 4.6%

— was that of processing services whose market share declined from 20.7% in 1987 to 18.4% in 1988.

Revenues from professional services (which include custom software, training and facilities management) increased by 19.5%. Together with the software and consultancy elements of system integration activities (which grew by 33%), the combined market share of these services rose to 37%.

Software products are clearly the dominant market segment. In Table 4, they are recorded twice — when sold independently (market share 30.4%) and when sold as part of turnkey systems (market share 10.8%). (Their limited use in systems integration contracts is ignored here.) Sales revenues for the two product categories rose from ECU 9.7 billion in 1987 to ECU 11.6 billion — to account for a combined market share of over 41% in 1988.

Products market structure

The diversity of software products is illustrated in Figure 1 which distinguishes between system soft-

ware and application software. Each of these categories includes 'tools', i.e. software that performs generic functions in proximity to the system or the end user. Tools give the software user more control over his information services activities.

Some analysts treat tools as a separate product category. IDC, for instance, include database management systems, program design and development, business graphics, decision support, fourth generation languages, spreadsheets, integration software, etc. in their definition. According to IDC, software tools have become as important as system software, with each category accounting for 31% of the market (1987); application solutions take up the remaining 38%.

Input reports that 58% of all software and services sold in Europe in 1988 were supplied to the manufacturing and finance sectors. Until recently, the government, distribution, services transportation and utilities sectors embraced information technology relatively more slowly, but these sectors will become more prominent in the market in the next few years.

46% of all software products sold in 1987 were for single user and small systems, 35% for medium-sized systems and 19% for large systems.

And finally, 53% of all software products were supplied by hardware manufacturers, 31% by independent vendors and 16% by systems houses. Independent vendors are active in the tools and application software segments (38% and 36% market share), but play only a minor part in system software (16%) where hardware manufacturers dominate.

The software product market has become highly concentrated. This is illustrated by the word-processing and spreadsheet market segments, where

the top five products account for two-thirds and three-quarters of all units sold. All of these products are of US origin.

Trade and market trends

Software markets have grown dramatically in the course of this decade and have not yet reached maturity or stability.

Table 5 shows historical market data. The table shows growth rates for the two three-year periods of 1981-84 and 1984-87.

Over the six-year period, software and services revenues increased by an average rate of 23.5% per annum; package software revenues rose by 35% per annum.

This compares with growth of about 16% per annum for data processing equipment and about 50% per annum for PCs (in ECU). The surge in demand for PCs is acknowledged to have been the single most important driving force for the development of software products and for the evolution of the software market at large.

In consequence, the share of software products in the total software and services market rose from 23.4% in 1981 to 39.2% in 1987. Processing services, the dominant sector in 1981 with 41.5% of the market, lost importance and its market share fell to 27%.

The 'custom software and consultancy' and 'training' segments more or less maintained their market shares of about 29% and 5% respectively.

In the absence of trade statistics for this sector, the market shares of US suppliers have been estimated

Table 5
Trend in software and computing services revenues in the Community (EC 8), 1981-87 and 1993

	1981 (million ECU)	1981-84 CAGR (2) (%)	1984 (million ECU)	1984-87 CAGR (2) (%)	1987 (million ECU)	1987-93 CAGR (2) (%)	1993 (million ECU)
Package software	1 568	40	4 347	29	9 326	21	29 721
Custom software and consultancy	1 998	26	4 041	19	6 838	12	13 166
Processing services/facilities management	2 778	18	4 576	12	6 459	11	11 789
Training	353	25	683	18	1 134	19	3 290
Total revenues, EC 8	6 697	27	13 649	20	23 758	16	57 965
Western Europe (1)	7 944	27	16 244	20	28 128	16	68 687

(1) EC 8 (EC 12 minus Greece, Ireland, Luxembourg and Portugal) plus EFTA 5 (Austria, Finland, Norway, Sweden and Switzerland).

(2) Compound average growth rate.

Source: IDC/ CEC.

for the three main activity classes by using IDC data of product and supplier segmentation in 1987, together with company listings and US and European survey and news information.

