

Transport equipment



The transport equipment sector continues to occupy a privileged position within European industry, not only because of its size but also because of its healthy balance of payments position. In terms of production, the sector grew by 63% over the period 1980-87. A lean start in the 1980s was marked by major restructuring and widespread job losses, but this paved the way for improved standards of productivity and higher corporate profitability. Towards the end of the decade, growth in production accelerated, but it is now clear that the pace has slowed considerably. Only negligible growth is expected over the next year or so, in line with the general world slowdown. In the medium term, prospects are fairly good, but the sector in the EC is still handicapped in several respects compared to its chief North American and Japanese competitors.

Description of the sector

According to the European NACE classification the transport equipment sector covers the following subsectors:

- ❖ motor vehicles (NACE 351 and 352);
- ❖ motor vehicle parts and accessories (NACE 353);
- ❖ shipbuilding (NACE 361);
- ❖ railway rolling stock (NACE 362);
- ❖ mopeds and motorcycles (NACE 363);
- ❖ aerospace equipment (NACE 364).

The spare parts and accessories' sector for motor vehicles poses a problem in that there is no real consensus as to its composition. Turnover for 1988 was estimated at 70 billion ECU- around one third of the total turnover of the motor vehicle industry. It should be remembered however, that such data includes certain products

which are classified under NACE in other sectors, such as the electrical industry for example.

The public transport equipment sector, which is discussed separately in this chapter, refers to passenger vehicles which are used in urban, suburban and regional transport. This includes motor buses, which are part of the motor vehicles industry, and rail vehicles (trams, metros and commuter trains), which are part of the railway rolling stock sector.

In terms of production, the most important sector by far is the motor industry (including parts and accessories), which accounted for over three quarters of output in 1989. The aerospace industry, which is the

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Table 1
Transport equipment
Main indicators, 1980-89

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Apparent consumption	135 242	144 932	158 836	168 952	173 960	192 012	210 595	229 958	260 769	296 556
Net exports	15 530	18 862	21 985	21 123	24 325	25 545	22 281	21 972	15 896	14 120
Production	150 772	163 794	180 821	190 075	198 284	217 558	232 876	251 930	276 665	310 676
Production in constant prices	204 267	205 706	209 862	211 323	208 212	217 523	229 525	241 241	256 511	275 217
Employment (1000)	3 232	3 073	2 983	2 853	2 770	2 689	2 632	2 602	2 588	2 604

Source: Eurostat

next largest, is well behind with around 14%. During the course of the 1980s, it is these two sectors which recorded the most rapid growth rates.

Current situation

Production in the sector reached around 310 billion ECU in 1989, meaning that it remained one of the principal industrial sectors in Europe. In terms of turnover, transport equipment is ahead of electrical, chemical and building, and second only to the food industry.

1989 was the 5th consecutive year of growth in the industry. Real production was boosted by fast rising domestic demand and rose by more than 7%. Most of the impetus came from the automotive and aerospace sectors, though demand for rail equipment and shipbuilding was more resilient than the years before. Due to excess pressure on capacities, production was unable to meet all of the additional demand, and the trade balance deteriorated.

Production and consumption

The transport equipment sector was significantly affected by the second oil crisis at the beginning of the 1980s, although this led 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. Over the period as a whole, real production progressed by an average of only

0.5% per year.

From 1985 onwards, fortunes improved, and the revival which ensued was far more vigorous than in most of the EC's other important industrial sectors. As a result, average annual real production growth was superior to 5.5% over the 1984-88 period. The motor industry was the main driving force behind this growth, propelled by higher levels of demand for cars and trucks, whilst the aeronautical industry profited from the strong development in world civil aviation, including the Airbus programme.

In some of the other branches, production, which had been dwindling since the early 1980s, seems to have levelled out. In the shipbuilding industry, for example, it looks as if the bottom was reached in 1988, and EC production is now growing at a faster rate than world production. The growth in sea trade has eliminated overcapacity, and sales levels for 1990 look promising. To a lesser extent, the situation of the railway rolling stock industry is also improving.

After 6 consecutive years of decline, real production experienced a slight increase in 1989, mainly due to the development of high speed trains. The outlook for the sector remains mitigated and depends on the future ability of rail transport services to stop losing ground to road transport.

In terms of demand, the wide-ranging nature of the transport equipment sector,

which includes not only finished consumer goods but also capital and intermediate goods, means that the main customer for these intermediate goods is the sector itself. The transport equipment sector acts as a customer for a number of other industrial sectors, the most important being:

- ❖ the iron and steel industry and metal products;
- ❖ mechanical engineering;
- ❖ the electrical industry;
- ❖ plastics and chemicals.

External trade

This section is based on OECD trade data which sometimes differ from Eurostat data. Since 1982, EC exports within the transport equipment sector have grown by well over one third in value terms. From just over 37 billion ECU in 1982, exports grew to almost 50 billion ECU in 1988. North America remains the largest EC export market for EC products in this sector. In 1988, it accounted for over 28% of EC exports as against 20% in 1982. Conversely, imports of US transport equipment in 1988 reached only 4.15 billion ECU, enabling the EC to show a positive balance of almost 10 billion ECU.

Growing trade with the US has helped the EC's trade balance in the sector to reach a surplus of 21.5 billion ECU in 1988. However, this was lower than the surpluses recorded in 1982 and 1986, due mainly to higher imports from the Pacific

Table 2
Transport equipment
Trends in EC exports and imports

Average annual % change - current ECU

	Total	EFTA	North America	Pacific rim	USSR	Eastern Europe	S.East Asia	Rest of the world
EC Exports								
1982-1988	4.97	9.64	11.16	18.94	-10.54	4.55	1.51	-1.32
1982-1986	5.28	12.11	23.7	15.11	-1.45	12.38	-7.07	-9.77
1986-1988	4.35	4.86	-10.23	26.99	-26.28	-9.52	21.13	18.01
1988-1989 (*)	17.46	7.77	-3.13	39.95	75.36	99.95	28.85	20.84
EC Imports								
1982-1988	13.56	15.01	2.93	12.48	8.14	5.17	22.08	32.64
1982-1986	13.6	19	8	15.92	8.57	9.71	23.96	3.84
1986-1988	13.47	7.43	-6.5	5.91	7.29	-3.34	18.4	116.4
1988-1989 (*)	19.15	7.97	33.33	9.3	-0.72	20.49	58.64	19.94

(*) 6 European countries (France, Italy, Netherlands, W. Germany, UK, Belgium)
 Source: DRI

Rim, EFTA nations and combined rest of the world. Overall, imports of transport equipment goods to the EC increased by over 13% from 1982 to 1988 whilst exports rose by under 5%.

In 1982, world exports of transport equipment totalled 175 billion ECU, of which the EC accounted for around 21% or 37 billion ECU. World exports grew steadily over the next four years, and by 1988 reached 344 billion ECU. By then, the EC share of exports had fallen quite sharply to 14.4%. World imports in the sector totalled 331 million in 1988, of which the EC accounted for 8.4%.

At 21.5 billion ECU in 1988, the EC's trade balance on transport equipment was much healthier than most other global regions. North America's 27 billion ECU deficit in the same year is noteworthy for its magnitude, whilst the Pacific Rim's 49 billion ECU surplus is particularly remarkable. This is mainly due to Japan, whose widespread success in the sector is principally a result of the growing domination of the world motor industry.

Employment

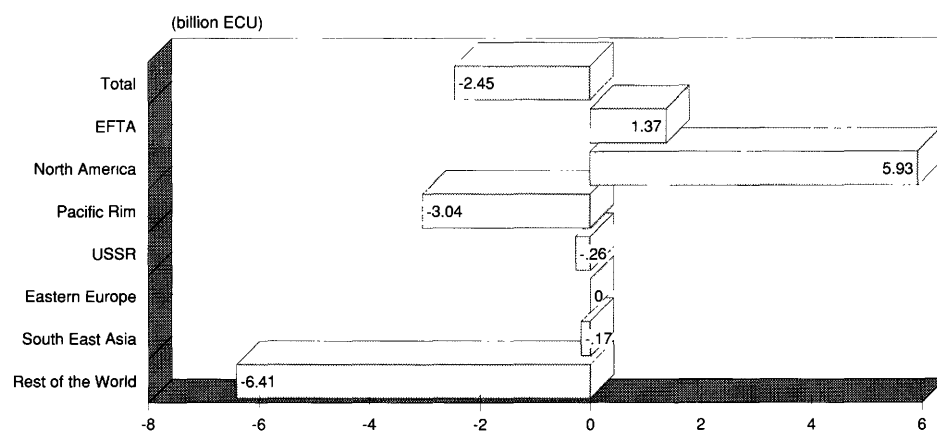
As mentioned earlier, stagnation in the sec-

tor led to major restructuring in the early 1980s. The advent of new technology and labour saving techniques also had their effects, and from over 3 million employees in 1981, the total number fell steadily to just over 2.5 million in 1988. The UK was the main victim as the labour force fell by more than one third over the period. The Federal Republic of Germany from 866 000 in 1981 to 906 000 in 1988 experienced a substantial increase in the workforce.

On a more positive note, as total employment for most branches fell, production rose, indicating vast improvements in the

realm of productivity, as witnessed in the automotive and the aerospace industries. Between 1980 and 1989 productivity, i.e. production per employee measured in constant prices, increased by more than 60% in the EC. Such an improvement results from an important rationalisation effort in terms of labour organisation, but also from a substitution of capital for labour. Increasing use of advanced technologies such as robotics and CAD/CAM, as well as advanced management techniques such as zero defect, have all contributed to boost productivity. In parallel, production is becoming more flexible to allow for shorter

Figure 1
Transport equipment
Total change in the EC trade balance, 1982-1988



Source: DRI Europe

production runs, especially in the automotive sector. This process also spells an increasing need for skilled manpower; the rise in the use of highly qualified workers is particularly evident in the case of the aerospace industry.

Structure of the industry

Financially speaking, the transport equipment sector is well represented amongst the leading European companies. Daimler-Benz from West Germany, which is the leader in terms of turnover, is the 4th largest industrial company in Europe. The sector is considerably concentrated as the top five companies account for 51% of the turnover.

Some of the leading corporations in this sector have interests in various different

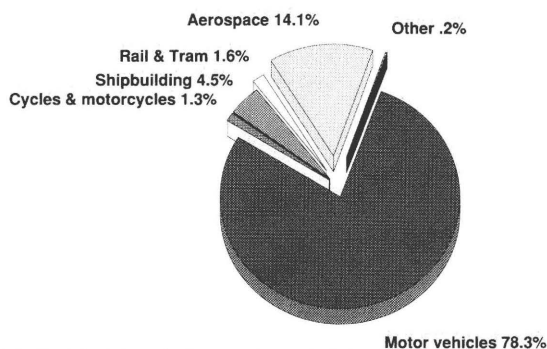
Table 3
Transport equipment
Share of employment by country, 1980-89

(%)	1980	1989
Belgique/België	3.5	2.7
Danmark	0.5	0.7
BR Deutschland	31.7	35.2
Hellas	0.4	0.8
España	6.4	7.6
France	26.0	18.6
Ireland	0.2	0.1
Italia	11.4	11.9
Nederland	1.3	0.8
Portugal	0.5	1.2
United Kingdom	17.9	20.5
EC	100.0	100.0

Source: Eurostat (inde)

branches. A large number of the big volume car manufacturers, such as Renault, Fiat and Daimler-Benz, also have interests in the truck industry. On an even wider scale, the French company, Peugeot SA still produces mopeds, motorcycles and bicycles, whereas both Fiat and Daimler-Benz are involved in both the motor and aerospace sectors and British Aerospace now holds a majority stake in Rover

Figure 2
Transport equipment
Composition of the industry, 1989
(% production)



Source: Eurostat, DRI Europe

Group. At the time of the Rover Group takeover by British Aerospace, much was made of the opportunity for the two companies to enjoy industrial synergy. Although there does not seem to be much evidence of this, companies with dual interests such as these are at least broadening the risk base.

The concentration of the transport equipment sector which has taken place during the 1980s looks set to continue during the 1990s. Iveco, the Italian truck manufacturer, has recently taken over Enasa, after it seemed certain that it would go to the German producer, MAN. 1990 has also seen General Motors take over struggling Saab, and Renault and Volvo declare their commitment to a joint future by taking mutual stakes in each other, and pledging to

enter into common development programmes. But the automotive industry is not the only sector where concentration is increasing. Following the restructuring of the electrical engineering industry, the rail equipment sector saw the emergence of two major players with the creation of ABB in 1988 and GEC-Alsthom in 1989. In the aerospace industry, the recent past has been essentially marked by the concentration of the German industry under the wing of Daimler-Benz. Given very high R&D cost, the aerospace industry is furthermore characterised by numerous joint-ventures in both the military and civilian fields. Collaboration has not however, only been taking place between EC producers. In recent years, there have been a number of

Table 4
The 11 largest transport equipment companies in the EC, 1989

	Country	Turnover (¹)	Employment	Profit (¹)
Daimler-Benz	BR Deutschland	36 902	368 226	3 106
Fiat	Italia	34 445	286 294	2 189
Volkswagen	BR Deutschland	31 569	250 616	501
Renault	France	24 840	174 573	1 322
Peugeot SA	France	21 776	159 100	1 467
Robert Bosch	BR Deutschland	14 776	174 742	302
British Aerospace	UK	13 511	127 500	346
BMW	BR Deutschland	12 808	66 267	269
Adam Opel (General Motor US)	BR Deutschland	10 050	54 614	543
Ford Motor LDT (Ford Motor US)	UK	10 012	48 000	611
Ford-Werke (Ford Motor US)	BR Deutschland	9 567	48 222	175

(¹) millions ECU

Source: Le Nouvel Economiste 1990

collaborative ventures or cooperation agreements between EC companies and Japanese or American organisations. The Japanese motor industry's superior standing in certain areas of the industrial process has led to a steady stream of joint manufacturing agreements on EC soil. For example, General Motor's arrangement with Isuzu to jointly produce vans in the UK, and the much-publicised Rover-Honda tie-up which has now been in existence for over ten years. In terms of cooperation between US and EC companies, the aerospace sector is the unquestionable leader. This cooperation is essentially taking place between aerospace engine manufacturers (MTU and Pratt & Whitney or General Electrics and Snecma for instance), but it is also worth mentioning the contribution through out-sourcing, of US companies to the Airbus programme as well as of European companies to some of Boeing and McDonnell Douglas programmes.

In the public transport sector, a number of acquisitions or collaborative ventures have also marked the last few years, with the most notable one occurring back in 1988 when Volvo Bus Corporation of Sweden acquired Leyland Bus in the UK. In 1989, DAF's bus division consolidated with BOVA to form a jointly owned company known as United Bus. In July 1990, United Bus signed a letter of intent with DB Silkeborg of Denmark with a view to future cooperation.

Eastern Europe

The opening up of the Eastern economies is expected to have a significant impact on the EC transport equipment industry. Demand for transport equipment in Eastern Europe will rise over the next years due to a very low rate of equip-

ment. In the short and medium term, this new market will be supplied essentially with exports from Western Europe. In the long term, the Eastern countries could constitute a low cost base to supply both the Eastern and the Western markets. Many companies present in the transport equipment sector saw Eastern Europe as a potential low-cost producing base, but after an initial wave of enthusiasm, most companies have adopted a more cautious approach. Volkswagen, General Motors (through its German subsidiary Opel) and Daimler-Benz are setting up production operations for motor vehicles in East Germany. Volkswagen is also teaming up with the Czechoslovakian car producer Skoda for a joint production venture, whereas Fiat has important production plans in Poland and the Soviet Union. Though most of the announced joint-ventures concern vehicle production, production of components could be another fruitful area for investment. In terms of sales in the East, cars, trucks and aircraft are the most promising sectors. Prospects for rail equipment are less bright given the over-emphasis that was put in the past on rail transport as opposed to road transport in the Eastern countries.

Environment

Transport has been one of the main targets of environmental regulations for several years now, mainly because of air pollution related to acid rains and, to a lesser extent, because of noise pollution. In the long term, the kind of solution adopted to solve the global warming problem is of a major importance, given that it could lead to a significant shift in production between certain branches of the sector. Transport services account for 1/4 of

total CO₂ emissions, and CO₂ is the main gas responsible for the so-called greenhouse effect. Given the strong "technological" link between CO₂ emissions and energy consumption, heavy energy users such as the aerospace and automotive industries are likely to be under attack during the 1990s. This could be to the benefit of some of the smaller transport subsectors like rail. In the area of personal transport, increasing congestion in most towns and cities, coupled with a growing environmental awareness should benefit the motor-cycles and mopeds industry, as well as the public transport equipment sector.

The impact of higher energy prices

The transport equipment industry itself is not among the most energy intensive industries, and its energy requirements per ECU of output is much smaller than in the case of iron and steel, non metallic minerals or chemicals. Nevertheless, the sector is quite sensitive to energy prices because of their impact on its main customer sectors. Transport services belong to the most energy intensive industries, especially as far as air, maritime and road transport are concerned. At the end of 1990, financial results of airlines and road transport companies were already showing signs of strains, mainly because of higher energy prices. The most important end-market for the transport equipment sector is final consumption. The share of final consumption expenditure is devoted to cars (car purchases and car running costs) is usually very stable over time. This means that a rise in car running costs (for instance oil prices) is usually compensated by a fall in spending on car purchases. As a result, car sales are very

Table 5
Transport equipment
Share of production by country, 1980,89

(%)	1980	1989
Belgique/België	2.3	4.1
Danmark	0.7	0.5
BR Deutschland	26.8	34.5
Hellas	0.8	0.3
España	7.5	7.6
France	20.6	23.1
Irland	0.2	0.1
Italia	12.6	12.3
Nederland	1.9	0.6
Portugal	1.4	0.5
United Kingdom	25.2	16.5
EC	100.0	100.0

Source: Eurostat (Inde)

sensitive to oil prices. However, much depends on the consumers' expectations about the duration of the oil shock. If the rise in gas prices is perceived to be only temporary, its impact on consumption is likely to remain limited.

Geographical distribution

In 1989, as in previous years, more than 85% of EC production was concentrated in the major four countries; the Federal Republic of Germany, France, the United Kingdom and Italy. Spain is in fifth place with around 7%. This situation has in fact not changed greatly during the last decade. In terms of reliance on the sector, the transport equipment sector in the Federal Republic of Germany accounted for almost

9.9% of the total GDP in 1989, against an average for the EC of 7.1%. Fairly high dependencies were also the case in France, in the UK, and more surprisingly, Belgium, which is used as a production base for foreign EC producers.

Outlook

The short-term outlook for the sector is fairly downbeat, mainly due to the worsening performance of the largest motor and aerospace subsectors. The recent years of high expansion for both the car and truck industries in the EC seem to be over, and a sharp slowdown has already been experienced in some of the EC's major markets. In 1991, production of transport equipment is forecast to rise by a meagre 1%. In the medium-term, however, prospects look more optimistic. The outlook for the aerospace industry remains favourable, and the overall motor industry is expected to recover from 1992 onwards. Hence, annual growth will accelerate to 3.3% in 1992 and 3.1% in 1993. In the slightly longer term, the influence of the Eastern European countries, both as markets in their own right, and as production bases, should not be underestimated.

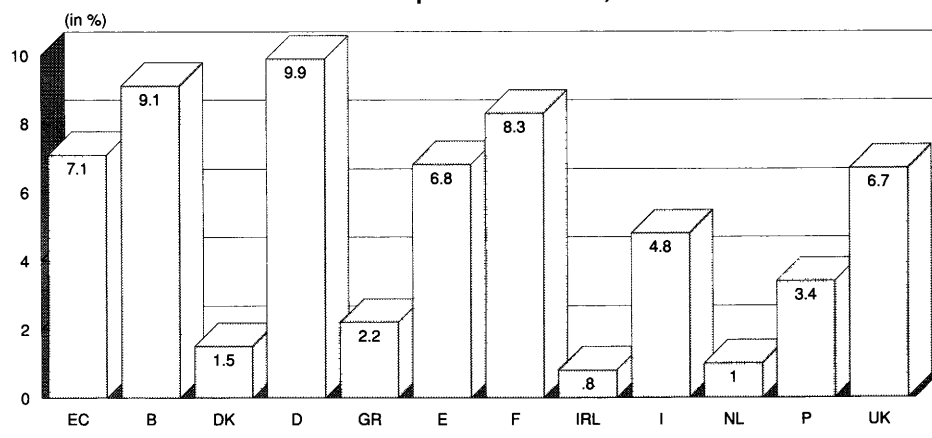
The railway rolling stock industry is currently undergoing a recovery after six years

of decline. Rail travel has received a huge boost from the success of high speed trains, which have been in the middle of a significant expansion phase in certain EC countries, such as France. The wide acclaim given to the French Train a Grande Vitesse (TGV) has provided a tremendous fillip to the French industry.

There is also currently a revival of interest in the light urban railway concept in the EC. New light rail systems are already under construction in Paris, Genova and Manchester, with further similar systems planned over the next few years. The United States could also prove to be a fruitful market, but this is largely dependent on federal funding.

As freight traffic on the roads reaches crisis proportions in some Member States, the railway industry could be a major beneficiary. In particular, combined or intermodal transport should continue to grow in importance. The advent of the channel tunnel link between France and the UK in particular could provide an incentive for companies to switch from road to rail. The motor vehicles, parts and accessories industries are all set to benefit from the move towards increasingly sophisticated technology over the next few years. Manufacturers are moving up-market, and vehicles are increasingly going to be called upon to comply with anti-pollution regulations, which is good news for the component manufacturers. At the same time, as compulsory vehicle testing requirements are tightened up in certain Member States, this should stimulate the replacement market both for parts and vehicles. Given the large share of the world fleet which is obsolete and needs to be replaced, the shipbuilding sector is expected

Figure 3
Transport equipment
Share of production in GDP, 1989



Source: Eurostat, DRI Europe

to experience fast growth over the next years. Furthermore, the share of the EC in world ship production is expected to rise as a consequence of the specialisation of the Community in customised ships highly efficient in terms of energy and manning cost.