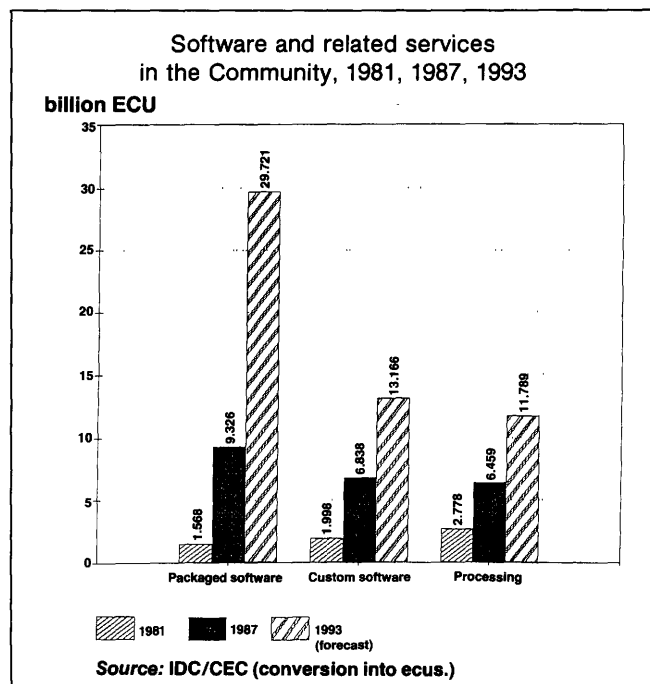
The US market share in 1988 is estimated at 55 to 60% in the software product segment, 19 to 21% in the custom software and consultancy segment and 35 to 40% in processing services. The average US share of all software and services sold in the Community in 1988 is estimated at 40%.

Assuming apparent consumption of software and services of ECU 28.2 billion (see Table 4), 'imports' of ECU 11.3 billion and exports of ECU 0.8 billion (ECSA estimate these at 4 to 5% of European production), then the Community's output of software and services was of the order of ECU 17.7 billion in 1988.

These data should serve as global indicators of the activities and do not intend to imply that the Community has been running a trade deficit in software and services of the order of ECU 10.5 billion. Non-Community suppliers of software and services tend to operate via branch and partner organizations in the Member States thus contributing to employment and value added in the Community.

As regards intra-EC trade in software and services, ECSA estimate that France and the UK are the most active Member States in as far as their leading suppliers exported about 10% of their output in the recent past.

Figure 2



Industry structure

IDC/ECSA estimate that in 1987 there were about 13 to 15 thousand software companies in the Community employing about 287 000 persons. This means that the variety of products and services covered by the sector and described in the introductory sections is supplied by a variety of firms, the majority of which belong to the small and medium-sized category of companies. These firms fall generally into the following classes:

Hardware manufacturers sell standard software with their own hardware. The software is primarily system software and software development tools, but also, to an increasing extent, application software or application-specific systems.

Systems houses supply turnkey systems (comprising standard hardware and standard software) and system integration services; they are often engaged in research (e.g. architectures, advanced processing) and in development (e.g. operating systems, languages, compilers).

Independent software vendors derive their revenues mainly from the sale of package software, with or without adaptation, and with or without consultancy or training; they also provide custom software solutions.

Professional consultancies supply software and associated services as a vehicle for the problem solutions they are selling. Only those consultancies whose revenues derive mainly from activities in the information technology and communications area, are included here.

Computing centres carry out major, recurring processing tasks for their clients or manage their clients' information services, usually at their clients' premises.

Software training specialists.

Business information services providers supply distributed information services which tend to rely, to a significant extent, on software know-how. Examples of such companies are Reuters and Geisco.

In the software and services sector it is difficult to distinguish firms on the basis of their predominant activity; data about their activities are not collected or monitored on a disaggregated basis.

Figure 3 lists the leading suppliers in the sector in Europe in terms of their software and services revenues and market shares in 1987. Six of the top 10 suppliers are hardware manufacturers (of which four

are American) with combined revenues of about USD 6 billion or ECU 5.1 billion — 17% of the European software and services market; IBM accounts for half of these revenues.