The main drawback for the sector, which is one which has been referred to in previous editions of "Panorama", is that despite substantial improvements over the 1980s, productivity and profitability in certain branches of the sector are still low

Table 6
Transport equipment, forecast
Production, demand and employment 1989-95

(%)	% changes Annual compound growth				
	1990	1991	1992	1993	1993-95
Production	1.2	1.0	3.3	3.1	3.0
Apparent consumption	1.9	1.1	3.5	2.9	3.2
Employment	0.1	0.1	0.5	1.7	1.7

Source: DRI Europe

when compared to main competitors in the United States and Japan.

Written by: DRI Europe

The automotive sector accounts for around 9% of the EC industrial value-added, and is responsible for the employment of about 8% of the total manufacturing industry. It is estimated that around 10% of all EC jobs are either directly or indirectly dependent on the automotive sector. In the late 1980s, both the car and truck industries of the EC have benefitted from the buoyant demand conditions. Production has boomed, and from a situation of overcapacity a decade ago, most manufacturers have found themselves short of stock.

As we move into the 1990s, the outlook for the car and truck industries is mixed. Growing concern about the environment, and the uncertainty as to how the industry might be required to deal with these problems, could provide a threat to further growth.

Such problems have been highlighted by the Gulf crisis, which has provoked considerable uncertainty amongst both car users and producers. The heavy truck industry is believed to have reached a peak, and is faced with a slowing down period, and possibly further rationalisation. The lighter van market looks set for further growth in the early 1990s, whilst the fact that some of the EC's car markets, such as Spain and Portugal are still very immature, also provides cause for optimism.

Description of the sector

This sector corresponds to NACE 351.

In particular, it covers the manufacture and assembly of motor vehicles (including road tractors) and the manufacture of motor vehicle engines.

Demand

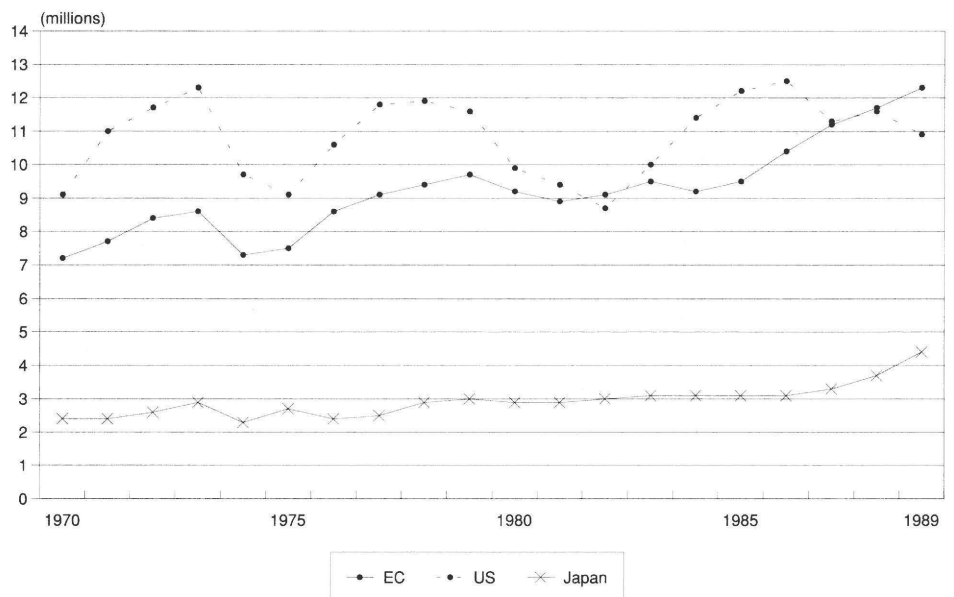
Passenger cars From just over 3 million units in 1960, the demand for passenger cars in the EC has enjoyed almost continuous growth, passing the significant 12 million mark in 1989. Growth has been almost uninterrupted, with solid expansion throughout the 1960s until 1974, when the impact of the first oil shock caused registrations to decline by 14.3%. The growth pattern then resumed until the second oil crisis at the end of the 1970s caused a further two years of decline for car demand. During the early 1980s, the EC automotive industry suffered a period of relative stagnation, followed by a recovery in the latter half of the decade to push total sales to over 10 million units. With sales of 12.3 million units in 1989, the EC market for passenger cars represents 35% of world sales. For the second year in succession, this meant that more cars were registered in the EC than in North America. 1988 was significant in this respect, for in 1985, the North American market was already over the 12 million unit level, while the EC was behind at 9.5 million units. Since 1985, the EC market for passenger cars has grown by 29%, principally as a result of strong sales in the UK, Germany, France and Spain. In contrast, the North American market has remained fairly stagnant, although Japan has seen rapid growth during the late 1980s. 1989 was again a record year for passenger car sales in the EC. Strong de-

Table 1
Motor vehicles
Main indicators, 1980-89

(millions)	1980	1985	1986	1987	1988	1989
Net exports						
Cars	0.7	0.8	0.5	0.3	0.4	0.6
Vans and Trucks	0.2	0.2	0.2	0.1	0.1	0.3
Total	0.9	1.0	0.7	0.4	0.5	0.9
New registrations						
Cars	9.2	9.5	10.5	11.2	11.7	12.3
Vans and Trucks	0.9	1.3	1.3	1.5	1.6	1.6
Total	10.1	10.8	11.8	12.7	13.3	13.9
Production						
Cars (*)	9.9	10.0	11.3	11.7	12.2	12.2
Vans and Trucks	0.8	1.3	1.3	1.5	1.6	1.6
Total	10.7	11.3	12.6	13.2	13.8	13.8
Vehicle park						
Cars	91.8	110.2	113.3	116.9	120.4	124.0
Vans and Trucks	9.3	10.9	11.2	11.7	12.5	12.6
Total	101.1	121.1	124.5	128.6	132.9	136.6
Passenger car density (°)	310.0	362.0	371.0	382.0	391.0	399.0

(*) excluding double counting
(°) Cars per 1 000 inhabitants
Source: DRI Europe, Eurostat

Figure 1
Motor vehicles
Total car sales by region, 1970-89



Source: DRI Europe

mand in the UK, France, Spain and Italy in particular was chiefly responsible for increasing the total expansion to 4.5%. Although it is the EC's largest economy and car market, Germany has not experienced the kind of growth seen in neighbouring France, Italy and the UK in the

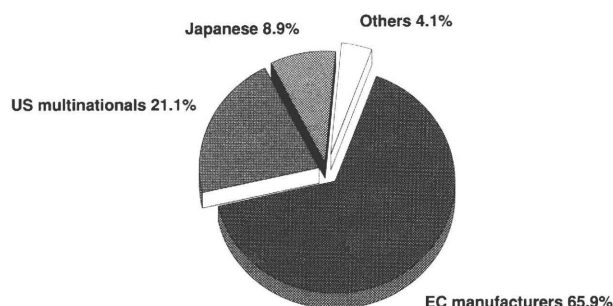
late 1980s. In 1989, the German car market accounted for 23% of EC sales, but over the 1984-89 period, it supplied only 14% of the increase. This has been the case despite a relatively strong economy, and the existence of subsidies supporting the purchase of "clean" cars.

Table 2
Motor vehicles
Passenger car registrations by EC country

(1 000)	1986	1987	1988	1989	1990 ⁽¹⁾
Belgique/België/Luxembourg	395	406	427	440	457
Danmark	169	124	89	78	95
BR Deutschland	2 829	2 916	2 808	2 832	2 953
Hellas	65	51	58	86	116
España	644	861	991	1 136	1 078
France	1 912	2 105	2 217	2 274	2 367
Ireland	58	54	61	76	80
Italia	1 825	1 977	2 184	2 362	2 339
Nederland	561	556	483	496	507
Portugal	110	124	213	193	200
United Kingdom	1 882	2 014	2 216	2 301	2 072
Total EC	10 450	11 187	11 745	12 274	12 264

⁽¹⁾ Forecast
Source: DRI Europe

Figure 2
Motor vehicles
Penetration of the EC market, 1989



Source: DRI Europe

The UK car market which has enjoyed non-stop growth in recent years, is currently in the midst of a serious downturn in demand. In 1990, as inflation increased and consumer spending failed to decrease quickly enough, the UK government responded with high interest rates. A recovery is anticipated by 1992, and the UK car market is not expected to continue on a downward trend.

Part of the reason behind the UK car market's recent strength has been the exceptional growth of the company car market, which is estimated to account for over 50% of all new car sales. Although the current government has increased the "scale charges" (the additions to income tax payable by company car owners) by 220%

over the last few years, the impact has not been significant. Company cars could face more opposition in the coming years, and this could be a crucial factor dictating the direction of the market in the early 1990s.

In France, 1990 was another record year, with 2.3 million cars registered. Reductions in VAT rates in 1987 and 1989 provided a boost to demand - the French VAT rate now stands at 22% after the 3% reduction in September 1990. Further reductions are anticipated in a bid to get France into line with EC proposals, and this is just one of the factors which is expected to keep car sales fairly high over the next few years. France is also witnessing the gradual implementation of a compulsory vehicle

testing system (the Contrôle Technique), which by providing strict mechanical and safety standards, will help to force older cars out of circulation, thus stimulating replacement demand.

Italy has provided around 24% of the growth in the total EC car market from 1984-89, with a total market size of 2.36 million in 1989. However, the short to medium-term outlook is probably the least promising of all the major EC markets.

1990 presented some uncertainty given the government's commitment to increase the costs associated with vehicle ownership.

Despite the fact that the market started well in the first half of 1990, the second half saw a sharp decline in sales.

Spain and Portugal have contributed consistently to the growth in new car sales to account for 1.33 million units of the EC total. After problems with economic overheating, both countries have resorted to the implementation of quantitative controls on consumer credit, to control the expansion in demand that has taken place since their entrance into the EC in 1986. This has led to a slump in new car demand (in 1989 in Portugal and in 1990 in Spain), although Portugal is already showing signs of recovery, and Spain is expected to follow soon.

The Belgian market has grown by an annual average of 4.5% since 1984, implying that car density has increased to reach 366 cars per 1 000 inhabitants as against 341 in 1984. In the Netherlands, a considerable accumulated demand has built up in recent years, as would-be purchasers waited for the Dutch government, which is under pressure from the EC, to lower the rate of consumption tax levied on car purchases. It now looks as if the tax will not

be reviewed until 1992, and hence many would-be purchasers who avoiding making a decision in anticipation of a tax reduction have now entered the market. As one of the most pro-environment governments, the Dutch authorities are considering various radical proposals to encourage cleaner cars.

The three smallest EC markets, Greece, Denmark and Eire have all been suffering from erratic sales performances in recent years, mainly due to government policy. Whilst the development of the Irish car market has been held back by a poor economic performance, the recovery which has manifested itself in the late 1980s is fuelling the automotive revival. Both the Greek and Danish markets have been handicapped by tight fiscal policy which has forced car prices to exorbitant levels, and kept demand at a low level in a bid to alleviate trade deficit problems. After a second year of dynamic growth in 1990, the Greek market is now approaching more normal levels of demand for a country of its size and economic development.

The growth experienced in recent years, which has far exceeded the rate of withdrawal, has increased the vehicle parks in most countries. The EC's more developed nations now show motorisation rates of over 400 cars per thousand population (Germany, France and Italy), whilst the UK, Belgium and Netherlands are around the 340-380 region. With only 290 cars per thousand inhabitants, Spain should offer the potential for further strong growth, once the current temporary downturn (which has arisen due to problems with the economy) has been overcome.

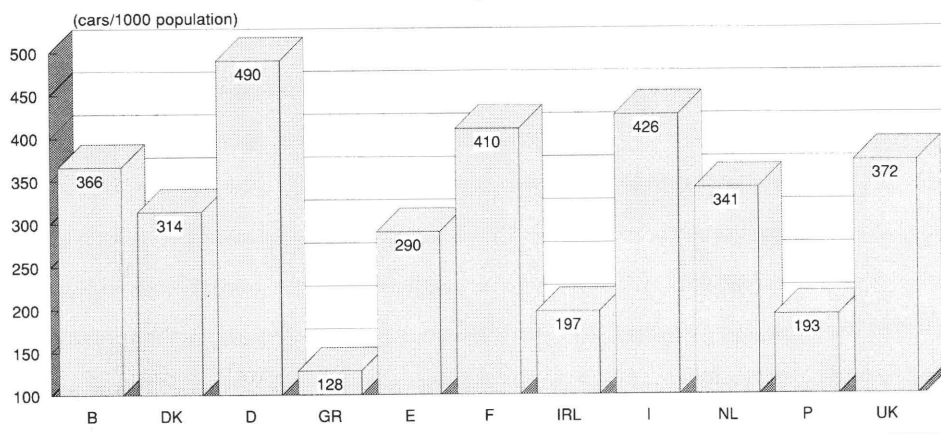
Commercial vehicles In recent years, the demand for commercial vehicles in

Table 3
Motor vehicles
LCV and truck registrations

(1 000)	1986	1987	1988	1989
LCVs < 6 tonnes	1 108	1 253	1 313	1 395
Trucks > 6 tonnes	201	228	254	271
Total EC	1 309	1 481	1 567	1 666
Total Western Europe	1 440	1 614	1 703	1 801
North America	5 075	5 284	5 373	5 657
Japan	2 432	2 540	2 722	2 980

Source: DRI Europe

Figure 3
Motor vehicles
Car density in the EC, 1989



Source: DRI Europe

Western Europe has grown strongly. In the mid 1980s, a major factor behind truck sales was the renewal of the fleet which took place in the late 1970s. More recently, it has been new demand rather than replacement demand which has given the market its buoyancy. An increase in trade between Member States has also contributed to this growth. All sectors of the market have seen a positive trend during the late 1980s. The lightest category of vehicles, the van market below 3.5 t GVW (gross vehicle weight) has grown by an average of 7.9% over the period 1986-89 and the medium sector (3.5 t-15 t GVW) has expanded by an average annual 8.1%. The steepest rise has been achieved by the heavy rigid and articulated trucks, which have experienced an average increase in sales of 13.9% over the same period.

In West Germany, truck registrations have

grown consistently in the late 1980s, but now face a more uncertain outlook in the face of probable domestic deregulation. As the bureaucracy which the hauliers have faced is gradually relaxed, this should allow them to use existing fleets with greater flexibility, reducing the need for larger fleets.

The industry does, however, stand to gain as a result of the opening up of Eastern Europe and in particular the merging of East and West Germany. The French market has also enjoyed excellent growth, although in 1990, the heavier sectors of the market declined. A further drop is anticipated in 1991, with the light sector of the market (under 6 t GVW) also falling back slightly.

After a similar period of growth in the late 1990s, the UK truck market is in the midst of the sharpest downturn of all the major

European markets. As a result, the UK is losing its position as the EC's largest truck market in favour of Germany. Although vans are set to rise as a result of gradually recovering consumer expenditure and a succession of new products, the British heavy truck market is not anticipated to reach the levels witnessed in 1988 and 1989 within the medium-term.

The late 1980s have seen particularly strong growth from the Italian market, with a 39.3% rise in the heavy truck (above 6 t GVW) market in 1987, followed by two years of growth averaging 14.7%. The Italian market fared better than the UK in 1990, but such a pace cannot be indefinitely maintained. Partly as a reaction to the pace in recent years and partly due to other factors, 1991 is expected to see a reduction in the investment in new vehicles. These other factors include increasing diesel fuel prices, higher labour and financing costs and taxation.

Production

The late 1970s and early 1980s were marked by some uncertainty in the wake of the second oil crisis, as well as fears concerning overcapacity. Most companies went through a period of consolidation and restructuring. Intensifying competition, and the growing threat not only from the Japanese producers, but also from the fast evolving Pacific Basin companies, caused EC manufacturers to make substantial changes in production processes and to cut costs. Revolutionary cost-effective Japanese techniques were paramount in causing producers to re-evaluate their systems. The main objectives, to reduce unit production costs, improve productivity, build in more flexibility and increase research and

development expenditure were achieved by various means. Plant closures involving substantial lay-offs, the rationalisation of operations and the increasing use of common platforms for several models helped to minimise costs, whilst the introduction of flexible manufacturing systems and "just-in-time" management were directly adopted from the Japanese.

At a time when profitability was deteriorating, increased research and development expenditure was needed for investment in CAM (computer aided manufacturing), involving the growing use of robotics, and CAD (computer aided design). The total capital expenditure by EC car manufacturers reached 66 billion ECU over the 1981-86 period (about 8% of turnover). In some cases this was funded by state aid packages. Government intervention was also used to protect domestic industries in a period of restructuring by imposing quotas on Japanese imports.

Large workforce reductions took place, notably in France, the United Kingdom and Italy. For some companies, the rationalisation process is still not complete.

However, most of the producers who are still enjoying the growth of the late 1980s have found themselves short of capacity - in direct contrast to the beginning of the

decade. Having already closed one of its two Antwerp plants, General Motors, faced with a severe shortage throughout most of its product range, has been considering the option of re-opening it. Peugeot SA plans to re-open its Valenciennes plant in Northern France in around 1993-1994. Producers are also looking outside the EC for solutions to their capacity problems. General Motors is to start production of their Calibra Coupé sports car in Saab's Valmet plant in Finland from 1991, whilst almost all of the EC manufacturers have been considering Eastern Europe as a production base offering a large workforce and significantly lower costs.

Production of passenger cars Total EC production of passenger cars in 1989 was 12.9 million, meaning that EC production exceeded EC demand by only 600 000 units. The other main producing regions, Japan and the US are at opposite ends of the spectrum. Whilst North American output accounted for only 72% of domestic demand in 1989, in Japan the domestic market absorbed only 49% of total output, with the remainder going to export markets. In terms of growth, EC output has grown by 29% since 1984, against the progression in demand of 33%. Over the same period, Japanese car production has

Table 4
Motor vehicles
Production of passenger cars by region, 1980-89

(millions)	EC	N America	Japan
1980	10.0	7.2	7.0
1981	9.4	7.1	7.0
1982	9.7	5.9	6.9
1983	10.4	7.7	7.1
1984	9.9	9.0	7.1
1985	10.3	9.3	7.6
1986	11.0	8.7	7.8
1987	11.7	8.0	7.9
1988	12.2	8.1	8.2
1989	12.8	7.9	9.1

Source: DRI Europe

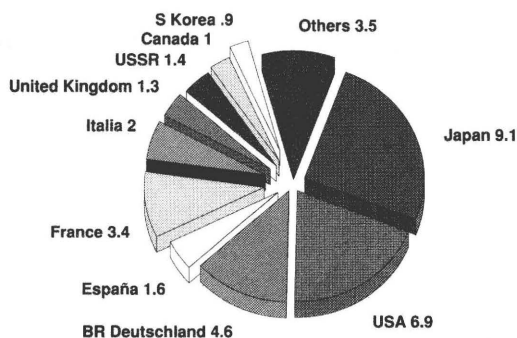


increased by 28%, whereas North American output has actually fallen by 12.5%. However, although in total terms the growth in EC production has been particularly encouraging - in 1989, most producing countries with the exception of Belgium reported an increase - the profile of the producers is already beginning to alter.

Production of commercial vehicles

Total production of commercial vehicles in Western Europe reached 1.8 million in 1989, representing an 8.4% growth rate against 1988. The heavy sectors have been most active, where producers have been capitalising upon general economic buoyancy within Western Europe, and also the generally optimistic perspective provoked by the prospect of the Single Market. Rationalisation in the 1980s led to the merger of Leyland of the UK and DAF of the Netherlands, whilst Ford and Iveco joined together in the UK. General Motors meanwhile, split its van and truck operation in the UK, with the heavy side eventually joining the company AWD, and the vans going under the control of a joint venture company IBC, with representation from Suzuki, Isuzu and General Motors. The IBC operation at Luton in the UK was typical of other joint venture operations with the Japanese, which were particularly successful in the lighter segments where the profit margins are tighter. Nissan Motor Iberica produces off-road 4x4s, vans and flat-beds in Spain, and the Suzuki-Santana venture, also produces off-rovers. Such collaboration is becoming increasingly common, both with Japanese and fellow-EC partners. The Peugeot and Fiat Sevel agreement has been very successful in the production of vans in the 2-3.5 t category, and has opened the way for fur-

Figure 4
Motor vehicles
World car production, 1989
(millions)



Source: DRI Europe

ther long-term collaboration with a view to jointly developing new vehicles. Renault and DAF are also to develop a van jointly for production in France and in the UK from the mid 1990s.

EC trade policy

Trade frictions are the basis for self-restraint in Japanese car exports. In an attempt to reduce increasing pressure over the issue of imbalances in automotive trade the Japanese decided in 1986 to limit total Japanese imports to the EC to below a certain figure, which is set to increase each year. Total Japanese exports to the EC in 1989 reached 1.2 million units. However, due to a production shortage in Japan, a significant share of these exports were sent during the last months of 1989. Consequently, actual imports did not exceed 1.1 million units, giving them

9% of the market - the lowest share since 1985. However, this share significantly increased in 1990.

Within that overall limit, various countries have their own individual quota systems. Broadly speaking, Japanese imports account for 2% of the Italian market, 3% of the French market, 11% of the UK market, 14% of the Portuguese market and below 1% of the Spanish market. There has been some disagreement with certain Member States over whether transplants should be included in the quotas, notably in the case of the Nissan Bluebirds produced in the UK. However, the level of local content, which appears to have been reached for that model by Nissan UK (around 80%), has changed the pattern of the problem.