Figure 3

Top vendor rankings and market shares, 1987			
Western Europe Computer software and services All vendors			
Rank	Company	Market share (%)	Estimated revenues (million USD)
* 1	IBM	8.3	2950
* 2	Nixdorf	3.0	1055
* 3	Unisys	2.0	725
4	Cap Gemini Sogeti	1.5	525
* 5	Siemens	1.5	520
* 6	Digital	1.3	475
7	Finsiel	1.2	415
8	Reuters	1.1	400
9	Transpac	1.0	355
*10	Olivetti	0.9	330
*11	Bull	0.7	250
12	Datev	0.7	245
13	Sligos	0.6	225
14	GSI	0.6	210
*15	McDonnell Douglas	0.6	200
15	Scicon	0.6	200
15	Volmac	0.6	200
18	Sema Metra	0.5	195
19	CISI	0.5	190
20	Andersen Consulting	0.5	180
20	Computervision	0.5	180
* 22	Computer Associates	0.5	170
22	ICL	0.5	170
23	Telesystemes	0.4	155
23	Thorn Software	0.4	155
26	Microsoft	0.4	150
27	Logica	0.4	145
28	CCMC	0.4	140
29	CAP Group	0.4	135
29	Intergraph	0.4	135
	Others	68.0	24 320
	Total market	100.0	35 700

*Hardware manufacturers. **Source: Input.**

Two of the top 10 companies — Cap Gemini Sogeti (F) and Finsiel (I) — are independent software houses which are international companies who operate in Europe and the USA. Cap Gemini acquired two US companies during the 1980s and claims to hold a share of 1% of the US market. Its acquisition in early 1988 of Data Logic and SESA (a systems integration specialist employing 1 600 people) raised group turnover to approximately USD 900 million which is not reflected in Figure 3.

Two of the top 10 companies — Reuters and Transpac — belong to the category of enhanced, network-based business information services whose boundaries are not yet clear.

Overall, the list covers all types of suppliers, and the 29 companies shown account for 32% of the European software and services market.

A list of the top 10 independent European software vendors would be headed by Cap Gemini, SD-Scicon (from Systems Designers, UK, and Scicon International), Sema Group (from Sema Metra, F, and Cap Group, UK), and Finsiel (I) each of which had revenues of over USD 400 million in 1987/88. All four companies specialize in custom software and systems development, are engaged in R&D, have staff of the order of 3 000 to 5 000 people and operate internationally — in several Member States and in the USA.

Sligos (F), GSI (F) and Datev (G) would rank as the second largest group of European suppliers who focus on software products and had revenues of over USD 200 million in 1987 from operations in several Member States.

The list would further include CISI (F), Logica (UK) and Thorn Software (UK) with revenues between USD 150 and 200 million in 1987. Whereas CISI and Logica are particularly strong in customized software and systems, Thorn's revenues accrue from software products, custom software and services and processing services.

Table 6
**Revenues and market shares of the top 5
and top 10 independent software and services
vendors in the Member States, 1987**

	Total revenues (1) (million ECU)	Top 5 vendors %	Top 10 vendors %
Belgium	575.3	18.3	25.3
Denmark	733.7	46.4	54.0
FR of Germany	3 930.8	12.4	18.5
Spain	497.8	18.3	30.2
France	4 682.1	17.2	28.2
Italy	2 105.3	20.9	28.2
Netherlands	1 527.4	25.4	35.6
United Kingdom	2 975.2	18.7	28.8
EC 8	17 027.6	18.9	27.8
Western Europe (2)	20 504.5	20.8	29.8

(1) The figures exclude the software and training revenues of hardware manufacturers.

(2) EC 8 plus EFTA 5 (Austria, Finland, Norway, Sweden and Switzerland).

Source: IDC/CEC

Table 6 shows the market shares of independent vendors in the Member States in 1987. In France, the UK and Italy, the top 10 vendors each accounted for 28% of the market, though there is a marked dif-

ference in the share of the top five companies. In Germany, the degree of market concentration is lower for both the top five and the top 10 suppliers. Among all other Member States, the degree of concentration is highest in Denmark and the Netherlands.

The software and services industry remains in a state of transition, but certain patterns are emerging. The wave of mergers, acquisitions and joint ventures at the top of the industrial pyramid are having a 'ripple effect' at the level of medium-sized companies where cross-border acquisitions serve to build a broader Community presence in anticipation of the single market.