The objective of the EC Commission is to

Table 5
Motor vehicles
LCV and truck production

(1 000)	1986	1987	1988	1989
LCVs < 6 tonnes	1 105	1 156	1 303	1 428
Trucks > 6 tonnes	229	245	281	290
Total EC (¹)	1 334	1 401	1 584	1 718
Total Western Europe	1 436	1 611	1 703	1 801
North America	4 288	4 651	4 786	5 414
Japan	4 407	4 308	4 444	3 931

(¹) Excluding double counting
Source: DRI Europe

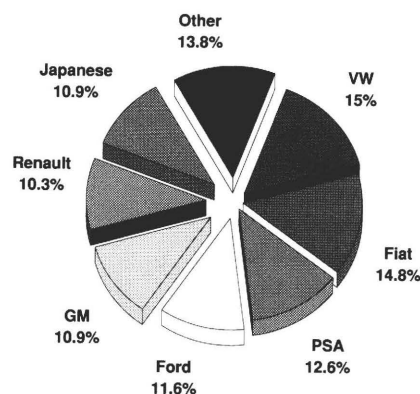
ensure that national restrictions are gradually phased out. Nevertheless, given the degree of trade imbalance with Japan and the high dependence of their domestic manufacturers on the five protected markets, certain Member States are opposed to a rapid relaxation of quotas, and are calling for a long transitional period from 1993. The EC Commission favours a shorter transitional period which would be based on some kind of voluntary restraint agreement (VRA) by Japan. At the end of this period, access to the EC market will be completely free. The objective is to avoid a situation similar to that of the USA, where Japanese self-restraint has been renewed constantly for over ten years.

Having dropped slightly in 1990, overall production in the EC is forecast to continue to fall in 1991, before picking up again to reach around 13.7 million units by 1994, much in line with the pattern of European demand. All producing countries are expected to share in this growth, with Spain and the UK taking the greater share of the additional output as Japanese transplant activity expands over the short to medium-term.

Trade flows

Intra-EC trade has been estimated to account for 4.6 million cars and trucks in 1989. As far as extra-EC trade is concerned, from the peak of 491 000 units sales in the US in 1986, EC sales dropped to 281 000 units in 1989, with all manufacturers experiencing lower sales than the previous year. So far in 1990, the overall downward trend in sales of EC makes continues, with the exception of Porsche, Daimler Benz, Jaguar and Alfa Romeo. The losses in the US have how-

Figure 5
Motor vehicles - Passenger cars
Western Europe: Market share by manufacturers, 1989



Source: DRI Europe

ever been somewhat compensated by gains in the Japanese market. In 1989, EC sales rose by 34% to 150 400 units to give them a 3.4% penetration rate: a figure which represents around 2% of the total vehicle market. All EC producers enjoyed increased sales in 1989, and with the help of distribution agreements with Japanese manufacturers, they are likely to continue increasing volumes over the next few years, though at a reduced rate.

Market shares

1989 saw the usual strong competition between the Volkswagen-Audi Group and the Fiat Group for market leadership of Western Europe. Although Audi sales dropped last year, an improvement of SEAT's products in the major markets helped to propel Volkswagen ahead of Fiat. Fiat were followed by PSA, Ford, General Motors and Renault respectively. In 1990 however, General Motors progressed largely at the expense of Ford, due to a fresher product line. In the light commercial vehicle (LCVs up to 6 t GVW) market, Renault comfortably held on to market leadership in 1989, with a sharp increase in sales. Renault is followed by PSA, Ford and Fiat/IVECO re-

spectively. VW, who in 1986 was ahead of Fiat, and only slightly behind Ford, has fallen back. The situation is expected to change, given the imminent launch of a replacement for the linchpin of the VW LCV range; the new Transporter.

Mercedes-Benz has dominated the heavy end of the truck market during the late 1980s, and indeed took 23% of the truck market over 6 t GVW in 1989, with a strong performance in the heavy sector. It was followed by Fiat/IVECO with 14% and Volvo with 10%.

Employment trends

The level of direct employment in the EC automotive industry reflects the restructuring which has been taking place since the early 1980s. Overall, around 390 000 (18%) jobs were lost in the industry between 1980 and 1987, although total job losses (direct and indirect) are believed to be closer to 600 000. In contrast to France and the UK, the Federal Republic of Germany achieved an increase in employment of +68 000 during the same period. The latest estimates of direct employment (manufacturing) in the West European motor vehicle industry for 1988 stand at 1.5 million, although a further 8.8 million

employees were indirectly employed within the motor industry and services, making 10.3 million employees in total.

In the long-term, the downward trend in the numbers employed is expected to continue as investment strives to improve standards of productivity, which usually results in the substitution of capital for labour.

Between 1980 and 1988, productivity increased by around 39% due to the restructuring activities discussed earlier.

Manufacturers are still pushing for further productivity improvements, and are offering benefits to employees to help them achieve this. These include reduced hours as well as financial incentives.

Financial performance

The financial performance of the EC automotive manufacturers has greatly improved since 1984. After combined losses of 2.2 billion ECU for the 1981-84 period, the 1985-87 period saw automotive companies realising a net profit of 10.6 billion ECU, and from 1987 onwards, almost all companies have been operating profitably.

This turnaround was largely the result of a succession of good years for the EC passenger car and truck markets, but was also assisted by the long period of restructuring in the late 1970s and early 1980s. In recent years, the US multinationals, Ford and General Motors have been supporting their profitability with high earnings from European operations in the UK, Germany, Belgium and Spain. In 1989, however, General Motors Europe's net profit remained flat, whilst Ford of Europe's operations suffered a sharp fall in profits.

All of the other major EC producers managed to record higher profits. The VW Group made the most progress, with turn-

over higher by 10.4% and net profits up by 34.6% (though from a low level). With the highest turnover at 34.5 billion ECU, the Fiat Group reported a profit of 2.4 billion ECU, of which slightly more than half was attributed to automotive operations.

Eastern Europe

Much of the development of the Eastern European motor industry got started during the 1960s when most of the current production capacity, product designs and technology were developed and licensed. Much of this development occurred with the assistance of West European companies, notably Fiat in the Soviet Union and Poland, and Renault in Romania. Although there was a marked increase in activity and output during the 1970s, political and economic reasons led to a slowdown in expansion during the 1980s.

The opening up of Eastern Europe in 1989 has led to a strong revival of interest from the Western automotive manufac-

Table 6
Motor vehicles
Employment and productivity, 1989

	No of employees	No of vehicles produced	Vehicles per employee
Fiat	286 300	2 245 900	7.8
Ford Europe	115 000	1 864 000	16.2
GM Europe	118 000	1 624 000	13.8
Peugeot SA	159 100	2 216 100	13.9
Renault	174 600	1 955 600	11.2
Volkswagen	251 000	2 503 800	10.0

Source: DRI Europe estimates

Table 7
Motor vehicles
Financial performance of the main EC producers, 1989

(billion ECU)	Turnover	% change 1988-89	Net profit	% change 1988-89
Fiat	34.5	+17.0%	2.4	+10.0%
Ford Europe	19.1	+1.0%	1.1	-18.0%
GM Europe	17.9	+13.8%	1.6	0.0%
PSA	21.8	+10.8%	1.5	+6.7%
Renault	24.8	+8.1%	1.3	+5.6%
Volkswagen	31.6	+10.4%	0.5	+34.6%

Source: DRI Europe

turers in the countries of Eastern Europe, both in terms of potentially large markets, and also as a low-cost production base. All Eastern European markets have low levels of per capita car ownership by Western standards. In addition, production levels have failed to satisfy consumer demand, with 5-10 year waiting lists not uncommon. Investment activity from Western producers is likely to help to redress this shortage.

Most of the major West European manufacturers have already entered into agreements with Eastern European producers, in anticipation of future rewards. Fiat is negotiating a wide scale investment for the Yelabuga operation in the Soviet Union. This is to be a three phase investment programme, involving production of two small models and one larger model. Around one third of output is eventually intended for Western markets. Fiat has also been very active in Poland, where in a

joint venture with FSM, it plans to produce over 300 000 minicars by 1995. In Eastern Germany, VW plans to replace the Trabant with the Polo, whilst General Motors has projects in both Eastern Germany and Hungary.

The major impact on capacity and production in terms of Western projects is not likely to be realised until the beginning of 1994. By 1995, total production is forecast to increase from 2.5 million in 1989 to over 3 million units by 1995. Around 35% of capacity in place by this time, will result from the replacement of existing capacity. Over this period, exports to the West are anticipated to increase by close to 90%, to over 330 000 units. Steady, but consistent growth is also forecast for new car sales in the Eastern European markets, and the total market size by 1995 is expected to be around 2.6 million units.

Environmental issues

Since the early 1970s, EC legislation has controlled the emission of both unburned hydrocarbons and carbon monoxide, and in 1978, nitrogen oxide also became subject to control. In 1987, the "Luxembourg compromise" finally became law as a result of the Single European Act, introducing stricter regulations for cars with engines over 1400cc capacity. These regulations were to be phased in on a gradual basis over the period to 1993. Nevertheless, the legislation failed to make any judgement on cars with engines below 1400cc or diesel engined cars.

For the manufacturers, the technical changes required to meet these regulations were substantial, with the consequence of considerably higher costs for both producers and consumers. For the most part, catalytic converters were re-

quired, creating a demand for unleaded petrol. In fact, a separate EC Directive, requiring Member States to ensure that unleaded petrol was widely available by the end of 1989 (lead itself being regarded as a pollutant), was issued in 1985. By 1989, there was a more acute recognition of the need for European integration at an industrial and legislative level, which allowed the compromise to be removed. According to recent legislation, all new cars will have to meet standards as severe as those originally conceived for cars with engines over 2 000cc, i.e. as strict as US norms. This will probably come into force by 1992, and the legislation will be mandatory rather than optional. In 1989, legislation was established to this effect for the small car class. Although the problem of inadequate unleaded petrol supply has been largely resolved, there are still some problems, particularly that of cost. Some Member States have been considering the introduction of fiscal subsidies for "clean" cars with a joint objective of reducing emissions as soon as possible, and making it easier for domestic manufacturers to withstand the higher prices which would undoubtedly curb demand. So far, only Germany and the Netherlands have taken significant steps in this direction. The issue of carbon dioxide emissions (which add to global warming) have still not been adequately addressed. At the moment, there are no specific technological methods to reduce carbon dioxide emissions from an engine other than improving its efficiency. This is unlikely to result in higher production costs for producers. Road transport is estimated to account for around 25% of total European

carbon dioxide emissions.

A further consequence of the recent growing public consciousness of the problems caused by motor vehicles to the environment has been the "bad press" given to the diesel engine, which originally arose after the concern about acid rain in the mid 1980s, but is now founded on their high particulate emission levels. In fact, because of their greater economy, diesel engines do have a positive part to play in the environment debate. The diesel issue is particularly relevant to the truck industry which is completely reliant on this form of fuel.

Unlike the United States, whose CAFE standards have been regulating fuel consumption since the 1970s, the EC does not currently monitor or regulate this factor in any way. However, the average fuel efficiency in the EC is currently quite similar to the US average. There have however been some developments on other environmental "hazards" such as noise levels permitted by heavy trucks, and circulation restrictions in major cities at peak times and during the night.

Outlook

With the introduction of the Single European Market at the end of 1992, EC car manufacturers are moving into a time of great potential change, with consequences for both internal and external competition. Although the industry has already seen considerable restructuring, competition is expected to intensify again, possibly leading to further rationalisation, particularly in the truck sector.

After several years of buoyant market growth, 1990 brought a slight fall in the demand for passenger cars. A further decline (likely to be worse than -1%) is

anticipated in 1991. In 1990, the UK car market fell sharply, and the outlook remains negative for 1991. Italy also declined marginally in 1990, and 1991 is expected to bring a further drop in sales. West Germany performed well, and the addition of Eastern German car registrations from 1991 should enable the market to cross the 3 million units barrier.

By the mid 1990s, new passenger car sales in the EC are forecast to be roughly one million units higher than the 1989 level, at 13.2 million. The main propo- nents of the growth in the interim are ex- pected to be Germany, Spain (back into its stride again after a slackening in 1990), and France. Of the smaller EC mar- kets, Portugal, Greece, Denmark and Eire will also be contributing to the growth.

The major threat to continued growth must be the growing environmental pressure, which is manifesting itself throughout the EC. This pressure is likely to become more influential, making it increasingly diffi- cult for the motor industry to carry on as it is today. However, all manufacturers are known to be investing heavily in "greener" technology, and some kind of break- through is possible eventually. The van and light truck market are also set for steady progress in the early 1990s, with the evolution of new image-conscious products such as off-road vehicles, mini- vans and pick-ups providing a particular boost to demand. Indeed, most of the major EC manufacturers have plans to pro- duce one or more of this type of product, and although volumes are not initially pro- jected to be very high, profit margins will be good, and if such vehicles take off, as they are already showing signs of doing, the outlook for growth is promising.

Table 8
Motor vehicles
World car production forecast

(thousand)	1989	1990	1991	1992	1993	1994
BR Deutschland	4 564	4 709	4 781	4 938	4 956	5 016
France	3 409	3 339	3 263	3 328	3 373	3 456
Italia	1 972	1 932	1 811	1 853	1 884	1 898
United Kingdom	1 299	1 229	1 342	1 459	1 556	1 615
Total EC	12 832	12 683	12 678	13 081	13 387	13 704
Western Europe	13 216	13 039	13 061	13 488	13 815	14 141
North America	7 925	7 634	7 503	7 730	7 566	7 675
Japan	9 052	9 413	9 099	9 270	9 449	9 564
Eastern Europe	2 455	2 476	2 260	2 298	2 317	2 457
World	35 657	35 490	35 198	36 394	37 077	38 036

Source: DRI Europe

Table 9
Motor vehicles
World car sales forecast

(thousand)	1989	1990	1991	1992	1993	1994
BR Deutschland	2 232	2 996	3 244	3 368	3 397	3 504
France	2 274	2 367	2 267	2 320	2 333	2 371
Italia	2 362	2 333	2 140	2 267	2 307	2 288
United Kingdom	2 301	2 021	2 030	2 194	2 255	2 278
Total EC	12 273	12 195	12 180	12 716	12 984	13 284
Western Europe	13 423	13 292	13 259	13 798	14 116	14 449
North America	10 855	10 363	10 055	10 471	10 591	10 697
Japan	4 404	4 950	4 731	4 858	4 989	5 136
Eastern Europe	2 276	2 316	2 098	2 134	2 149	2 287
World	35 386	35 514	35 043	36 452	37 266	38 282

Source: DRI Europe

With regard to the heavy market, the sharp surge in demand in the late 1980s was partly a result of the road transport in- dustry investing with a view to drawing the maximum benefit from the approaching Single Market. Markets such as Belgium and the Netherlands, which are major players in the haulage industry, have re- cently enjoyed marked strong growth. There have been numerous new entrants to the industry, causing competition to in- tensify and margins to tighten. It is looking increasingly likely that there will be a shake-down period in the early 1990s, with demand falling back towards more "normal" levels. By 1992, sales of vehicles over 15 t GVW, are expected to be

around 12% below the record 1989 figure. Even by the mid 1990s, sales are not ex- pected to have recovered.

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The motor vehicle parts and accessories sector is emerging as an important industry in its own right. Comparative statistics on the sector should however be regarded with caution due to the lack of a standard definition of its boundaries. A recent study, carried out for the European Commission (DG III), underlines the vital importance of a sector which employs around 1 million people (ie 2.5% of total EC industrial employment) in around 3 250 enterprises within the Community. The sector is estimated to have generated, in 1988, a turnover of around 70 billion ECU, ie about 40% of the overall revenue of the European motor vehicle industry. The sector generates a significant trade surplus, of around 2.5 billion ECU per year.

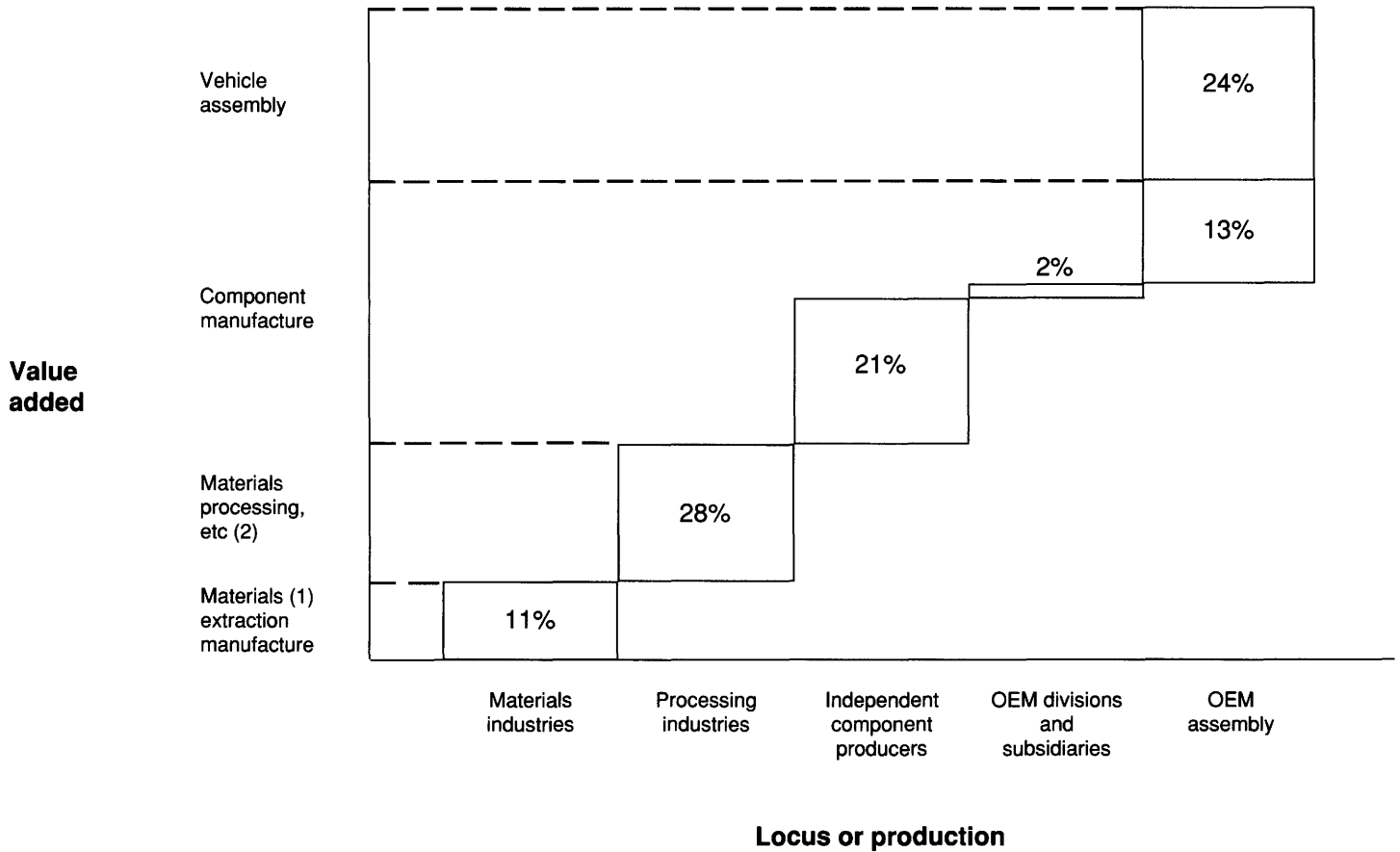
Original equipment parts account for approximately 75% of company revenues, with the remaining 25% attributable to the replacement of parts.

In terms of added value, the independent components industry accounts for approximately 21% of the total value added by the automotive industry.

However, the importance of the automotive suppliers' industry goes far beyond these figures, since the scope of the study mentioned above, was limited to automotive component activities for passenger cars and commercial vehicles up to 3.5 tonnes, and did not include products such as tyres, accessories, paint, adhesives, unfinished components and materials, as well as communication equipment. In addition, the mutual dependence and synergies linking automotive manufacturers and

suppliers, makes this sector a strategic industry in terms of new technology diffusion, owing to the importance of the automotive activities within the overall European economy. International competition in the automotive parts industry is intensifying as trade develops and investment requirements reach new heights. Being a key element within the competitive structure of the automotive industry, the sector is therefore confronted with the challenges facing the EC automotive industry, as well as with the necessity of adapting to the changing industrial standards of the profession.

Figure 1
Importance of the EC component industry



(1) Including steel, non-ferrous metal, plastic, textile and paint manufacture
 (2) Including universal, unfinished and sub-componentry
 Source: Boston Consulting Group

Description of the sector

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 specialised producers for assembly into their vehicles, and the market for replacement, which comprises of parts destined for repairs and automotive accessories. Another important segment for motor vehicles parts and accessories' trade includes exports of both automotive components and vehicle parts destined for assembly outside the Community.

The market for motor vehicles parts and accessories

The original equipment parts market (OEM) Demand for OEM is, by definition, linked to the level of activity in the automotive production sector. To a large extent, the situation in the OEM depends on the degree to which car manufacturers are integrated. Increasingly, 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 sourcing 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 a well established trend towards more outside purchasing of components by car manufacturers, as the in-house production of parts is increasingly seen as a handicap. Such developments, combined with the fundamental changes in the nature of the industry, are having a dramatic result on the overall numbers of independent operators present in the industry.

Vehicle manufacturers are cutting back on the 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, such as Valeo/Neiman and Magneti Marelli/Solex/Jaeger/Weber.

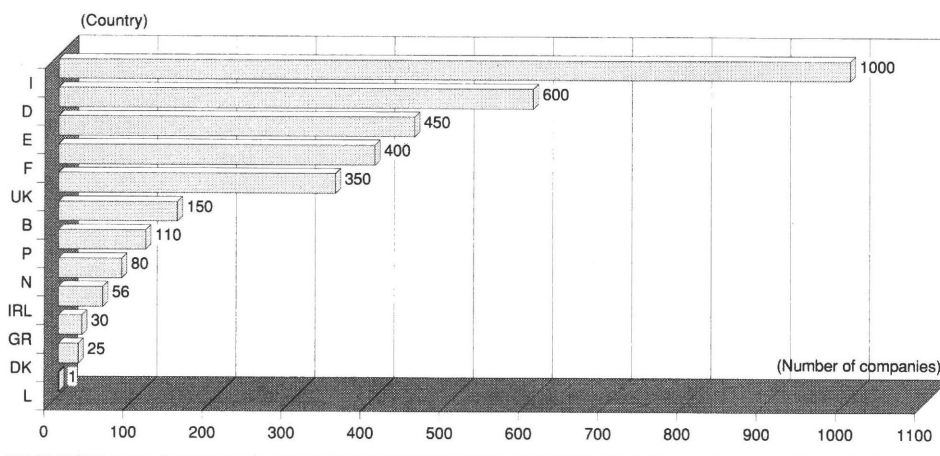
In spite of the increased presence of large, international companies, the original equipment sector continues to be very fragmented. This is essentially due to the nationally based nature of parts procurement. Although intra-EC trade has grown to extremely high levels during the past decade, most vehicle 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 comprises mainly of small and medium-sized companies. The average size of employment is about 270 people, but 64% of these enterprises employ less than 100 people. Only 4% of the companies have more than 1 000 employees, although these firms account for 50% of total employment.

The replacement parts market

Demand for replacement parts depends on the usage of automobiles and other motor

Figure 2
EC autocomponents: estimated number of suppliers by country 1988
(total 3 252)



Source: Government Statistics, Trade Association, PRS Analysis

vehicles, as opposed to new sales thereof.

Demand is thus likely to be more stable on this market segment than on the OEM.

It is generally estimated that about 70% of this market is supplied by independent parts manufacturers, with the remaining 30% controlled by the car manufacturers via their distribution and service networks.

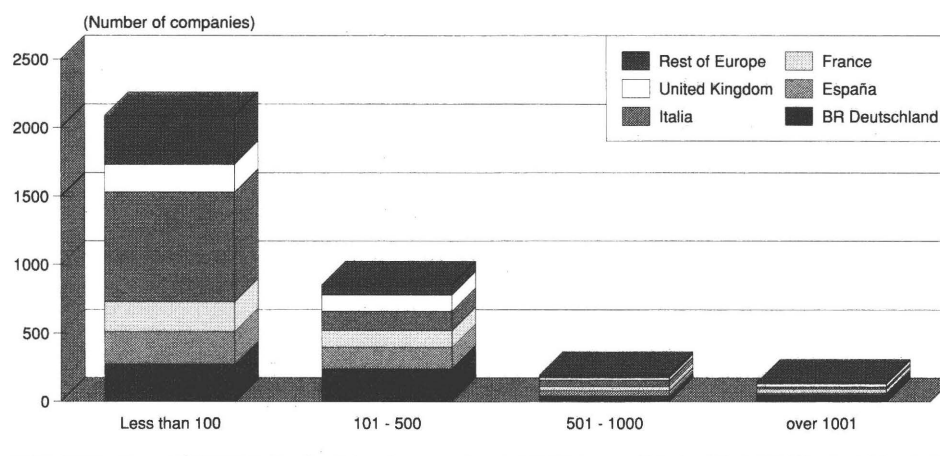
The replacement parts market differs greatly from country to country. Market features in the various EC countries depend largely on the characteristics of the cars on the road, the age of the park of cars and the existence of specific legislation with regard to obligatory inspection of vehicles once they reach a certain age.

Trade

The internationalisation of the industry has been a determining factor in the substantial increase in foreign trade experienced since 1980. Exports reached the equivalent of 6.5 billion ECU in 1989.

The analysis of trade flows (see table 1) shows that the EC's trade surplus has regularly increased between 1980 and 1985, when it reached a record 6 billion ECU. Trade between Member States almost doubled during the same period. However, over the period 1986-89, the Community experienced a decrease in its trade balance of about 50% as compared

Figure 3
EC autocomponent companies shown by size bands
(total number of companies: 3 252)



Source: Government Statistics Trade Associations, PRS Analysis

Table 1
Motor vehicle parts and accessories
External trade, 1980-89

(billion ECU)	1980	1985	1986	1987	1988	1989
Intra-EC trade	6.3	11.4	13.1	15.3	13.1	15.3
Extra-EC trade						
Imports	1.0	2.7	2.9	3.3	3.4	4.0
Exports	5.4	8.7	8.3	8.6	6.4	6.5
Net exports	4.4	6.0	5.4	5.4	3.0	2.5
of which,						
BR Deutschland	2.3	3.6	3.5	3.7	1.4	1.4
France	0.7	1.2	1.1	1.0	1.0	0.7
Italy	0.5	0.9	0.8	0.7	0.8	0.9
United Kingdom	1.1	1.1	0.8	0.7	0.5	0.4
Other	-0.2	-0.8	-0.8	-0.8	-0.7	-0.9

Source: Eurostat (Comext)

with 1985 when, concurrently, trade between Member States grew at sustained rates. This situation is mainly attributable to the boom in car demand experienced in Europe since 1986, but also to a change in the classification of trade statistics. 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 NIC) of parts and accessories reached a new peak of 4 billion ECU in 1989 (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.

Industry structure

The EC motor vehicle parts and accessories industry is based on five national industries, 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 specialising in auto parts (Valeo-Neiman in France, Magneti-Marelli in Italy);
- ❖ hundreds of SMEs producing auto parts on a smaller scale.

Table 2 illustrates the organisation of the motor vehicles parts and accessories' sector, by country.

German industry

The independent German industry dominates the European market with about 39% of the total European production (estimated at 79 billion ECU 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 illustrated by Bosch, the world's largest unaffiliated auto parts producer, which is a pioneer in the fields of fuel injection and anti-blocking system brakes. Bosch alone is estimated to account for nearly a quarter of 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 23% of the European total, although its structure is still very much characterised 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, Epeda-B-Faure and ECIA (PSA group).

Italian industry The Italian industry, which accounts for about 14% of the Euro-

Table 2
Motor vehicle parts and accessories
Structure of EC production by country and component type

Country	% of total	Component type	% of total
Belgique/België-Luxembourg	1.8	Fuel systems	4.4
Danmark	0.5	Engine parts	11.8
BR Deutschland	39.0	Cooling systems	3.3
Hellas	0.2	Exhaust systems	3.3
España	10.2	Transmissions	3.0
France	23.0	Drive train	7.3
Ireland	0.1	Suspension	5.9
Italia	14.1	Steering	2.5
Nederland	0.5	Body parts	18.1
Portugal	0.5	Interior parts	10.8
United Kingdom	10.4	Braking	6.4
		Wheels (1)	5.5
Total	100.0	Electrical parts (2)	15.6
		Other	2.3
		Total	100.0

(1) Excluding tyres

(2) Excluding electronics

Source: PRS/BCG/European Commission

pean production, is dominated by the Fiat group. The leading producer is Magneti-Marelli, a subsidiary of Fiat, which now has 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 tightly re-structured under the influence of Fiat.

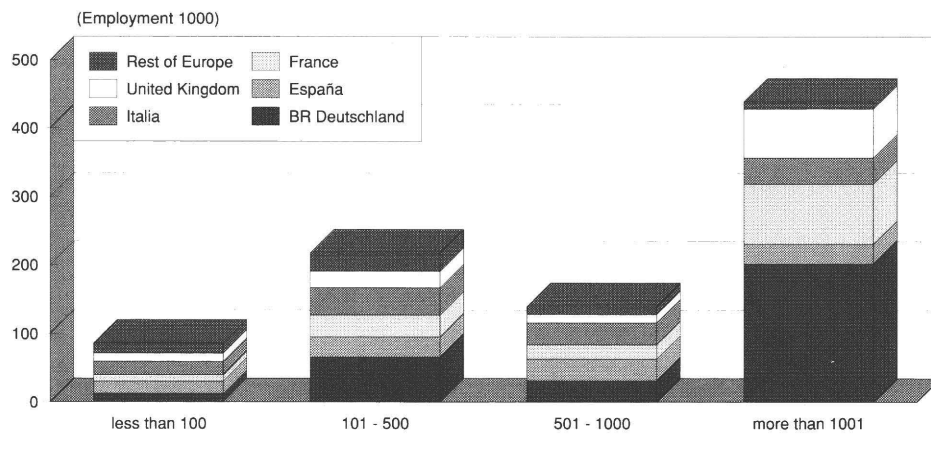
UK industry The UK components industry, which accounts for about 10% of the total sector, has been badly hit by the decline of British vehicle production and its excessive dependence on domestic manufacturers. However, the existence of an important replacement market together with the increased rate of Japanese investment in automotive production activities in the UK, has allowed the large British component producers (Lucas-Girling, T&N and GKN) to re-structure 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 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.

EC in comparison to the USA and

Japan The high degree of vertical integration of the US industry makes American car makers the world's biggest producers of motor vehicle parts and accessories (this is particularly true of GM). Furthermore, there are large diversified US corporations with strong market positions and proprietary technology in the automotive market in the US and around the

Figure 4
EC employment by employee size bands



Source: Government Statistics Trade Associations, PRS Analysis

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 Community (0.5 million compared with 1 million 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 3 250 companies in the EC. The average size of enterprises is 900 compared with the EC level of 270. Forty-five percent of the Japanese firms employ more than 500 people, compared with only 10% in the EC.

These Japanese companies have close organisational 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 partly owned by Toyota.

Many component producers are owned by more than one vehicle producer. This system has resulted in an industry which is more specialised and concentrated than the Community.

The extensive transfer of Japanese automotive 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 (about 50 companies). 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 the form of joint ventures with European companies. Of course, these suppliers will not just be content with supplying Japanese transplants, but will also try for a bigger share of the total European market.

In this context, the EC component producers must be able to compete, particularly in the high-growth electronics segment of the market, or face losing a

large slice of the next decade's 30 billion ECU growth to Japan.

It should, however, be noted that several European component producers have interests in the Japanese industry, such as Bosch who has a minority stake in Nippondenso.

Relationship between manufacturers & suppliers

The pattern of relationships between manufacturers and suppliers is being substantially modified. A major reason behind such a change arises from the necessity of car manufacturers to limit investment and resources to essential activities which represent the core of their industry. At the same time increasing outside purchasing and passing on the responsibility for product development, manufacturing and quality assurance functions to their suppliers (systems suppliers and/or specialised affiliated companies).

Components producers thus contribute to the competitiveness of the industry, and the increased inter-dependence 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 Japanese car industry has shown, the necessity for the car manufacturer to rely increasingly on such a supply base, implies fundamental changes in the structure of the sector. This means an increase in the sharing of high-value added products, faster growing R&D expenditure, and a need for organisations to adapt to

new constraints (excellence in quality, delivery and price as well as production flexibility). Finally there is a need to share productivity gains with car manufacturers on a continuous basis, and to finance a growing share of the productive investments (tooling and specific equipment) necessary for tailor-made products.

In return, car manufacturers are offering longer term purchasing commitments and closer cooperation, both of which contribute to improved stability in mutual relationships.

Implications of the Single Market

The increased internationalisation of the automotive industry is forcing the motor vehicles parts and accessories sector 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 in particular 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, on the one hand, the combination of Japanese car investment in the Community: the Japanese involvement in the EC will imply the arrival of new component competitors who, in turn, become potential new sources of suppliers for the EC car manufacturers. On the other hand, the increased internationalisation of EC car producers imply geographically enlarged supply bases, with a constant search for lower cost purchasing alternatives. In es-

sence, these developments are tracing a new international division of component production.

Technological developments

The nature of the automotive product, together with shorter product life cycles, places 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 organisations 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 sector are now taking a greater initiative in terms of new technologies offering improved performance, fuel economy, emission control, safety and comfort. Black-box engineering is becoming increasingly a standard practice within the industry, therefore requiring enlarged R&D functions utilising up-to-date CAD equipment and involvement at an early stage of the development process of new vehicles.

Competitive pressure on costs

Competitive pressure on costs, prices, quality and delivery standards has led the industry to restructure in a way similar to the car manufacturers. Automotive parts suppliers compete on the basis of price as well as 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 a recourse to skilled manpower, is far from being complete, especially amongst small and medium-sized producers.

European distribution channels

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 inter-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. These 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 amongst the smaller suppliers. The main driving force behind such pressure is the need to reach a cer-

tain critical size, allowing economies of scale and financial strength on an international basis.

Outlook

It is likely that the market for components in Europe will extend rapidly over the next decade, reaching around 95 billion ECU in the 1990s from a current 70 billion ECU total, 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 and more efficient safety restraint systems;
- ❖ the general "up-market" move in car demand with customers demanding more equipment, comfort and power;
- ❖ the increase in component out-sourcing by car manufacturers with high added value.

With regard to the replacement market, it should be remembered 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 may either occur 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 until now. This, combined with the consumer's desire for safer and more comfortable driving, and the expected growth of the total car park in Europe, implies that there will be promising growth in demand in the replacement parts market. On the other hand, technological advances should result in much longer lasting parts and thus slow replacement cycles. Increased opportunities in the Eastern European markets will also have a positive influence on demand for automotive components. 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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Edited by: DRI Europe

Having held a dominant position until the beginning of the 1970s, European output of mopeds and motorcycles experienced a long period of decline, due to shrinking market demand and strong import competition from Japanese products.

The leading European firms reacted to this situation by investing and restructuring, with obvious benefits for employment levels. The situation now seems to be improving and during the late 1980s, production moved upwards once again.

Description of the sector

The NACE definition is very general since it includes cycles and parts.

Mopeds are motor driven vehicles with two or three wheels, with an engine displacement not exceeding 50cc (if thermic) and a large spread of a maximum design speed up to 50 km/h. Legal definition and limits vary between each Member State. Motorcycles are motorised vehicles with two or three wheels, exceeding the legal definition of mopeds.

In certain Member States, some four-wheelers are also designated as motorcycles, when they conform to particular design limitations.

Current situation

The world production of mopeds and motorcycles is dominated by the Asian countries (which accounted for 66.7% of total world production in 1988, with Japan's share at 26.2%), followed by Eastern Europe (16%) and the EC (12.9%). However, if we take account of the fact that a large part of the production in Asia is done under European and Japanese licences (the same holds in Africa and Brazil) and

that the equipment produced in the Eastern countries and China is outdated, the high technologies of the mopeds and motorcycles industry in Japan and the EC pull these two regions to the top of the world market.

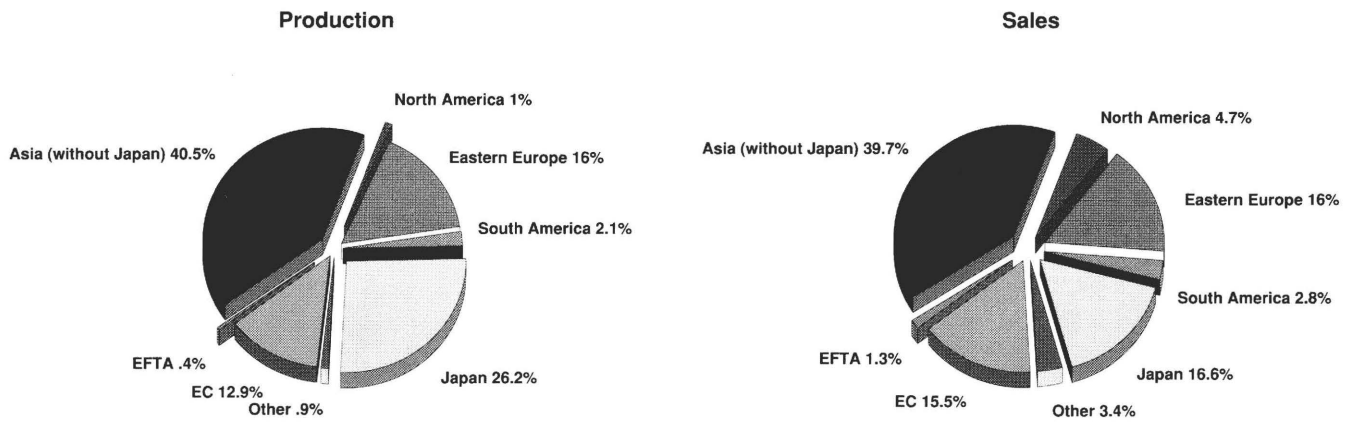
In 1989, the main EC producers in 1989 were, in decreasing order, Italy (52%), Spain (20%) and France (18%); mopeds represent the major part of the EC production, at around 71% of the total output of the sector.

Mopeds are also the major item sold on the EC market (69% of total sales of the sector), whereas, on the world market 56% of sales in 1988, were motor driven vehicles with an engine displacement exceeding 50cc.

Nowadays, the number of EC producers of mopeds and motorcycles is about 50; these account for 85% of the Community production, the remaining 15% being accounted for Japanese producers.

Nevertheless, the 10 largest EC producers represent 68% of the production, reflecting a certain degree of concentration in this sector.

Figure 1
Breakdown of the world production and sales
of mopeds and motorcycles in 1988



Source: IMMA, JAMA, Eurostat, National Associations of Motorcycles

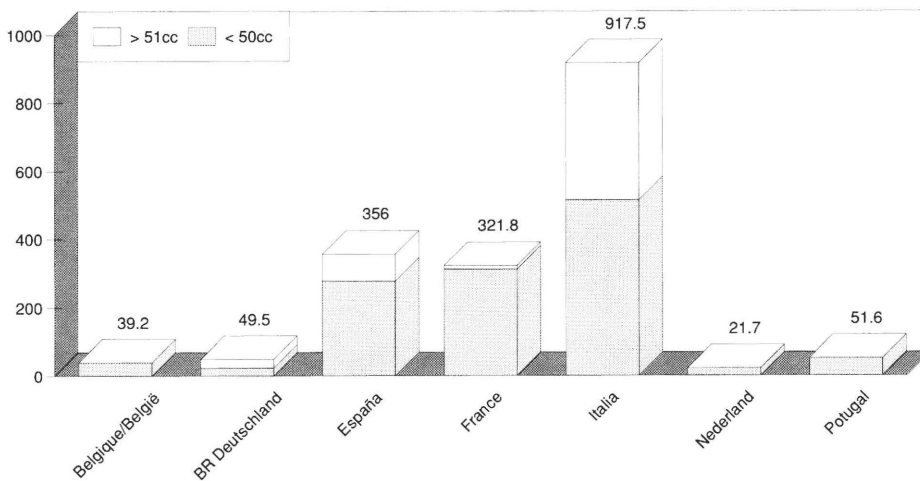
Production

The EC industry dominated the worldwide production of mopeds and motorcycles until the early 1970s. Subsequently, the industry encountered a period of great difficulty, because of a de-

crease in demand, resulting from the falling birth-rate, a shift in favour of four-wheeled vehicles, and certain legal requirements; for example, since 1986, crash helmets must be worn in Italy, while speed limits for mopeds and the need of

a licence were established in the Federal Republic of Germany. At the same time, EC manufacturers were confronted with a stronger Japanese presence, as imports began to increase significantly. The overproduction of Japanese producers (Honda and Yamaha) led to a real competition war between the largest producers, and to a novelty race. The average price of motorcycles however rose, reflecting their higher sophistication. For a large part of the 1980s, European output of both mopeds and motorcycles continued to decline, by varying degrees, according to Member State. The sharpest falls were recorded in the Federal Republic of Germany (-18% per year between 1980 and 1989) and France (-7.6% per year), while Spanish production increased by nearly 5% a year. The trends by prod-

Figure 2
Breakdown of EC production of
mopeds and motorcycles in 1989



Source: National Associations

Table 1
Mopeds and motorcycles
Producers and employment, 1989

	BLEU	D	E	F	GR	I(*)	NL	P	UK	Total
Employment (1000)	0.5	1.9	4	1.8	0.1	12	0.1	2.3	0.1	22.8
No of producers (2)	1	5	7	2	2	23	3	6	2	51

(*) 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

Table 2
Production of mopeds and motorcycles by country, 1980-89

(thousands)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Mopeds										
EC (1)	2 143.9	1 549.9	1 308.3	1 391.2	1 191.5	1 185.4	1 019.1	1 034.2	1 188.5	1 239.8
Belgique/België (2)	N/A	N/A	N/A	53.2	55.8	58.3	47.0	48.7	42.1	39.2
BR Deutschland	253.4	128.4	74.4	98.1	78.7	45.6	32.0	34.3	26.2	23.7
Hellas	N/A	N/A	N/A	5.2	5.0	4.0	4.0	3.0	N/A	N/A
España	194.0	153.0	131.0	139.0	143.0	146.0	149.0	190.0	249.0	277.0
France	651.0	486.4	500.3	513.6	443.8	441.3	283.4	274.9	298.8	311.6
Italia (3)	1 025.1	773.0	596.5	529.0	425.5	451.7	444.8	404.5	504.0	515.0
Nederland	18.7	8.1	6.1	8.0	6.2	6.5	12.6	28.9	18.5	21.7
Portugal (4)	N/A	N/A	N/A	45.0	33.0	32.0	46.0	50.0	50.0	51.7
United Kingdom	1.7	1	0	0.1	0.5	0	0.3	0	0	0
Motorcycles										
EC	545.7	648.5	587.4	457.1	404.3	470.9	507.8	432.6	544.2	518.4
BR Deutschland	49.5	88.3	58.8	41.5	41.3	40.2	33.8	27.6	23.8	25.8
España	39.0	36.0	36.0	40.0	34.0	27.0	33.0	66.0	78.0	79.0
France	3.4	5.5	3.2	4.9	5.6	4.7	6.0	3.4	6.4	10.2
Italia (5)	442.3	515.6	484.0	368.6	321.7	396.0	432.3	334.0	435.0	402.5
United Kingdom	11.6	3.1	5.5	2.2	1.8	3.0	2.7	1.6	1.0	0.9

(1) 1980-83 excluding Belgium, Greece and Portugal; 1988-89 excluding Greece

(2) Scooters excluded

(3) Including three-wheelers under 50 cc.

(4) 1988-89 estimated

(5) Including CKD vehicles and three-wheelers

Source: COLIMO

uct were however different, with the production of motorcycles remaining fairly stable while mopeds production decreased by close to 6% per year during the 1980s. The downward trend of the EC production was stopped in 1987 for mopeds and in 1988 for motorcycles. In 1989 production reached 1758.2 thousand units, 20% over 1987. As the 1990s get under way, the trend in the production of mopeds and motorcycles seems to have been reversed and the outlook points to positive though moderate growth.

Consumption

On the sales side, the largest EC market is Italy, closely followed by France and Spain. Sales in the Federal Republic of Germany accounted for only one third of those in Italy in 1988.

The changes in demand for mopeds in particular were fairly similar, and once again the German and French markets suffered, while the Spanish market remained constant. Although the decline in demand for

motorcycles continued in most markets right up to 1987, now the signs are that the sector is recovering.

Most observers believe that demand cannot fall much further, and forecast a positive future trend, mainly for mopeds and light motorcycles, particularly as they offer an alternative to the generally worsening levels of traffic congestion throughout the EC.