The recognition that information technology can serve as a competitive tool has prompted a reorientation and reorganization of companies in virtually all industrial sectors where companies are acquiring crucial know-how through acquisition rather than through system development contracts with outside suppliers.

Outlook

Projections for the main categories of software and services activities (see Tables 2 and 4) differ in particular over the degree at which software products may increase over the next few years. IDC, for

instance, believe that the sales of package software (including semi-custom packages) will continue to grow strongly, while others claim that the customization of software solutions, supported by productivity tools, will be the key to market success in the foreseeable future.

'Connectivity' is now a fact of life and open standards are playing their role in this process. As PCs are being linked into corporate information systems, demand for single-user software will decline in due course. *Software Magazine* have observed in a recent survey that companies are returning to IS management that is more centralized than in recent years. This implies imposition of corporate standards which curtail user choice and may imply changes in buying patterns which are likely to favour hardware manufacturers and system providers. Standards will also play an increasing role in public purchasing decisions in the future.

The future of processing services is difficult to predict at present because of the advent of substitute services including network-based services and other hardware-related services which are changing the nature of activities in this sector.

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ELECTRONIC INFORMATION SERVICES

Summary

At present, professional electronic information services, e.g. off and on-line queries to databases, make a vital contribution to the competitive ability of European business. On the other side of the coin, the weight they carry, in comparison with the communications industry, computer services (software, timesharing mode, value-added networks, etc.) or with company services such as legal and financial services, is still rather modest. Electronic information services are still mainly structured along national lines, especially where information on companies is concerned. One notable exception to this are information services on financial and stock markets, where they account for nearly 70% of turnover in on-line information services, and a few large scientific and technical databanks.

The 20% annual growth on these markets will be given an added boost with the advent of the single market and as a result operators will have to be better informed on companies, markets and rules in the Member States.

The deregulation of telecommunications services will foster the creation of added-value networks, and professional electronic information services will gradually gain a foothold as the single market's information infrastructure. This trend will accelerate with the penetration of new means of disseminating information through the CD-ROM.

With this in mind the European professional electronic information services sector is embarking on a phase of mergers and alliances. The European sector consists of a few firms backed by large communications groups such as Maxwell, Reed, Bertelsman, Kluwer, Springer, Pearson and Elsevier, in addition to some medium-sized independent firms that mainly operate on national markets.

Changes in demand

The first generation of databanks was designed for documentation professionals, i.e. large public and private organizations. With the arrival of microcomputing in businesses and available access to telematics networks, professional databanks began to serve a wide range of users, such as executives, engineers, business managers, liberal professionals, etc. This vast market, much larger than that for documen-

tation centres and intermediaries, called for new and easy-to-use electronic information products for the user lacking prior knowledge of documentation systems.

European production of databases

One quarter of the world's accessible on-line databases are of European origin.

The monitoring service of the information market, created by the EC Council Decision of 26 July 1988 on the creation of an information services market, registered in the pages of annual professional directories that in 1987, 3 288 databanks were commercially available in 1987 and that in 1988, 289 databanks were available on CD-ROM.

The EC produces 27% of world supply of on-line databanks, while 56% are of US origin. Despite the fact that the EC produces 39% of world supply of bibliographical and factual databases, its position is rather weak in the area of integral text (16%) and statistical (11%) databases.

Notwithstanding changes in demand, European supply of on-line databanks is still mainly focused on documentation professionals. However, CD-ROM databanks, on the other hand, are directed more at the final user and mainly supply factual information or integral texts. This new form of transmitting database information has not yet gained wide acceptance — only an estimated 50 000 CD-ROM databases have been installed so far in 1989 — but it nevertheless has a promising future.

The first databanks were created by public operators or through the initiative of public authorities. While the public sector is the dominant force in the production of databases in Europe, the rapid expansion of the European market has lately been the work of the private sector, especially in the fields of information on companies and economic and legal information. In 1987, 45% of European on-line databanks were produced by private companies, 17% by non-profit-making organizations and 38% by public organizations. The market share of the private sector in the production of CD-ROM databases is much larger (75%) compared with 25% for the public and non-profit sectors.

The gap between the European and US on-line information markets is closing. Ten years ago, the European market, excluding vertical information services that are practically non-existent in Europe, and videotext services that are now emerging in the US, was one-tenth the size of the US market. Today, it is one-third the size of the US market.

Table 1
Forecasted turnover for on-line services, 1988-92

(million ECU)	1988	1989	1990	1991	1992
Belgium/Luxembourg	25	38	47	65	81
FR of Germany	165	204	256	317	405
Spain	8	9	14	20	26
France	237	290	345	408	492
Italy	39	43	56	64	77
Netherlands	35	47	56	69	84
United Kingdom	921	1 072	1 236	1 485	1 770
EC 7	1 431	1 704	2 009	2 429	2 936
Switzerland	199	225	262	311	360
Rest of Europe	112	119	139	168	196
Total	1 742	2 048	2 410	2 908	3 492

Source: The European Electronic Information Industry, 1988-92; Link resources, February 1989.

According to the latest figures released by the Link Resources firm, Western Europe's on-line information market is valued at USD 2.4 billion (about ECU 2.18 billion).

About 90% of the turnover of on-line services is produced by economic and financial information, and on-line information on stock and financial markets alone accounts for 70% of overall turnover.

Videotext services hold a place of their own in the dissemination of professional on-line information services. They are more a tool for communication for some professions, such as transport and tourism, than a means of extracting information from professional databanks.

Except for France, where at the end of 1988 more than 4 million videotext terminals were in use, the rate of penetration and use of videotext remains low in most European countries — about 330 000 terminals at the end of 1988 in the other EC Member States. Because of differing standards, videotext services have developed exclusively along national lines. In spite of the introduction of bridging one system to another, international videotext traffic is practically non-existent.

At the current stage of its development, it is difficult to estimate correctly the size of the services market

for CD-ROM databases. Available estimates are contradictory and do not always draw a clear distinction between the turnover in CD-ROM equipment (disk drive), published CD-ROM material available to the public and that published for use by businesses, i.e. the recording of internal documentation on CD-ROM. According to the Infotech firm, the world CD-ROM market, including drives and disks, amounted to around ECU 368 million in 1988, 293 million of which went to public publications and 112 million to internal publications.

The internationalization of information services and the dispersion of the European market

The internationalization of database services varies from sector to sector. In the world of finance, patents and science and technology, information is a worldwide commodity. A few European suppliers have attained a solid position, such as Reuters, Derwent, Questel and Beilstein.

In other fields, e.g. legal information, company year-books, solvency information, marketing data on consumer behaviour and media audiences, the market often consists of medium-sized firms and has so far been structured along national lines. It is precisely this sector that could undergo the most upheaval when the single market is introduced.

Considerable investment in commercial networks and the acquisition of company shares will be necessary to overcome the dispersion of national markets. Only a small number of North American firms have to date developed strategies to gain a foothold in Europe. Dun & Bradstreet has bought a share of Schimmelpfeng in the Federal Republic of Germany, Cosmos has begun to operate in Italy, Datastream in the UK and ITT World Directories has also set up in Europe. European operators have also begun a phase of mergers and alliances through the sharing of marketing costs and the setting up of Europe-wide databanks based on national data banks, to cite two examples. Such joint ventures have been set up in the field of company and product catalogues (acquisition of Kompass by SEAT and Office d'Annoces); economic forecasting (GSI and Pittagora); trade information (Or Télématique, Infotrade and Ecodate); stock exchange and freight (Lamy and Kluwers); transport (Transpotel); and company accounts and results on CD-ROM (Van Dick and Infocheck).

At the same time, several European suppliers have set up on the North American market. For example,

Inka has set up STN network agreements, Reuters has bought out IP Sharp, Pergamon has acquired SDC Orbit and BRS, and Questel Inc. has set up subsidiaries in North America.