With this in mind, the outlook for EC manufacturers is reasonably positive, although there are risks to the forecast given the uncertain implications of the Single Market.

External trade

The deficit of the external exchanges of the EC reached 615 million ECU in 1988, imports being nearly five times the level of exports.

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 the largest EC producer, Italy.

Available statistics reveal considerable market penetration by Japanese manufacturers, who now dominate import activity in this sector. Most of the EC imports (89% in 1988) were coming from Japan, while the EC exports to this country represent no more than 15% of the EC total exports.

This holds despite restrictions on imports of Japanese vehicles. The EC industries located in Italy, France, Spain and Portugal are protected by such restrictions. There are however several agreements between EC manufacturers and licencees for the 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.

Since the EC is a large producer of mopeds, the trade balance deficit mainly reflects the high level of imports of bigger-engined motorcycles; the trade balance of mopeds showed a surplus of 18 million

Table 3
Sales of mopeds and motorcycles by country, 1980-89

(thousands)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Mopeds										
EC (1)	2 002.3	1 536.1	1 280.8	1 279.2	1 074.2	1 017.0	989.4	1 038.6	1 101.5	1 233.1
Belgique/België	N/A	N/A	N/A	44.3	41.7	39.6	42.5	45.6	44.2	51.0
BR Deutschland	386.7	196.7	113.4	162.2	126.4	92.4	63.4	66.5	58.5	53.0
Hellas	N/A	N/A	N/A	37.4	41.7	44.4	38.4	41.0	N/A	N/A
España	179.0	148.0	131.0	145.0	147.0	132.0	144.0	195.0	262.0	299.0
France	430.0	357.5	361.8	324.7	252.5	221.3	215.0	231.6	229.4	240.2
Italia (2)	815.0	647.5	500.0	412.0	330.0	365.0	350.0	310.0	360.0	440.0
Nederland	50.2	47.5	41.7	47.0	45.4	44.3	59.4	64.5	63.0	66.4
Portugal	51.8	48.0	42.4	40.4	35.3	31.0	40.0	55.2	60.0	61.2
United Kingdom	90.5	90.9	90.4	66.3	54.1	47.1	36.7	29.2	24.4	22.3
Motorcycles										
EC (2)	760.7	825.2	843.7	768.3	632.8	559.3	510.9	465.8	488.7	532.0
Belgique/België	N/A	N/A	11.0	10.6	8.5	7.5	6.6	6.5	6.7	7.4
BR Deutschland	141.9	241.8	256.7	230.0	179.3	122.3	98.4	96.6	93.1	95.8
Hellas	N/A	N/A	N/A	20.1	10.6	10.8	7.2	N/A	N/A	N/A
España	41.0	40.0	41.0	42.0	33.0	39.0	46.0	61.0	81.0	107.0
France	147.7	106.6	116.9	98.3	78.6	71.6	84.7	91.8	102.4	111.1
Italia (2)	190.3	239.6	261.6	248.0	223.6	223.0	191.2	138.4	133.1	130.0
Nederland	14.6	13.2	14.6	9.8	9.0	8.4	8.9	9.6	10.7	12.1
Portugal	N/A	N/A	N/A	1.0	0.5	0.3	1.0	4.0	N/A	N/A
United Kingdom	255.1	184.1	141.9	108.5	89.6	76.4	66.8	58.0	62.0	69.0

(1) 1980-83 excluding Belgium and Greece; 1988 excluding Greece

(2) Including three-wheelers

(*) 1980-82 excluding Belgium, Greece and Portugal; 1983 and 1987 excluding Greece and Portugal; 1986 excluding Greece*

Source: COLIMO

ECU in 1988.

Employment and productivity

In the mopeds and motorcycles industry, direct employment accounted for 22,800 in 1989, a relatively low level compared to the 157,000 persons working indirectly for this industry in the distribution, sales, accessories and secondhand shops.

The falling levels of production have led to lower direct employment levels, as a result of plant closures and restructuring activity, especially in the northern countries. A few successful operations have however been able to increase their labour force. Employment is now expected to stabilise close to the present level.

Labour productivity varies depending on the type of model that is produced by each company, and ranges between 18 units per employee and per year at BMW in 1989, to 102 at Honda, and

122 at Moto Vespa for instance. On average, the numbers hover around 100 per year for the biggest companies.

Investment

Since the early 1980s, some European manufacturers have carried out major investment projects to improve their competitiveness, yielding advancements in the area of moped, scooter and low capacity motorcycle production.

The leading firms approached the situation by restructuring their activities and combining the rationalisation of production facilities with the utilisation of new technological processes.

Despite the fact that demand was still falling during the last decade, promising an uncertain future, the improved outlook for demand is now providing a new impetus for companies to consider further investment activity.

Investment in R&D for new, more ad-

vanced or cleaner models, is also increasingly important. According to a sample of respectively 9 and 16 constructors of mopeds and motorcycles, R&D investment accounted for about 3.4% of the turnover in 1989, while investment in new capacity reached almost 5% of turnover. BMW for example spent 8.1% of its turnover on R&D that year.

The share of EC production that is in the hands of Japanese firms is however increasing. Japanese manufacturers, who already own local plants, have recently increased their financial shareholdings, gradually assuming control of existing European companies.

Structural changes

In response to the poor economic situation in the early 1980s a number of companies began to engage in M&A activity, and the 1980s saw the growth of new, dynamic, factories. There has been a build-up of

such activity recently, and further developments are expected until the companies operating in this sector become large enough to draw benefit from economies of scale and synergies. This is particularly true of Italy, where Piaggio has acquired the Austrian company Puch, and the group Cagiva-Ducati merged with Moto Morini and Husqvarna.

Mergers and acquisitions have been made mostly between EC companies and Japanese producers trying to have a base in Europe. In Spain, for example, Suzuki bought Avello-Puch in 1986; Yamaha, Babesto in 1987.

Some Japanese companies established in the EC to sell their mopeds and motorcycles more easily. Nevertheless, while the 12 largest EC producers accounted for 94.4% of total EC output in 1989, these same producers accounted for only 64.2% of the total EC sales, while Japanese producers accounted for 35.8% of sales. The Japanese producers implanted in Europe are in fact mostly assembly plants.

Industry structure

The EC motorcycle industry comprises

some 50 companies, with most of the production taking place in Southern Europe. About 52% of EC production comes from Italy (42% of EC moped production and 78% of EC motorcycle production); Spanish manufacturers represent nearly 20% of the total production. France follows closely with 18%, while Japanese manufacturers control 15% of EC production through licensing agreements, financial stakes or local plants.

Based on sales, the Italian Piaggio Group is the largest supplier on the EC market, followed by Peugeot MTC, Moto Vespa and Derbi. At the world scale however, Piaggio is taking third place, preceded by Honda and Yamaha. The three Japanese producers installed in Europe are Yamaha, Suzuki and Honda. The Japanese are principally taking place on the market for motorcycles with engines exceeding 251cc, their part being 82% of the EC market. In terms of production, the Piaggio Group (Piaggio, Gilera and Puch) is both the largest Italian and 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 in Italy. In France, the largest manufacturer, Peugeot MTC (which produced about 170 000 vehicles in 1989), in which Honda is a 25% shareholder, is producing mainly mopeds and scooters (50/80cc), while Peugeot scooters and some 50cc engines are produced under licence from Honda. The second French manufacturer, MBK Industrie, is under full control of Yamaha and is assembling Yamaha scooters and light motorcycles, while it manufactures mopeds under Motobécane design.

In Spain, Motovespa (Piaggio Group) and Derbi are the main manufacturers, representing 59% of the Spanish production of motorised 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 Portu-

Table 4
Extra-EC Exports of mopeds and motorcycles by country, 1980-89

(thousands)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Mopeds										
Belgique/België	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.5	3.6
BR Detschland	38.6	10.9	4.8	12.0	8.1	4.8	3.5	2.4	1.7	1.0
España	N/A	3.7	2.6	2.8	3.8	4.6	4.7	4.1	6.0	3.1
France	N/A	N/A	N/A	219.1	N/A	237.5	90.0	78.0	98.3	83.5
Italia	130.3	74.2	37.2	51.9	48.5	41.3	45.1	42.1	N/A	35.7
Nederland	N/A	N/A	N/A	N/A	0.3	0.3	0.3	0.4	N/A	N/A
United Kingdom	0.5	0.3	0	30.0	0.2	0	0.1	0	0	0
Motorcycles										
BR Deutschland	17.2	18.6	17.3	13.6	15.7	15.5	18.9	8.0	7.3	7.2
España	N/A	2.8	1.3	0.9	0.6	0.4	1.2	2.1	0.4	0.3
France	N/A	N/A	N/A	0.3	N/A	0.5	3.4	0.3	0.4	0.4
Italia (*)	111.4	57.2	26.1	159.5	135.7	214.6	269.5	206.4	N/A	272.7
United Kingdom	3.5	0.9	1.7	0.7	0.5	0.9	0.8	0.5	0.3	0.6

(*) 1980-83 excluding CKD vehicles
Source: COLIMO

gal, SIS Vehiculos Motorizados LTDA is the largest manufacturer and mainly produces mopeds equipped with engines either from Fichtel & Sachs (FRG) or from Franco Morini (Italy). SIS also assembles 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 of European origin. Some engine types are supplied by Peugeot.

In the Netherlands, the most important manufacturer, SPARTA BV produces light mopeds. The assembly of mopeds and mopeds is carried out by Tomos.

Special issues

Environment Mopeds and motorcycles offer a favourable transport alternative in an increasingly environmentally conscious world, by reducing the amount of congestion in busy town and city roads.

Table 5
Mopeds and motorcycles
Structure of the industry, 1989

	Sales on the EC market (units)	Share in %
EC Sales	1 054 777	64.2
Piaggio	361 154	22.0
Peugeot MTC	170 452	10.4
Moto vespa	111 554	6.8
Derbi	86 207	5.2
Cagiva	40 900	2.5
Malaguti	32 771	2.0
Rizzato Cesare	26 100	1.6
Aprilia	24 730	1.5
Garelli	22 993	1.4
Hercules	22 000	1.3
BMW	16 899	1.0
S.I.S	13 000	0.8
Rieju	12 300	0.7
GBM	10 244	0.6
Macal	7 872	0.5
Other	95 601	5.8
Japanese sales	587 521	35.8
Yamaha	118 635	7.2
Honda	70 053	4.3
Suzuki	40 077	2.4
Japanese import	358 756	21.8
EC Market	1 642 298	100.0

Source: National Associations and TES. COLIMO

Traffic jams can be avoided much more easily, and a greater availability of parking facilities are two further advantages, while the lower levels of pollution caused by mopeds and motorcycles also provide an extremely attractive proposition.

The industry is developing cleaner and quieter vehicles and is succeeding in eliminating components containing asbestos in order to reduce as far as technically feasible the impact on the environment.

The impact of 1992 The afore-mentioned process whereby leading firms are concentrating resources, and the recent efforts by the industry to increase its competitiveness, are also motivated by the likely advantages to be generated by the Single Market.

Therefore, notwithstanding recent market difficulties, all major EC manufacturers are actively pursuing strategies to help them capitalise upon the opportunities offered by the new competitive environment resulting from the Single Market.

The common standards (licence, legislation, homologation etc..) adopted by the members of the Community will probably lead to a larger automation and rationalisation of the EC manufacture process. Standards presently differ widely across Member States, as illustrated by the number of gears on mopeds and motorcycles of 50cc and less: whereas in Belgium, France and Portugal, automatic gears are required, in Denmark the maximum number of gears is 2 and in Spain, 4. The opportunities arising from the Single Market will also depend on the common transport policy and the result of the trade talks with Japan, especially on the opening of its market and an easier access to its distribution network.

New production technologies The industry is developing new technology both in

terms of the conception of vehicles (CAD-CAM) and in their construction. This involves the use of robots, laser cutting machines, improved painting systems and more sophisticated quality control systems.

Eastern Europe Most mopeds and motorcycles on the road in the Eastern countries are fairly old; moped and motorcycle production in Eastern Europe is in fact lower than domestic demand for such products, whereas exports have been the first priority due to the need for foreign currency.

Besides East Germany, production plants exist in Poland, Czechoslovakia, Romania and the USSR. This would seem to point to new opportunities for EC producers, and, indeed, some talks have already taken place between East and West European producers. The success of EC producers in Eastern Europe will however depend on their willingness to establish new plants there and to keep prices down to gain market share, at least in the short run. The strong presence of the Japanese worldwide, and their own interest in this growing market, is however likely to limit the gains for EC producers. This is all the more true, because of the Japanese firms' involvement in other segments of the motor vehicles sector, which enables them to offset losses on the mopeds and motorcycles market (as a means of penetrating the market and gaining a leading position) by profits on other markets.

Outlook

Most observers seem to believe that the most difficult period is over, and that the situation will now become more stable. Recent and continuing efforts by the manufacturers to restructure and reorganise their activities augur well for the future. Future success will however depend on

the sector's ability to achieve a higher level of concentration, in order to benefit from synergies in production, economies of scale in research and development, and develop vehicles that can use standard parts; this later factor could indeed enable a further concentration on the "two-wheel parts and accessories" segment of the market, and bring costs down.

A harmonisation of legislation within the EC, such as that which will result from the European unification, will play a positive role in the development of more standard

products and encourage the restructuring of the sector. Environmental concerns could on the other hand lead to government initiatives to encourage the use of mopeds and motorcycles in urban centres, thereby contributing to reduce traffic congestion.

However, in view of the uncertainty which characterises future trade agreements with Japan, it is hazardous to make forecasts of future developments of production in Western Europe. Total sales are expected to grow by a little more than 3% per year

on average in the short-term (2-3 years), but could grow faster if certain government initiatives to encourage the use of two-wheeled vehicles were implemented soon.

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The strong economic growth recorded both in the industrialised countries and in the newly emerging economies of South East Asia over the last few years has stimulated world trade and reversed the continuous decline experienced by the shipbuilding sector since the mid 1960s. The continued growth in seaborne trade absorbed nearly all excess shipping capacity. Furthermore, successive waves of capacity reductions in Western Europe and Japan led to a more balanced world shipbuilding market. The outlook seems promising, but the improvement of the market could be reversed if capacity were reactivated or expanded carelessly. In autumn 1990, the long-term positive outlook for the world shipbuilding industry was overshadowed by the Gulf crisis and by recessive tendencies in the USA as well as in some European countries. Furthermore, the position of EC shipbuilding was aggravated by the weak Dollar. Hence, for 1991 EC shipbuilders face a great deal of uncertainty.

Sector definition

The shipbuilding industry includes the following NACE activities:

- ❖ 361.1 Building and repair of sea-going vessels;
- ❖ 361.2 Building and repair of vessels for inland navigation;
- ❖ 361.3 Building and repair of boats and yachts;
- ❖ 361.4 Painting of ships;
- ❖ 361.5 Shipbreaking.

The core of the industry is made up of yards for the building of seagoing merchant vessels. Therefore, the trends de-

scribed hereafter relate to that type of shipbuilding only.

Current situation

Until mid-1990, the continued growth in seaborne trade, against the background of only a modest increase in the size of available fleets, absorbed nearly all shipping capacity and ensured firm shipping markets in nearly all sectors. Increased confidence in the continuing strength of the market has led to the conclusion of firm long-term charters at enhanced rates, as well as to high prices for secondhand ships. The world merchant fleet grew by 2.6% in

1989, but is still 7% below the 1982 level. Investments in modern ships increased in 1989 and during the first half of 1990. However, due to a low rate of demolition since then, replacement demand slackened. Compared to long-term demolition requirements of 23-25 in tdw p.a. actual scrappings and losses developed as follows:

1988 - 8 m dwt

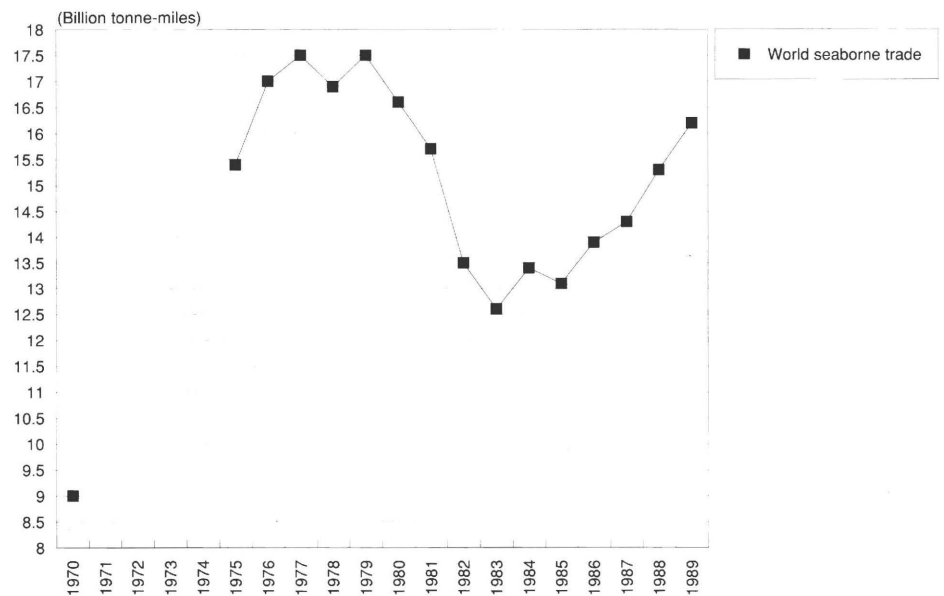
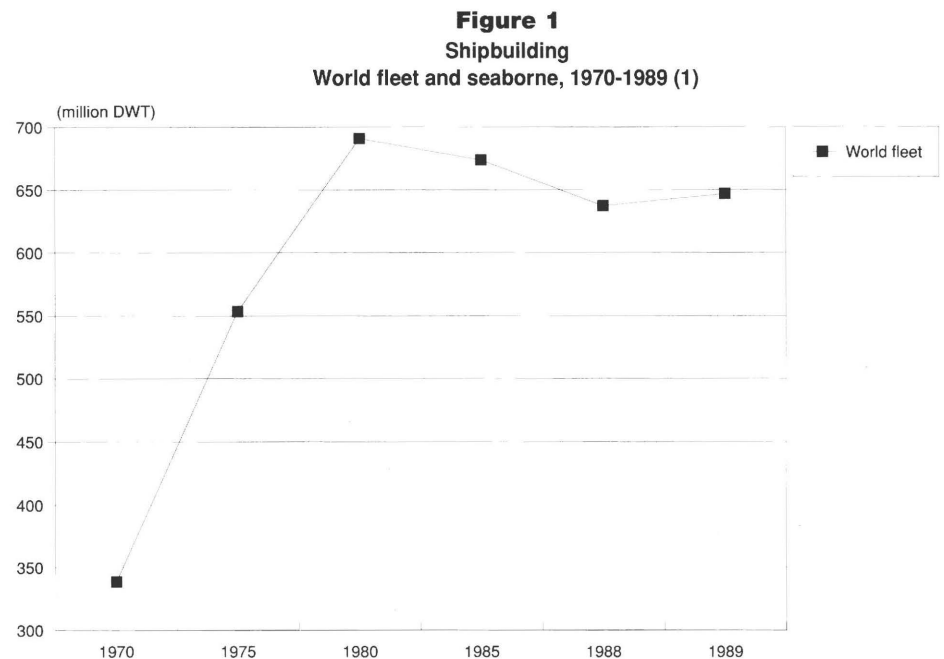
1989 - 4 m dwt

1990 - 2-3 m dwt (estimated)

Owing to the recovery in new building orders, some improvement in prices were noted. From figure 2 it can be seen that in 1989, the tonnage laid up and broken up reached its lowest point since the 1970s. It is also clear that as seaborne trade and ship production rise, the tonnage broken up and laid up drops. Since 1986, all contract prices for new vessels have risen continuously in real and nominal terms although they remain far below the 1980 price level. Additionally, the price rise lagged considerably behind inflation and was insufficient to provide a reasonable return on capital. Against this background, recovery in shipbuilding prices was insufficient. Material costs are rising, and significant price increases are necessary if world shipbuilding is to regain profitability.