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LIST OF ABBREVIATIONS

ACCA	Air Charters Carriers Association
ACE	Association des compagnies aériennes de la Communauté européenne
ACP	African, Caribbean and Pacific countries
AEA	Association of European Airlines
BAP	Biotechnology action programme
bbl	Dollars per barrel
Benelux	Belgium, Netherlands, Luxembourg
BLEU	Belgo-Luxembourg Economic Union
Bridge	Biotechnology research for innovation development and growth in Europe
Brite	Basic research in industrial technologies for Europe
CAD	Computer-aided design
CAM	Computer-aided management
CAP	Common agricultural policy
CAPR	Compound annual growth rate
CCITT	International Telephone and Telegraph Consultative Committee
CCTV	Closed-circuit television
CD	Compact disc
CEN	Comité européen de normalisation (ESC)
Cenelec	European Electronics Standards Committee
CEPT	European Conference of Post and Telecommunications
CFC	Chlorofluorocarbon
cif	Cost insurance freight
CIM	Computer integrated manufacturing
CKD	Complete knocked down
CMOS	Complementary metal oxide semiconduct
CNC	Computerized numerical controlled
COM	Communication from the Commission of the European Communities
Comecon	Council for Mutual Economic Assistance
CPE	Centrally planned economies
CTV	Colour television
DAT	Digital audio tape

DFI	Direct foreign investment
DG	Directorate-General
DPP	Direct product profitability
DRAM	Dynamic random access memory
EAGGF	Agricultural Guidance and Guarantee Fund
EC	European Community
ECAC	European Civil Aviation Conference
ECSC	European Coal and Steel Community
ECU	European currency unit
EDI	Electronic data interchange
EDP	Electronic data processing
Efics	European Forestry Information and Communication System
EFTA	European Free Trade Association
Eftpos	Electronic funds transfer at point of sale
EMU	European Monetary Union
EPA	Environment Protection Agency
EPOS	Electronic point of sale systems
ETSI	European Telecommunications Standards Institute
Euraca	European Air Carriers Association
Euram	Research programme on raw materials and advanced materials
Eureka	European Research Coordination Agency
FAO	Food and Agriculture Organization
FRG	Federal Republic of Germany
FTE	Full-time equivalent
GATT	General Agreement on Tariffs and Trade
GDP	Gross domestic product
GFCF	Gross fixed capital formation
GNP	Gross national product
GOS	Gross operating surplus
GSP	Generalized system of preferences
HDPE	High-density polyethylene
HDTV	High-definition television
IACA	International Air Carriers Association
IATA	International Air Transport Association

IC	Integrated circuits
ICA	International Coffee Agreement
ICAO	International Civil Aviation Organization
ICO	International Coffee Organization
IMF	International Monetary Fund
ISDN	Integrated system digital network
ISO	International Standards Organization
Istat	Istituto Centrale di Statistica, Italy
IT	Information technology
LDCs	Less-developed countries
LDPE	Low-density polyethylene
LME	London Metals Exchange
LP	Long playing
LWR	Light water reactor
Mdf	Medium density fibreboard
MFA	Multi-fibre Agreement
MMC	UK's Monopolies and Mergers Commission
M&A	Mergers and acquisitions
NACE	General industrial classification of economic activities within the European Community
NCE	New chemical entity
NICs	Newly industrialized countries
Nimexe	Nomenclature of goods for the external trade statistics of the Community and statistics of trade between Member States
NRC	National Research Council
NVOCCs	Non-vessel-owning common carriers
OECD	Organization for Economic Cooperation and Development
OEM	Original equipment manufacturer
OJEC	Official Journal of the European Communities
OPEC	Organization of Petroleum Exporting Countries
osb	Oriented strand board
OTC	Over the counter
PBX	Private Branch Exchange
PC	Personal computer

PCB	Printed circuit board
PCI	Pulverized coal injection
PET	Polyethylene terephthalate
PP	Polypropylene
PS	Polystyrene
PVC	Polyvinyl chloride
RAM	Random access memory
RDS	Radio data system
R&D	Research and development
SITC	Standard international trade classification
SMC/BMC	Compression and injection moulding
SMEs	Small and medium-sized enterprises
TFS	Tin-free steel
TGV	Train à grande vitesse
UK	United Kingdom
USD	US dollar
VA	Value-added
VAT	Value-added tax
VCR	Video cassette recorders
WHO	World Health Organization

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