Production

After many years of decline, world ship



(1) Estimated for 1989
Source: Fearnleys Review 1989

production is at last beginning to recover. EC production is growing faster than the world growth rate, with a consequent growth in world market share. Total EC

output increased by 20% compared to a world production increase of 15%, and its market share rose from 19% in 1988 to 20% in 1989 to the detriment of EFTA

Table 1
Shipbuilding
Main Indicators, 1980-90

(thousand CGT) ⁽¹⁾	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Production	N/A	N/A	3 143.0	3 300.0	2 628.0	2 457.0	1 900.0	1 719.0	1 638.0	1 953.0	2 100.0
% of world production	N/A	N/A	21.5	24.4	17.5	17.3	15.7	18.6	19.0	19.8	20.0
Employment (thousands) ⁽²⁾	273.0	251.0	229.0	211.0	195.0	176.0	159.0	139.0	127.0	N/A	N/A
Employment (thousands) ⁽³⁾	124.2	125.5	121.0	110.2	93.3	105.2	92.1	76.4	68.9	67.4	68.0

⁽¹⁾ 1982-83: 1978 coefficient (CGRT-compensated gross registered tonnes); 1984-89: 1984 coefficient (CGT-compensated gross tonnes)

⁽²⁾ New shipbuilding and repair

⁽³⁾ New shipbuilding only - from 1980 to 1984; EC-10

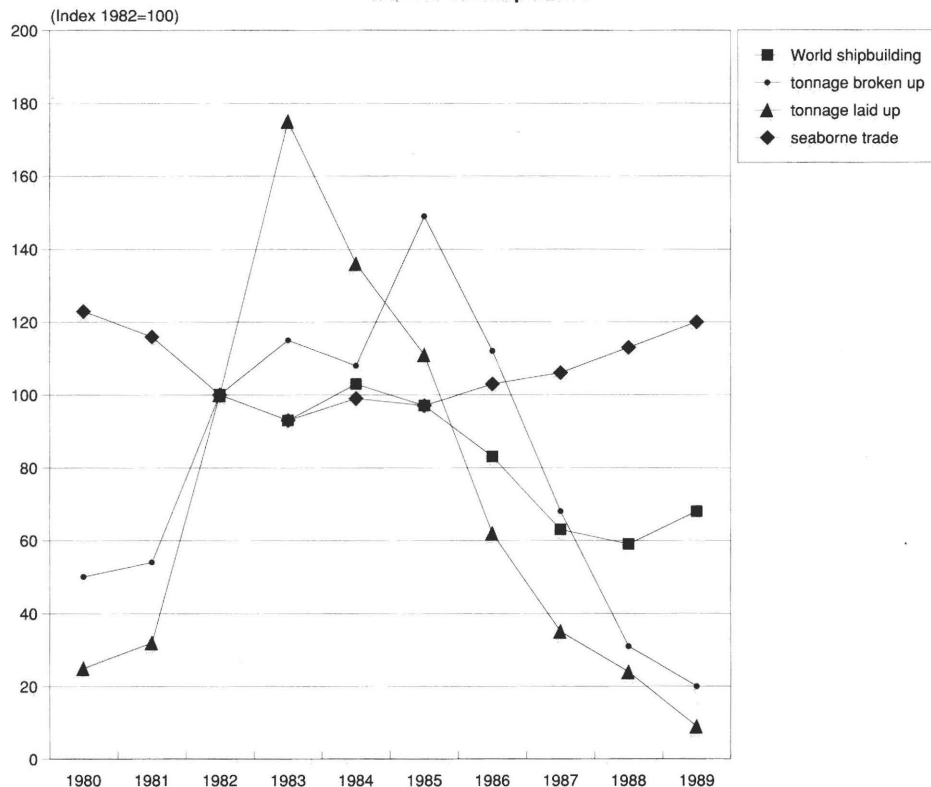
Source: CESA, EC Contract/Lloyd's Register of Shipping



countries' market share. Apart from the EC, only Japan succeeded in increasing its production share. Japanese production of 3.7 million CGT exceeded the recommendation made by the Japanese Government of 3 million CGT for the larger shipyards, and was above the 2.4 million CGT agreed upon by the cartel of 24 large shipyards which was dissolved in September 1989. Due to social unrest, South Korea's output was lower than in 1988, both in CGT and as a proportion of the world total.

As shown in Tables 4 and 5, the market shares of Japan and South Korea were especially high for the fast growing segments of merchant shipbuilding, such as oil tankers. The production of oil tankers increased by almost 45% in 1989. The EC presently dominates the high added value market of full containerships and non-cargo vessels, although South Korea and Japan are launching an offensive strategy to try and dominate this segment. Contrary to the widespread opinion that an increasing proportion of ships are built in

Figure 2
Shipbuilding
Market developments



Source: Fearnleys Review 1989

developing countries, the figures reveal that three quarters of world shipbuilding is carried out by industrialised countries. The two countries with dominant market shares are still Japan and South Korea, although the latter suffered a decrease in produc-

tion and market share. Japan took 43.3% of all orders (5.9 million CGT) and its production share rose to 37.1% in 1989 from 34.3% in 1988. In 1989, new orders (13 564 million CGT) considerably exceeded deliveries

Table 2
Shipbuilding
Development of contract prices for new vessels, 1980-89

dwt	shiptype	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
		Nominal Prices (million US\$)									
80 000	tanker	34.5	38.0	24.0	23.0	21.0	18.5	21.0	29.0	38.0	43.0
250 000	tanker	63.0	72.5	50.5	48.5	44.0	37.0	42.5	54.0	73.0	82.0
400 000	tanker	85.0	90.0	61.0	57.0	51.0	44.0	50.5	60.0	88.0	101.0
96 000	oil/ore/bulk	47.0	44.0	30.0	28.0	26.0	22.5	25.5	32.0	44.0	54.0
120 000	bulk carrier	44.0	42.0	26.0	25.0	24.0	20.5	23.0	30.0	39.0	45.0
125 000	LNG carrier	150.0	175.0	150.0	150.0	130.0	130.0	120.0	145.0	175.0	220.0
75 000	LPG carrier	75.0	75.0	53.0	50.0	45.0	42.5	47.5	55.0	61.0	71.0
		Real Price Index									
80 000	tanker	100.0	100.5	59.7	55.1	48.5	41.5	45.9	61.4	77.8	84.7
250 000	tanker	100.0	105.0	68.8	63.6	55.6	45.4	50.9	62.6	81.9	88.4
400 000	tanker	100.0	96.6	61.6	55.4	47.8	40.0	44.8	51.6	73.2	80.7
96 000	oil/ore/bulk	100.0	85.4	54.8	49.2	44.0	37.0	41.0	49.7	66.1	78.0
120 000	bulk carrier	100.0	87.1	50.7	46.9	43.4	36.0	39.5	49.8	62.6	69.5
125 000	LNG carrier	100.0	106.5	85.8	82.6	69.0	67.0	60.4	70.6	82.4	99.6
75 000	LPG carrier	100.0	91.3	60.6	55.1	47.8	43.8	47.8	53.6	57.5	64.3
GDP price index		100.0	109.6	116.6	121.1	125.6	129.4	132.5	136.9	141.5	147.2

Source: CEC/Fearnleys

Table 3
World shipbuilding production, 1976-89

(thousand CGT) (1)	1976	1982	1985	1986	1987	1988	(%)	1989	(%)
EC	5 927	3 143	2 457	1 900	1 719	1 638	19	1 953	20
Western Europe (2)	8 286	4 285	3 089	2 439	2 169	2 128	25	2 388	24
Japan	8 349	5 811	6 498	5 085	3 795	2 953	34	3 664	37
Rest of world	5 444	4 492	4 581	4 615	3 281	3 517	41	3 829	39
of which,									
Eastern Bloc	2 755	1 678	1 602	1 412	1 093	1 181	14	1 379	14
South Korea	349	880	1 633	1 971	1 194	1 505	18	1 389	14
Total	22 079	14 588	14 168	12 139	9 245	8 598	100	9 881	100

(1) 1976: CGRT coefficient AWES; 1982: CGRT coefficient 1978; 1985-89: CGT coefficient 1984

(2) Association of West European Shipbuilders: EC12 plus Finland, Norway and Sweden

Source: EC Contract/Lloyd's Register of Shipping

Table 4
Shipbuilding
Production by type, 1989

(thousand CGT)	World	EC (%)	Japan (%)	South Korea (%)
Crude oil tankers	1 138.3	4.9	39.0	42.4
Chemical carriers	1 389.3	12.0	30.7	29.4
Bulk carriers	1 884.1	2.6	60.3	13.2
Combined carriers	24.9	0.0	0.0	0.0
General cargo ships	964.3	21.7	28.8	5.0
Reefers	345.6	17.2	51.4	2.6
Full containers	959.7	43.3	28.5	9.6
Roll on/off vessels	126.8	29.7	14.5	13.1
Car carriers	126.6	29.5	47.4	0.0
LPG carriers	214.8	46.9	42.7	10.3
LNG carriers	191.3	0.0	100.0	0.0
Ferries	649.4	32.8	34.2	0.0
Passenger ships	233.4	67.7	21.7	0.0
Fishing vessels	1 116.9	29.2	19.3	4.9
Other non-cargo vessels	515.8	24.4	15.2	9.0
Total	9 881.2	19.8	37.1	14.1

Source: EC Contract/Lloyd's Register of Shipping

Table 5
World shipbuilding
Development of merchant shipbuilding by type of ship
1985-1989 in 1000 CGT and %

	1985	1986	1987	1988	1989
Dry cargo ships	4 457	3 891	3 062	2 885	2 523
%	32	32	33	34	26
Bulk carriers	4 991	3 555	2 093	1 099	1 909
%	35	29	23	13	19
Oil tankers	486	830	646	787	1 138
%	3	7	7	9	12
Other tankers	1 934	1 557	1 193	1 530	1 795
%	14	13	13	18	18
Fishing vessels	669	791	890	1 150	1 117
%	5	7	10	13	11
Other	1 632	1 515	1 362	1 148	1 399
%	12	13	15	13	14
Total	14 169	12 139	9 245	8 598	9 881
%	100	100	100	100	100

Source: EC Contract/Lloyd's Register of Shipping

(9 881 million CGT). Despite a 22% increase of total new orders from 1988 to 1989, the EC countries lost some of their market share to Japan. South Korea and the Eastern European countries also accepted more orders, but their growth rates were below average.

In the EC, Italy and France had the highest production growth. Germany's production decreased slightly in 1989 after a considerable increase in 1988, but it remains the EC's largest shipbuilding producer.

Within the EC, growth in Total Order Book, as shown in Table 8, was highest for Belgium. Germany, Italy, Portugal and Denmark also did very well. Greece, Spain and France suffered a slight loss in total orders compared to 1988.

Competitive conditions in the Member States have been altered since 1985. The number of ships annually built in Belgium, France and Germany has dropped, but in all three countries volume and value per ship has risen. Denmark, Greece, Portugal and the United Kingdom have maintained a constant production although average volume per ship declined. In the United Kingdom and Portugal, average value per ship declined over 70% since 1985. For the Netherlands the number of ships built de-

Table 6
New orders in world shipbuilding, 1976-89

(thousand CGT) (1)	1976	1982	1985	1986	1987	1988	1989
EC	3 127	2 404	2 175	1 581	1 971	2 260	2 754
Western Europe (2)	4 660	2 966	2 479	1 979	2 819	2 494	3 326
Japan	7 338	4 859	4 440	3 432	3 121	3 361	5 880
Rest of world	3 985	3 708	3 403	4 071	3 800	3 271	4 358
of which,							
Eastern Europe	1 896	1 069	1 414	1 875	1 059	1 068	1 277
South Korea	325	1 003	807	1 352	1 943	1 203	1 671
Total	15 893	11 533	10 322	9 482	9 740	9 126	13 564

(1) 1976: CGRT coefficient AWES; 1982: CGRT coefficient 1976; 1985-89: CGT coefficient 1984
(2) Association of West European Shipbuilders: EC12 plus Finland, Norway and Sweden
Source: EC Contract/Lloyd's Register of Shipping

Table 7
Shipbuilding
Ships completed by member state, 1987/89

(thousand CGT)	1987	1988	1989
EC	1 719	1 638	1 953
Belgique/België	26	47	36
Danmark	194	277	287
BR Deutschland	396	503	453
Hellas	7	12	13
España	328	326	306
France	208	63	199
Italia	225	120	265
Nederland	146	153	172
Portugal	26	23	46
United Kingdom	162	113	157

Source: EC Contract/Lloyd's Register of Shipping

Table 8
Shipbuilding
Total Order Book
by country at year's end

(thousand CGT)	1988	1989
Belgique/België	82	148
Danmark	460	590
BR Deutschland	856	1 315
Hellas	117	114
España	838	854
France	380	362
Italia	904	1 189
Nederland	365	415
Portugal	114	156
United Kingdom	317	377
EC	4 433	5 517
Finland	963	N/A
Norway	114	N/A
Sweden	39	N/A
Western Europe	5 549	6 707
Japan	3 474	5 697
South Korea	2 343	2 813
Eastern Europe	3 168	3 222
Rest of world	3 140	3 530
World	17 673	21 968

Source: EC Contract/Lloyd's Register of Shipping

mainly attributed to different composition of production.

Employment

The continuous decline in the number of people employed by EC shipbuilding companies during the 1980s stabilised in 1989. The total workforce of the EC-10 in new shipbuilding fell from 124 229 in 1980 to 50 548 in 1988 and remained stable in 1989.

Regulatory environment

In 1989, continued negotiations in the OECD Working Party on shipbuilding led to an improved understanding of the need to reduce capacity and put an end to distorted competition. The Japanese submitted an agreement which explicitly admitted their responsibility as the leading shipbuilding nation, and offered to make every endeavour to avoid repeating the mistake of allowing excessive ship production. As a result, their government further restricted the output of the larger Japanese shipyards to 3 million CGT in 1989 and 3.2 and 3.5 million CGT for 1990 and 1991. In contrast to this development the Korean government refused to make any reduction in capacity. On the contrary, it provided aid for the rescue of Korea Shipbuilding & Engineering and Daewoo shipyard which were in financial dire straits. In the face of initiatives from several countries the OECD Working Party on shipbuilding tried to prepare a comprehensive inventory of governmental subsidies and other forms of governmental intervention. The Commission advocates a minimum of transparency as a pre-condition for the removal of subsidies and other governmental interventions. Furthermore, any reduction of aid must be agreed upon a basis

clined from 92 in 1985 to 55 in 1989, and the average value per ship fell by 85%. Italy and Spain were the only EC countries to experience a rise in total production.

Trade

Figure 3 reveals that the most important exporting EC countries are Germany, France and Spain. Spain and Portugal are gaining importance as exporting countries. Exports from Greece, on the other hand, were negligible, whereas Greek imports increased by a rate of 62% in 1989. As a result, Greece is the only net importing EC country. This is attributable to the Greek shipping tycoons. Table 8 also shows that, on average, export value was below domestic production value and export value as a share of total value was lower than the share of physical exports. This may be

Table 9
Development of EC merchant shipbuilding, 1985-89

	Number of ships					Volume/ship in 1000 CGT					Value/ship in million ECU				
	1985	1986	1987	1988	1989	1985	1986	1987	1988	1989	1985	1986	1987	1988	1989
Belgique/België	7	4	4	2	3	14.5	11.0	5.5	19.6	20.6	31.5	23.5	11.0	41.4	38.6
Danmark	16	21	14	12	12	22.6	14.9	12.0	16.4	17.4	44.6	30.2	29.9	36.6	46.6
BR Deutschland	136	85	67	59	58	5.8	7.5	6.3	8.9	8.7	9.4	14.2	14.4	16.4	17.9
Hellas	2	2	N/A	1	1	9.9	18.3	N/A	4.5	4.5	16.1	10.4	N/A	13.5	14.9
España	14	14	11	4	17	9.9	9.1	16.1	9.1	4.0	25.5	14.6	26.7	24.5	6.5
France	16	23	20	6	16	10.5	7.6	12.7	4.9	14.2	21.5	15.9	23.8	11.5	31.6
Italia	9	7	1	25	32	9.0	7.5	21.2	6.8	8.5	25.3	18.3	58.7	18.4	20.2
Nederland	92	58	74	59	55	3.1	4.0	2.7	2.8	3.1	53.4	63.6	31.1	11.2	8.3
Portugal	12	15	16	10	12	5.2	4.3	1.7	2.7	2.9	11.6	6.5	2.0	3.5	0.5
United Kingdom	14	14	11	4	17	9.9	9.1	16.1	9.1	4.0	25.5	14.6	26.7	24.5	6.5
EC(*)	359	303	325	290	343	6.3	6.4	5.7	5.1	5.5	11.4	11.6	11.3	9.8	11.3

(*) excluding IRL and L
Source: AWES

of fairness and equity.

The American government takes the position that protectionist measures under the Jones Act must be continued. In this case, the US market would continue to be completely separated from the world shipbuilding market.

The Japanese government wants to maintain support for the Japanese shipbuilding industry through national shipbuilding programmes. Korea's government takes a similar position and refuses to give information on the role of the Bank of Korea for financing and coverage of losses in shipbuilding.

At the time of reporting, this work has still not been finalised, the differing opinions on the impact of protectionism having failed to be reconciled. Former agreements on the abolition of subsidies were particularly ineffective since they were restricted to direct subsidies only and other forms of governmental intervention were excluded. The effectiveness of a new agreement will depend on the inclusion of measures which segregate national markets and also on an effective mechanism to prevent unfair price practices.

EC Policy

The 7th EC Directive on State aids for the shipbuilding sector was approved in November 1990 by the Council for a three-year period, thus replacing the 6th Directive which was due to expire on December 31, 1990.

The Council agreed that, at this stage, it was not possible to abolish state aids for the shipbuilding sector altogether because of the industry's pressing need for restructuring, but confirmed that all efforts would be made in order to eliminate distortion of competition.

Table 10
Employment in new shipbuilding, 1975-89

	1975	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Belgique/België	7 467	6 523	6 347	4 680	4 104	4 060	3 923	2 995	2 548	2 270	2 307
Danmark	16 630	11 400	11 350	11 800	11 200	10 300	10 200	7 000	7 000	7 300	7 900
BR Deutschland	46 839	24 784	26 521	27 600	25 966	22 189	22 260	18 184	12 875	14 845	14 732
Hellas	2 316	2 672	3 393	2 900	2 812	2 000	2 000	1 709	1 621	1 855	1 535
France (*)	32 500	22 200	22 200	21 600	21 000	16 940	15 058	13 700	8 940	6 850	6 800
Ireland	869	750	762	882	550	N/A	N/A	N/A	N/A	N/A	N/A
Italy (°)	25 000	18 000	16 500	13 750	12 800	12 800	12 000	11 570	9 500	8 428	9 675
Nederland (°)	22 662	13 100	13 100	12 800	11 250	10 330	6 236	5 400	3 600	3 500	3 500
United Kingdom (°)	54 550	24 800	25 345	25 000	20 486	14 655	10 200	8 500	8 000	5 500	4 124
EC10	208 833	124 229	125 518	121 012	110 168	93 274	81 877	69 058	54 084	50 548	50 573
España (*)		N/A	N/A	N/A	N/A	N/A	N/A	18 000	18 000	17 300	12 550
Portugal		N/A	N/A	N/A	N/A	N/A	N/A	5 370	5 087	5 020	4 245
EC		N/A	N/A	N/A	N/A	N/A	105 247	92 145	76 404	68 960	67 368

(*) 1986-89 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, 3 1980, 23 700; 1985, 17 700.

(°) 1985-89 estimated; 1987: 2780 unemployed should be added to the figure. Of these, 2000 represent a structural overcapacity for whom no new jobs can be found.

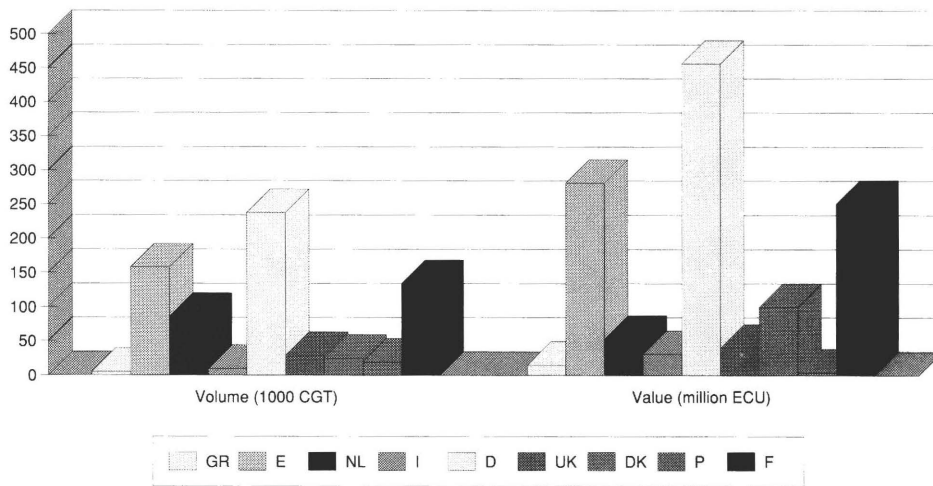
(°) 1986-89 estimated

(°) 1987, 1988 and 1989 estimated

(°) 1985-89; excluding Harland & Wolff (Northern Ireland), estimated as: 1985-86, 4000; 1987-89, 3500

Source: National data

Figure 3
Shipbuilding
1989 exports



Source: AWES

The ceiling for state aids which in 1987/88 stood at 28%, in 1989 at 26% and in 1990 at 29% was fixed by the Commission for 1991 at 13% of the contract value before aid. This ceiling applies to aids for new building production in EC shipyards and is to be revised annually. Additional aid may be granted if it purports to encourage the restructuring of the sector.

Greece and Spain will be exempt from this regime for one year in order to allow implementation of a restructuring programme. As concerns former East Germany, the Council and the Commission have agreed to examine a West German request for a transitory regime exclusive to East German shipyards.

Outlook

Ships are an efficient means of transportation. Despite the growth of airborne freight and haulage on certain overland routes, they still carry about 98% of intercontinental traffic.

Almost three quarters of the world tanker fleet is more than 10 years old and the normal lifespan of a ship is calculated at 20 years. This means that a large propor-

tion of the world's fleet will require replacement during the 1990s, simply to maintain the existing capacity. According to Lloyd's Register, 65% of the world fleet is to be replaced in the next few years. Rising costs for exploitation, maintenance and insurance make the existing fleet obsolete and call for rapid replacement with more efficient ships.

The Association of West European Shipbuilders (AWES) expects the world shipbuilding output to grow to an annual average of 12.5 million CGT for the 1990-1995 period, and 16.5 million CGT for the rest of the decade.

Prospects for the shipbuilding sector are more positive than they have been for years and significant investments in new capacity and re-opening of shut down shipyards are expected. A production of more than 16 million CGT would imply nearly a doubling of world shipbuilding output over less than 10 years. This pattern is realistic on condition that capacity cutbacks in Japan follow the pattern of European countries, and that Korea does expand its capacity.

The outlook up to 1992 is that production

in the EC will grow annually by 6%. The EC market share is likely to increase slightly as a consequence of EC shipbuilders specialisation in customised ships. However, these prospects are now overshadowed by the Gulf crisis and by the dawning recession in the US and in some European countries. Moreover, the EC shipbuilders' competitiveness is likely to be negatively affected by a weakening of the Dollar. 1991 appears, therefore, full of uncertainties for EC shipbuilders.

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Stimulated by an increased intra-EC demand for locomotives, passenger coaches, and mass transit rolling stock, the manufacturing industry of railway rolling stock has slightly recovered from the negative production trend which has prevailed over the past six or seven years. The improvement of the market owes much to the development of the high-speed train projects across Europe, but also to large investments in suburban and urban stock.

Some positive developments can be expected for the railway transport sector as a consequence of European integration. Freight and passenger traffic will inevitably be intensified among Member States thus increasing the demand for the transport sector in general. It remains to be seen, however, how railway transport will respond to the increased competition from road hauliers and international coach transport after 1992.

The growing concern with environmental issues may present additional opportunities for the low pollution railway sector, particularly if future anti-pollution measures become a hindrance for road transport. In addition, integration will lead to a more competitive EC market as national governments open tender procedures allowing other EC manufacturers to compete.

Political and economic developments in Eastern Europe are also expected to alter trade relations. East-European manufacturers may turn to the west for equipment and technical assistance, while their West-European colleagues may look east to establish joint ventures and other forms of

cooperation to supply the new opening market.

Although prospects are better than they may have been for years, it would be premature to assume that the future looks bright. The railway rolling stock industry is dependent on the performance of railway

transport and the latter continues to lose ground every year in favour of road and air transport.

Sector definition

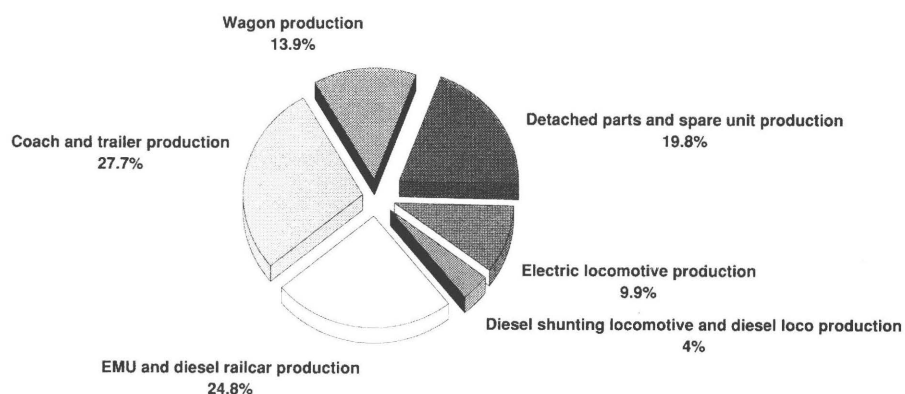
The EC industry of railway rolling stock, manufactures all necessary railway equipment, and is involved in the following areas:

- ❖ diesel and electric locomotives;
- ❖ mainline passenger coaches, metro cars and tramways;
- ❖ goods wagons;
- ❖ spare parts;
- ❖ fixed track equipment;
- ❖ electric signalling, safety and control devices for railways.

Total production value (turnover) for locomotives, passenger coaches, goods wagons including spare parts, amounted to 3 136 million ECU for 1989. Figure 1 gives the breakdown by product.

Locomotives are mainly produced by divisions within large firms and account only for a minor part of their total revenue. Passenger coaches and goods wagons, on the other hand, are still the main product of manufacturing companies, but a trend towards cooperation and integration with other firms is observed. The railway rolling stock industry differs fundamentally from other industries of transport equipment in that its products are totally dependent on existing network installations. This means

Figure 1
Different parts of EC-railway rolling stock
Eas percentage of total 1989 value



Source: UNIFE 1990

that producers can only develop new equipment in close collaboration with their clients.

Current situation

After six years of continuous decline, railway rolling stock production increased for the first time in 1989. In constant prices a slight recovery of production was noticed in 1989, although the production level is far below the figures for the first half of the 1980s. Figures (excluding railway stock parts and the UK production) showed an increase of 8.3% to a level of 2 152 million ECU at 1985 constant prices. High-speed train sets, Electrical Multiple Units and Diesel Multiple Units feature predominantly in the EC manufacturing of power units and passenger coaches. French companies have obtained orders for almost 2 500 TGV-derived vehicles, including the domestic TGV-R sets, the

cross-Channel TMSTs, and the first sets for Spain's Madrid-Sevilla high-speed line. In 1991, German manufacturers received orders for 41 ICE trainsets and an option for another 19 trainsets amounting to about 120 power units and 700 coaches. The UK market is dominated mainly by Electric Multiple requirements but also by Diesel Multiple Unit orders. With such a massive boost, the French, German and British are way ahead of other EC countries in terms of orders. Italian manufacturers have also received orders for high speed rolling stock. According to a recent survey, EC producers dominate the market for passenger coaches. In 1989, they won contracts for the production of more than 10 600 vehicles, 56% cent of the total number of new orders. Outside the EC, Japan is the market leader and received orders for al-

Table 1
Railway rolling stock
Main indicators, 1980-90 (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Apparent Consumption	1 856	1 996	2 241	2 522	2 224	2 204	2 144	1 841	1 792	2 184	2 340
Net exports (2)	314	442	436	453	623	465	431	382	341	334	329
Production (3)	2 170	2 438	2 677	2 975	2 847	2 669	2 575	2 223	2 133	2 518	2 669
Employment (3)	64.7	67.8	67.1	66.7	64.6	60.9	58.8	51.6	50.1	48.2	48

(1) Locomotives, passenger coaches, goods wagons

(2) 1980-83 EC10

(3) Excluding Netherlands and United Kingdom. Certain railway rolling stock parts are covered in this heading.

Source: UNIFE, Eurostat (Comext)

Table 2
Railway rolling stock
Production and Investment (1)

(million ECU)	1980 ⁽²⁾	1981	1982	1983	1984	1985	1986	1987	1988	1989
Production in current prices										
EC ⁽²⁾	2 170	2 438	2 677	2 972	2 947	2 669	2 575	2 223	2 133	2 519
Index	78	91	101	112	106	100	97	85	83	89
USA ⁽³⁾	5 608	4 855	3 528	2 525	3 829	3 585	2 655	N/A	N/A	N/A
Index	156.4	135.4	98.4	70.4	106.8	100.0	74.1	N/A	N/A	N/A
EC ⁽²⁾										
Production at constant prices	3 029	3 166	3 263	3 438	3 074	2 769	2 661	2 235	2 134	2 140
Index	109	114	118	124	111	100	96	81	77	77
Productivity ⁽²⁾	19.0	18.5	18.4	18.4	19.3	21.4	23.5	24.4	27.2	28.7
Index	88.8	86.4	86.0	86.0	90.2	100.0	109.8	114.0	127.1	134.1
Investment in current value ⁽⁴⁾	117	133	144	145	157	127	93	112	N/A	N/A
Index	92.1	104.7	113.4	114.2	123.6	100.0	73.2	88.2	N/A	N/A

(1) Locomotives, passenger coaches, goods wagons

(2) Excluding Netherlands and United Kingdom. Certain railway rolling stock parts are included in this heading. Italy estimated for 1980.

(3) Census of Manufactures and Eurostat estimates

(4) United Kingdom, Italy, France and West Germany

(5) Excluding Spain and Portugal

Source: UNIFE, Eurostat (Comext)

most 1 500 new units in 1989. New orders for South Korean builders totalled 333. The USA and Canada followed with an ordered number of 256 new vehicles.

Production trends

Germany, France, Italy and the UK are the main EC manufacturers of railway rolling stock, and together they accounted for almost 90% of total production in 1988.

Germany, France, Italy and the UK each have more or less equal shares in production. Production in Spain, Belgium and Portugal is on a much smaller scale.

The trends in EC production (in constant prices) indicate the negative development of the production of locomotives and

goods wagons. The manufacturing of goods wagons decreased at an average rate of 8.2% during the 1980s. From 1986 to 1988, wagon production dropped by more than 15% a year. In 1989, however, figures showed a stabilisation of total production. As concerns passenger coaches, production in 1989 increased substantially from 1 080 to 1 417 in constant prices. For locomotives and goods wagons no clear trend can be derived for the different types of railway rolling stock, mainly owing to the unpredictable demand.

Demand

The high level of investment in the high-speed train infrastructure and rolling stock

within the EC is a result of the increasing demand among railway users for fast transport. Moreover, the construction of the Channel Tunnel reflects the growing need for a permanent connection between Britain and the European continent. Besides high-speed vehicles, double-deck stock is gaining importance on busy suburban and regional connections. In Europe, the SNCF is the field leader with double-deck haulage stock for the longer distances. Rapidly increasing traffic on the Netherlands Railways has already given rise to the successful introduction of push-pull double-deck train sets.

Table 3
Railway rolling stock - National production by product, 1989 (1)

(million ECU)	EC ⁽²⁾	B	DK	D	E	F	I	P	UK
Locomotives	366	0	0	99	0	172	95	0	N/A
Passenger coaches	1 417	40	21	428	73	416	421	18	N/A
Goods wagons	370	7	3	157	26	57	116	4	N/A
Total	2 153	47	24	684	99	645	632	22	N/A

(1) Certain railway rolling stock parts are covered in these headings

(2) Excluding Netherlands and United Kingdom

Source: UNIFE

Table 4
Railway rolling stock - Trends in community production by product (1) (2)

(million ECU)	1981	1982	1983	1984	1985	1986	1987	1988	1989
Locomotives	530	712	760	644	663	517	511	441	366
Passenger coaches	1 601	1 792	1 904	1 664	1 464	1 351	1 056	1 080	1 417
Goods wagons	961	649	666	679	532	557	459	372	369

(1) Certain railway rolling stock parts are covered in these headings
(2) Excluding Netherlands and United Kingdom
Source: UNIFE

Trade

Table 5 clearly illustrates the negative trend in extra-EC exports since 1985. The development of extra-EC imports, however, was irregular during the 1980s, which was due in part to Spain and Portugal joining the EC in 1986, and resulted in an average growth rate of 7.6%. Although EC production of passenger coaches only decreased at a rate of 0.5% in the 1981-1988 period and witnessed a substantial recovery in 1989, trade, and especially the extra-EC exports decreased by more than 14%. For locomotives, however, both the EC-production and international trade increased. The share of the intra-EC trade is increasing. In 1989, for instance, over half of the German locomotive exports

went to other EC countries. Locomotive exports to third countries, together with the exports of spare parts, account for the greater part of the EC's external trade surplus in railway rolling stock. However, this surplus is coming more and more under pressure because of lower export results, and has dropped by almost half since 1984.

Employment and productivity

Employment figures for the railway rolling stock industry have been on the wane since 1981. While the number of employees fell steadily, total production steadily increased during the 1980s, reflecting rising productivity. Within the EC, the workforce is concentrated in France, Germany,

Italy, the UK and Spain.

Industry structure

The railway rolling stock industry is made up of about 100 locomotive, coach and wagon builders, and of roughly the same amount of railway equipment manufacturers. In 1988, there were 39 locomotive manufacturers, 54 manufacturers of passenger coaches and goods wagons, and 24 manufacturers active in locomotive, coach and wagon construction. The size of these companies varies widely, from less than 100 to several thousands. Large companies, including the GEC-Alsthom Group, which mainly operates directly or through affiliates in France, Belgium, the UK, Spain and Germany, Asea Brown Boveri which holds a strong position in

Table 5
Railway rolling stock
External trade by product (1)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Exports extra-EC										
Locomotives	65	86	118	130	232	153	94	212	266	299
Passenger coaches	167	247	272	275	281	309	254	188	83	41
Goods wagons	115	145	83	101	166	61	141	76	75	63
Parts	331	424	379	471	598	527	422	423	348	343
Imports extra-EC										
Locomotives	5	7	10	7	8	4	13	11	14	19
Passenger coaches	12	13	17	23	23	24	18	38	2	0.4
Goods wagons	16	16	10	23	25	30	27	45	67	50
Parts	44	59	85	63	76	81	61	80	78	80
Imports intra-EC										
Locomotives	7	53	60	40	12	21	16	12	21	49
Passenger coaches	62	62	83	129	180	80	73	68	60	67
Goods wagons	42	48	22	25	28	22	42	36	49	52
Parts	103	139	145	122	150	138	162	161	193	208

(1) 1980-83 EC10
Source: Eurostat (Comext)

Sweden, Switzerland Germany, Italy, the UK and Denmark, as well as Siemens of Germany which operates in most EC countries through cooperation agreements.

Developments in Eastern Europe will bring the entry of Eastern European manufacturers onto the EC market. Though more competitive in terms of prices than most EC manufacturers, because of cheap labour, the newcomers are no serious threat unless products are compatible with EC-demand in technical requirements, quality and design. The short-term impact of changes in Eastern Europe is likely to be a surge in demand for technical assistance from the EC countries. This will create business opportunities for Western European manufacturers.

The industry's consumers are limited in number. Several categories can be distinguished:

- ❖ the national railway companies;
- ❖ transport companies;
- ❖ private rental and lease companies;
- ❖ industries with their own rolling railway stock.

The impact of the Single Market

European integration will force the national governments and bodies to open up public procurement competition to all qualified EC manufacturers, and increased competition will put pressure on the general price level. As a result, competition will be raised to EC level, opening prospects for all EC manufacturers to compete on the international market. Within this scope, efforts are being made to even out differences in technical standards and design specifications. The European Commission, in cooperation with standardising bodies, the national railway companies and the rail-

way industry, are working on harmonising European standards.

Investments and technological developments

The growing popularity of high-speed trains calls for heavy investment in the development of infrastructure, and in technological developments of the manufacturing industry. To cope with competition, manufacturing industries have developed new technologies for rolling stock production. Multi microprocessor control equipment, GTO - invertors and three phase drives, first developed in Germany, have become standard in various countries. The introduction of aluminium for example, has minimised vehicle weight. The introduction of on-board computerised networks in trains, the application of telecommunication equipment and microprocessors in signalling systems, are a few examples of new techniques entailing far-reaching changes.

Outlook

Although the 1992 Single Market is expected to have a positive influence on railway rolling stock manufacturing, in terms of increased competition and technical harmonisation, it is not possible to assert that it will lead globally to increasing demand. Railway transport may come under pressure from road hauliers, international coach transport and airlines when the latter are deregulated after 1992.

The most important impulse to the railway rolling stock market in the next few years is the growing investment in the infrastructure for high speed trains and the growing need for mass transit rail systems. The high speed train network project presented by the Commission to the Council in December 1990, include the construction

of 9 000 km of new lines and the replacement of 15 000 km of existing lines before 2010 for a total investment of 90 billion ECU.

The plummeting of railway rolling stock exports in 1989 combined with the effects of the single market and the opening of Eastern Europe will contribute to shift the centre of the railway industry's activities towards Europe.

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The European aerospace industry is currently characterised by structural adjustments and changed political parameters. Opportunities for economies in public sector housekeeping are resulting from the improvement in East-West relations, disarmament negotiations and agreements and political changes in Eastern Europe, by stretching and cutting down military procurement plans. Because of the high proportion of products for military purposes in previous total production (66% in 1988), these influences are having a strong effect on the development of the sector. This makes efforts to increase production even more important for the civil market. As a result of all this, the European aerospace industry is engaged more than ever, in intensive competition with the aerospace industry of the USA, the clear world market leader, which is facing similar problems of adjustment. The selling/supply position of European civil aircraft can be estimated as relatively strong, not least because of an extension of the Airbus, so that, despite the structural changes referred to, favourable overall development of the sector can be expected in the near future. Product-orientated international cooperation relations between the leading European manufacturers, which have been built up since the seventies, form a basis for this.

Definition of the sector

NACE category 364, the aerospace industry includes:

- ❖ development and production of aircraft and helicopters, including their engines;

- ❖ maintenance and servicing of aircraft and helicopters;
- ❖ manufacture and servicing of other aircraft, including space craft, guided missiles and air-cushioned vehicles.

Table 1
The EC aerospace industry
Main indicators

(Million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 ⁽¹⁾
EC-sales	20 195	24 358	24 500	25 384	25 211	28 425	31 347	32 015	35 311	44 234	46 629
Net export	- 533	- 616	1 664	1 034	1 973	2 015	596	513	304	- 412	- 1 274
Production	19 662	23 742	26 164	26 418	27 184	30 440	31 943	32 528	35 615	43 822	45 355
Employees (1 000)	406.1	418.0	417.8	397.5	389.0	388.7	394.4	400.5	403.3	418.1	N/A

⁽¹⁾ ERA estimates

Source: Eurostat. Ifo Institut calculations and estimates

The aerospace industry produces custom-built capital goods for civil (private economy and public sector) and, to a considerable extent, for military consumers. It therefore supplies markets with very different conditions of competition and demand.

The sector is characterised by complex, very high-value products in relatively small quantities, as well as by long development periods and high development costs. This results in a high capital requirement and high investment risks both for manufacturers and users. The high technological requirements in the military segment, intensive international competition in the civil segment and working in new fields of technology (space flight) necessitate a particularly high level of research and development (high R&D expenditure). As a result of this the aerospace industry is a high development provider and user of new technological processes and products.

Another feature of the aerospace industry is the strong influence of government offices on sector development and the national competitive position. Firstly, governments are large creators of demand, especially for military and also civil equipment, and consequently influence R&D expenditure and production capacities to a considerable extent. Secondly,

they influence branch development by promoting research on the basis of target proposals of national industrial policy.

Branch-typical major projects overtax - especially in Europe - the financial and personnel capacities of individual national manufacturers. This has resulted in the major part of European aerospace production being carried out under international cooperation arrangements, e.g. by the setting-up of project-orientated consortia. All the leading European manufacturers, both from the segments of the Systems and Airframes industries to the Engine industry and Space Flight, are as a rule involved in cooperation arrangements of this kind. It was only with this structural adjustment to the needs of the world market that, for the first time, it was possible to reduce the disadvantages of competition, resulting from the past conditioned national fragmentation of markets and industries in Europe.

Current situation

In 1989, the European aerospace industry experienced a surge of growth. The gross value of production increased to 43.8 billion ECU that year, i.e. 23% more than in 1988. Adjusted by the trend in prices, the growth of production of this sector in 1989 was 16.5% (Table 2). This was by far the largest growth rate in the eighties. A considerable increase of production of

civil aircraft can be regarded as the cause of this development. For instance, the number of Airbus models supplied increased from 61 (in 1988) to 105 (in 1989), deliveries of the Fokker 100 increased from 11 to 35 and BAE 146 deliveries from 22 to 35.

Production growth of the sector was particularly strong in 1989 in Germany, whilst in France and Spain it moved close to the EC average. The aerospace industry showed a below average development in Italy and Great Britain (Figure 1).

At 418 100, the number of employees in 1989 was 3.6% higher than in 1988 (Table 1). There has been a clear increase, in Germany, Italy and Spain. With a sharp increase in real added value of 17%, there was nevertheless an overall improvement of productivity of almost 13% in the EC (Table 2).

This development, in combination with healthy orders in the civil segment - 774 orders in hand for Airbus models in 1989, and 174 for the Fokker 100 - allows favourable future development to be expected for the whole sector. Full confidence is placed in the branch over the next few years which can be seen from the strong investment activity. According to estimates by the Ifo Institute for the years from 1987 onwards, the growth of gross

fixed capital formation in 1989 has once again been strengthened by over 20% (Table 2).

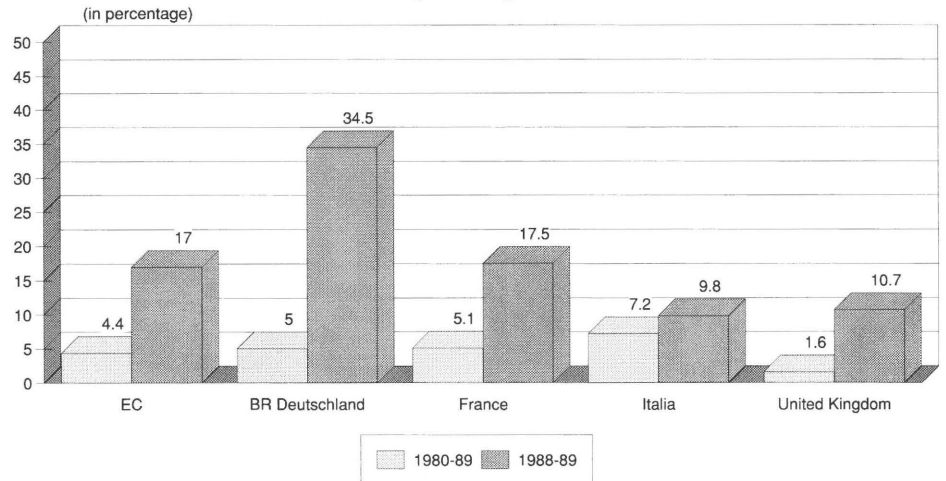
External trade flow of aerospace industry products increased in 1989 even more sharply than European production and demand (Table 3), although this, overall, proved slightly detrimental to European sellers. Whilst export from the EC increased by 34% compared to the previous year, imports into the EC increased by as much as 43%. At the same time there was also a considerable increase of trade between the EC countries (+ 36%).

After a favourable year in 1989, 1990 saw a pause in the growth of the European aerospace industry. Real production value in 1990 was estimated to be only slightly above the level of 1989. The main reasons for this were reductions in the area of military purchasing, and also production shortfalls in the Airbus programme as a result of strikes in Great Britain. This nevertheless does not change the fact that the medium-term overall prospects of the sector can be classed as favourable.

Production and consumption

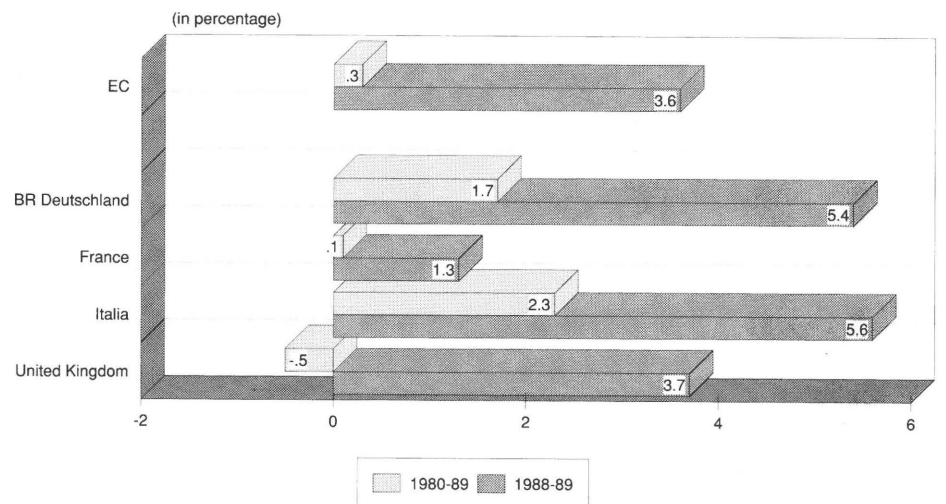
EC sales situation With a total production of 43.8 billion ECU in 1989, the EC aerospace industry ranked second on the world market, far behind the market leader, the USA, whose production value was approximately 2.5 times as high as that of Europe. No comparable data exists on the aerospace industry of the USSR and the other East European countries, but their potential is considerable. In the USA and the EC there is a clear predominance of the share of military products in total production (USA: 71%, EC: 65%, respectively, in 1988), although this can only be supposed for the

Figure 1
The aerospace industry
Added value change. Average for 1980-89 and 1988-89



Source: Eurostat. Ifo Institut calculations and estimates

Figure 2
The aerospace industry
Change in number of employees. Average for 1980-89 and 1988-89



Source: Eurostat. Ifo Institut calculations and estimates

USSR. Economies in military development and purchasing budgets as a result of the improvement in East-West relations, disarmament negotiations and agreements, and the political changes in Eastern Europe are having a correspondingly strong effect upon the development of the sector. The strong orders in the civil aerospace segment, however, act as a certain counterweight to these influences. For instance, in 1989, the combined total of 561 deliveries of civil airliners for the USA and the EC was made up of 1 789 purchasing orders, with orders in hand for 3 238 aircraft (90-seaters and

over). Of these orders in hand, 30.5% were for civil aircraft from the EC (A-300 to A-340 Airbuses, Fokker 100s and BAE 146s). Although aircraft sales from the USA, the EC and the USSR dominate the world market for aerospace industry products, there are, nevertheless, still a number of other countries with noteworthy capacities. For example, Canada, Sweden and Israel, especially Japan and other South-East Asian NIEs (Taiwan, South Korea) together with the developing countries of Brazil, and to a lesser degree Indonesia and India. Of these, particularly with Japan and the

Table 2
The aerospace industry
Production, added value and investments

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 ^(*)
Production (current prices)											
EC	19 662	23 742	26 164	26 418	27 184	30 440	31 943	32 528	35 615	43 822	45 355
Index	65	78	86	87	89	100	105	107	117	144	149
USA ⁽¹⁾	42 005	58 071	67 801	84 062	98 614	118 982	102 621	95 080	97 400	111 600	N/A
Index	35	49	57	71	83	100	86	80	82	94	N/A
Japan	871	1 189	1 848	2 108	2 853	3 558	3 773	4 011	4 450	4 900	N/A
Index	24	33	52	59	80	100	106	113	125	138	N/A
EC											
Production (constant prices)											
Index	91	97	100	98	94	100	108	109	113	131	135
Added value (const. prices)											
Index	93	93	99	100	100	100	109	109	113	132	N/A
Productivity (Ecus) ⁽²⁾											
Index	89	87	92	97	100	100	108	106	109	123	N/A
Investments (current prices)											
Index	94	103	109	109	81	100	112	129	151	184	N/A

⁽¹⁾ 1980-87: Census of Manufactures et d'Eurostat estimates

⁽²⁾ Added value (constant prices from 1985) per employee (Ecu/person)

^(*) ERA estimates

Source: Eurostat 1985, Trade association and DG III, Panorama of EC industry 1990, pag/es 13-35. Ifo Institut calculations and estimates.

NIEs, considerable increases of aerospace activities can be expected in the 1990s.

Overall development in the EC The gross added value of the aerospace industry of the EC in 1980 was 8.5 billion ECU. This corresponds to a share of gross national product of 0.34%. During the 1980s it has been possible to more than double the nominal added value of the sector, and in 1989 this was 18.8 billion ECU. From this data an average annual growth rate of 9.2% is calculated, which exactly corresponds to the growth of the nominal gross national product during that period. The importance of the aerospace industry therefore shows no overall change in the 1980s. The production value of the sector (+9.3 p.a.), i.e. the added value share of output (net share) has changed only very slightly, i.e. from 43.3% (1980) to 42.7% (1989). Average production growth in the 1980s therefore corresponded to demand for

aerospace industry products in the EC (market supply, Table 1). If, however, the nominal price development is not taken into consideration, a slightly changed picture emerges. The growth of real added value of the aerospace industry was clearly higher by an average of 4% (1980/89) than that of the total output of economic production at constant prices (GDP: +2.2% 1980/89).

Aircraft production Table 4 gives a survey of the development of individual market segments in the period from 1980 to 1988. Approximately half of the non-consolidated total turnover of the EC aerospace industry (in accordance with the extended sector definition by the industrial associations) related to the manufacture of aviation systems. However, this segment only shows a below average growth up to 1988. The reason for this was the drop in production of military machines in this segment (combat and training aircraft, military helicopters and rockets). Up

to the beginning of the 1980s, military products created the growth of the European aerospace industry. In the meantime, budget cuts in military procurement and downward trends in export, especially in the Middle Eastern countries, are taking effect. Added to this, is the expiry of the main programmes for various military systems (Mirage, Tornado, Harrier, Alfa Jet, Hawk), whilst new projects (e.g. Rafale, EFA) have not yet been developed sufficiently to start production. This applies both to aircraft and also to helicopters and rocket systems. There is therefore a gap in new procurement programmes, which is made worse by the fact that no decisions have yet been taken concerning commencement of series production of some new systems. The military aircraft market will face weaker growth in the next few years, as the changing military situation requires a revision of procurement plans and new generation armament systems.

Table 3
The aerospace industry
EC external trade (in current prices)

(million ECU)	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990 ^(*)
Extra-EC exports	2 945	4 725	6 402	5 903	7 592	7 409	5 884	5 685	9 381	12 564	12 526
Index	40	64	86	80	102	100	79	77	127	170	169
Extra-EC imports	3 478	5 341	4 738	4 869	5 619	5 394	5 287	5 172	9 076	12 975	13 800
Index	64	99	88	90	104	100	98	96	168	241	256
Exports/Imports in %	84.7	88.5	135.1	121.2	135.1	137.4	111.3	109.9	103.4	96.8	90.7
Import quota (%) ⁽¹⁾	17.2	21.9	19.3	19.2	22.3	19.0	16.9	16.2	25.7	29.3	30.4
Export quota (%) ⁽²⁾	15.0	19.9	24.5	22.3	27.9	24.3	18.4	17.5	26.3	28.7	27.6
Intra-EC trade	6 127	8 319	11 387	11 056	11 355	9 511	6 922	7 739	13 907	18 871	N/A
Index	64	87	120	116	119	100	73	81	146	198	N/A
Share in export total (%) ⁽³⁾	65.8	60.4	64.3	65.6	56.1	52.5	45.8	47.8	52.0	51.3	N/A

(¹) Share of extra-EC imports in EC production availability
(²) Share of extra-EC exports in EC productions
(³) Share of intra-EC imports in total exports by EC countries
(⁴) Estimates
Source: Eurostat. Ifo Institut calculations and estimates

Table 4
The aerospace industry
Turnover according to product groups

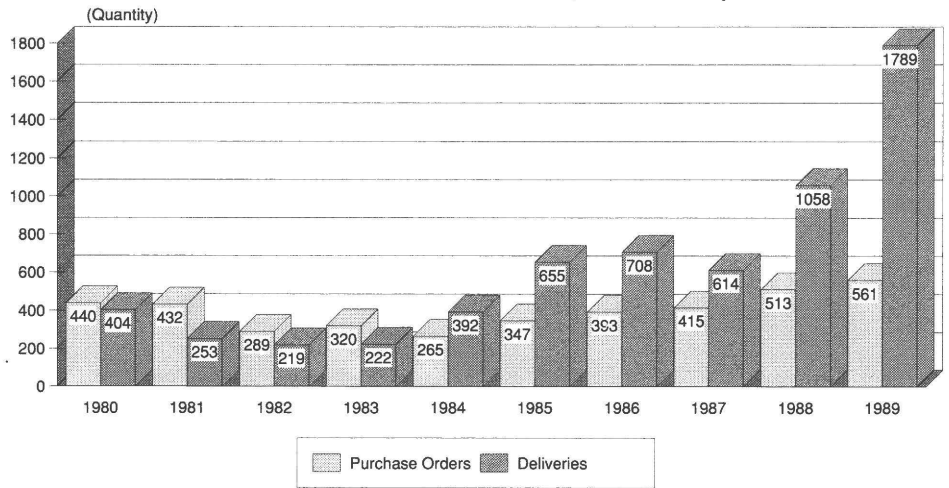
Turnover	1980			1988			1980-88		
	Million ECU			Million ECU			Annual Increase		
	Civil	Military	Total	Civil	Military	Total	Civil	Military	Total
Aircraft construction	2 826	8 215	11 041	7 647	15 663	23 310	13.3	8.4	9.8
Space segment	574	69	643	2 120	71	2 191	17.7	0.4	16.6
Engines segment	1 469	2 529	3 998	2 898	4 753	7 651	8.9	8.2	8.5
Equipment segment	1 246	3 465	4 711	3 457	9 489	12 946	13.6	13.4	13.5
Total non-consolidated	6 115	14 278	20 393	16 122	29 976	46 098	12.9	9.7	10.7
Interim deliveries ⁽¹⁾	2 123	4 134	6 257	5 180	8 507	13 687	11.8	9.4	10.3
Total consolidated	3 992	10 144	14 136	10 942	21 469	32 411	13.4	9.8	10.9
including									
Aircraft construction	1 848	6 512	8 360	4 914	12 525	17 439	13.0	8.5	9.6
Space segment	416	51	467	1 355	63	1 418	15.9	2.7	14.9
	Share in total turnover ⁽²⁾			Share in total turnover ⁽²⁾			Share		
Aircraft construction	13.8	40.3	54.1	16.6	34.0	50.6	2.8	-6.3	-3.5
Space segment	2.9	0.3	3.2	4.6	0.1	4.7	1.7	-0.2	1.5
Engines segment	7.2	12.4	19.6	6.3	10.3	16.6	-0.9	-2.1	-3.0
Equipment segment	6.1	17.0	23.1	7.5	20.6	28.1	1.4	3.6	5.0
Total, non-consolidated	30.0	70.0	100	35.0	65.0	100	5.0	-5.0	0

(¹) Supplied to other aerospace enterprises in the EC.
(²) Total non-consolidated turnover less interim deliveries.

Whilst the share of aircraft construction for military use in the overall non-consolidated turnover of the aerospace industry in the EC fell from over 40% (1980) to 34% (1988), the share of aircraft for civil purposes rose from just short of 14% (1980) to 16.6% (1988). The civil aircraft segment therefore shows a clear above-average growth.

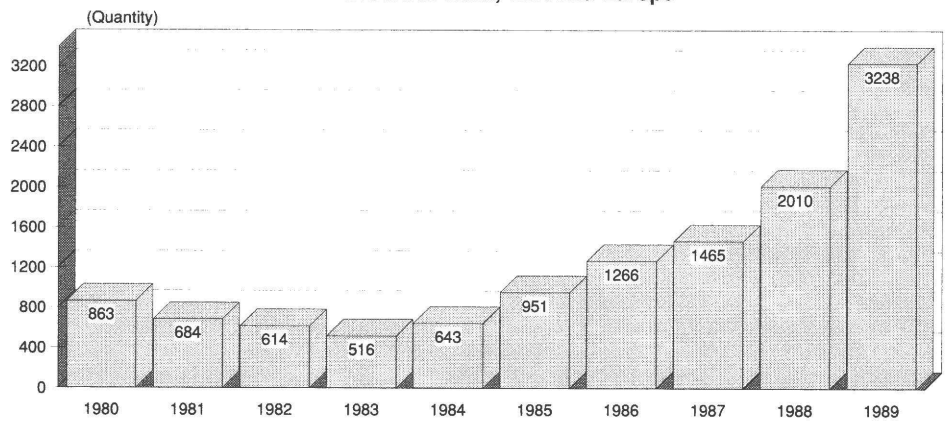
This shift further increased in 1989 and 1990. Production of civil aircraft benefited from the sharp increase in commercial air travel in the past few years and the need for modernisation of the fleets of the commercial airline companies, requiring improved economy and environment-friendly engines. Added to this is the improved competitive position of European sales by the extension of the production programme of the Airbus family (downward with Airbus models A-320 and 321 and upwards with the A-330 and 340). In 1989 a total of 105 Airbus models were manufactured and supplied (Boeing: 278, McDonnell Douglas: 119). Orders in hand that year were for 774 aircraft of the Airbus family, 560 of which were for the models A-300 to A-320 which are already available, with emphasis on the small A-320 model (446 off). With a stated figure for units delivered (24 A-300s, 23 A-310s, 58 A-320s), the Airbus took a market share of 18.7% in 1989 in the segment of medium and long-range civil aircraft in respect of western industrial countries. The share for Airbus in 1989 in the total number of orders in hand for western countries was just below 24% based on numbers of units. If the two European models in the 90 to 100-seater class (Fokker 100 and BAE 146) is included, the share of EC manufacturers is already 30.5% (1989). In the meantime,

Figure 3
Medium and long-range civil aircraft
Purchase orders and deliveries, USA and Europe



Source: DG III

Figure 4
Medium and long-range civil aircraft
Orders in hand, USA and Europe



Source: DG III

the order situation has further improved and it can be seen that from the medium term point of view, there are good prospects for civil aircraft construction in the EC. A weak point is the limited production rate because some production facilities are still under construction. The A-321, A-330 and A-340 models will only come up for production in future years, as extensive investments in the production are not yet completed.

The total market volume for the 1990s is currently estimated at approximately 7 000 new aircraft of different models. However, it is not sure whether the avail-

able infrastructure can cope with the increase in the number of medium and long-range jets in service from approximately 8 000 (1988) to 12 000.

Regional (commuter) aircraft, of which around 5 800 were in service in 1988 (389 deliveries in 1988) and total numbers in service are estimated at approximately 75% commercial use and 25% public authority (civil and military) use. European sales of regional aircraft, with a share of around two-thirds, occupies a leading position on the world market. The overall demand for new aircraft for the whole of the 1990s is at present estimated at approxi-

mately 4 400. Six manufacturers from the EC are active in this market, British Aerospace and ATR (Aérospatiale and Aeritalia) holding the largest market shares. Approximately one third of manufacturers from the EC are active on the world market for commercial and light aircraft and helicopters for civil use. In order to cope with a decreasing market which is becoming obvious in the segment of helicopter construction, a cooperation arrangement has been agreed between Aérospatiale and MBB (Eurocopter). The position for European suppliers of military helicopters remains stronger than that for civil helicopters. Aérospatiale is the world leader in this segment, with 231 machines, ahead of the American Sikorsky (170), Bell (166) and McDonnell (93), as well as the three other EC manufacturers, MCC (69), Agusta (68) and Westland (15).

Equipment production The product group of Equipment for Aircraft and Spacecraft forms the second largest part of the production sector (after the extended demarcation of the sector). This segment, which in 1988 included approximately 28% of the total non-consolidated turnover of the European aerospace industry (Table 4), showed above-average development from 1980 to 1988. Production of military products, the extent of which considerably exceeds that of civil production in this segment, shows a relatively strong growth. A strong increase in the export of military equipment for aircraft and spacecraft was achieved (Table 5).

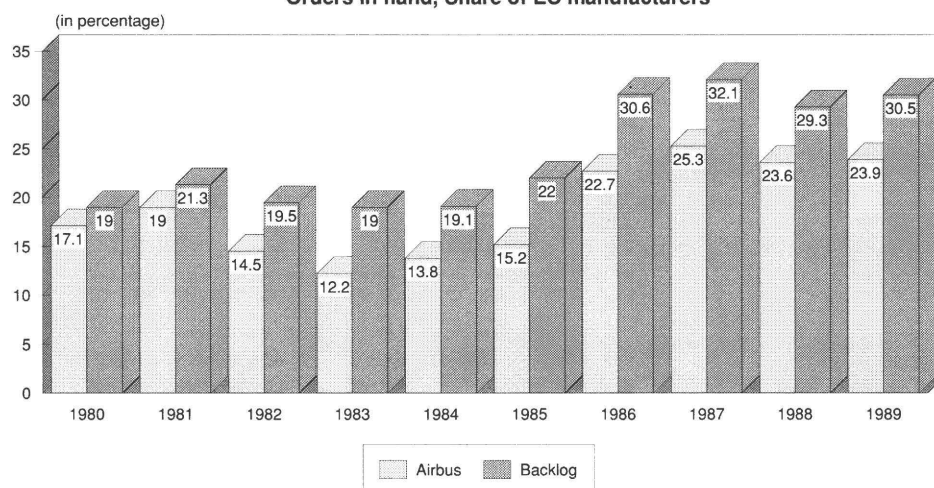
Engine production The third largest share in the total turnover of the aerospace industry was held by the Engines segment, at almost 17%, in 1988. Similarly to Systems manufacturers, the military share clearly predominates (Table 4). The Engines segment

Figure 5
Medium and long-range civil aircraft
Orders and deliveries, Share of EC manufacturers



Source: DG III

Figure 6
Medium and long-range civil aircraft
Orders in hand, Share of EC manufacturers



Source: DG III

showed the weakest growth from 1980 to 1988 of the four specialist segments of the aerospace industry. Not only military production of engines shows a below-average growth; but also the turnover of products for the civil market. The Engine market is not moving in pace with the development of aeronautics systems. Firstly, "Atlantic" cooperation arrangements exist between American and European manufacturers, and secondly, American engine manufacturers supply European systems manufacturers (Airbus A-300, 310), and conversely, American aircraft are fitted with engines of European origin (Rolls Royce RB 211) or result-

ing from Euro-American cooperation (Sneema/GE CFM 56). The relatively high export share for engines in the civil segment (1988: 64% of turnover) illustrates this. The situation is beginning to change in favour of the European industry, since the A-320 Airbus is being equipped with CFM-56 and the A-330 Airbus with RB-211 engines.

Space Systems production Space Systems represent the smallest of the four segments of the European aerospace industry. However, it has shown particularly strong growth in the 80s, and in Europe consists mainly of products for civil use. In com-

Table 5
The aerospace industry
Turnover according to market segments

Turnover	1980 Million ECU			1988 Million ECU			1980-88 Civil Annual Increase		
	Civil	Military	Total	Civil	Military	Total	Civil	Military	Total
Public authority R&D contracts	334	1 704	2 038	1 171	3 180	4 351	17.0	8.1	9.9
Modifications, repairs, maintenance	66	989	1 055	137	2 272	2 409	9.6	11.0	10.9
Sales in the EC (*)	1 437	3 925	5 362	3 112	7 353	10 465	10.1	8.2	8.7
Extra-EC sales (exports) including:	2 155	3 526	5 681	6 522	8 664	15 186	14.8	11.9	13.1
Aircraft construction	1 123	2 597	3 720	3 492	6 111	9 603	15.2	11.3	12.6
Space segment	59	23	82	212	7	219	17.3	-13.8	13.1
Engines segment	674	460	1 134	1 868	1 053	2 921	13.6	10.9	12.6
Equipment segment	299	446	745	950	1 493	2 443	15.5	16.3	16.0
Total turnover, consolidated	3 992	10 144	14 136	10 942	21 469	32 411	13.4	9.8	10.9

(*) to government and private economy customers.
Source: Trade associations and DG III. Ifo Institut calculations.

parison with the USA, the space industry in Western Europe is still less developed. In 1989, total expenditure on space flight in the USA was almost eleven times as high as the total space flight turnover in the EC. This is mainly attributable to the high place occupied by the military space programme in the USA, for which, in 1987 alone, expenditure amounted to eight times the total turnover in the EC. On the other hand expenditure on civil space flight in the USA was only slightly over twice as high as in Europe. The strong growth of space turnover in the EC is mainly attributable to the increasing number of successful launches of the Ariane launch vehicle (production and services turnovers) and production of satellites (telecommunications, ground observation and research). In addition to a further increase of these activities, additional impulses of use of the new Ariane 5 launch vehicle and development of a space station (Columbus) and a space shuttle (Hermes) can be expected.

Shares of civil and military production

This survey shows that overall, the military share is still predominant in European aerospace production, but that, as a result of above-average activity in the civil products segment, the structures are shifting (Table 4). The European aerospace industry would therefore appear to be faced with further considerable problems of adjustment. For this reason, despite favourable prospects on the civil markets, growth of the sector will still be subject to limits, especially since its dynamic segment still continues to show a lower weight within overall production. The segments of military R&D orders and military aircraft purchases, both of which have already shown only below-average growth from 1980 to 1988 (Table 5) will be particularly affected by economies. It is difficult to assess to what extent these influences will also affect military maintenance and servicing contracts and especially, exports of technical defence equipment. Continuation of the strong growth from the 80s (Table 5), however, appears somewhat improbable from to-

day's viewpoint. Longer-term reliable targets, orientated towards military purchasing plans, could facilitate the process of structural adjustment of the European aerospace industry.

Employment

The growth of production of the European aerospace industry, with a nominal average of 9.2% and a real average of 4% for the years from 1980 to 1989 (added value), was largely promoted by an improvement in productivity (cf. Table 2). The overall number of employees has risen only slightly during this period, i.e. from 406,000 to 418,000 people. Between 1981 and 1985 it even showed a steady decrease. After this, however, with a real growth in production of 7.2% per annum (1985/89), there was a sustained increase in numbers of employees of 1.8% per annum (Table 1).

The employment figures published by the Commission Service (DG III, Directorate-General for Internal Market and Trade and Industry) based on data from the industrial associations (extended sector demarcation)

give an insight into the structure of the overall figures, although only for the period 1980/88. These show that two segments have experienced above-average growth, namely employment in the Space segment (+7% per annum from 1980 to 1988) and employment in the Equipment segment (+2.9% p.a.). Admittedly, the Space Products Production segment represents only a small share in overall sector employment (1988: 4.3%). The Equipment segment, on the other hand, with a weight of 31.8%, was of considerable significance for the overall development of the aerospace industry. At 0.7% the increase in the number of employees of Systems manufacturers (1988 share: 47.6%) was close to the average for sector development. On the other hand, there was a strong reduction in personnel employed by Engine producers (-2.7% per annum). Their share in the total work force of the European aerospace industry fell from 21.7% (1980) to 16.3% (1988).

The employment structure in the aerospace industry quantitative features. With a 20% share of engineers and managers in its total personnel, this sector would appear to represent an extreme case for all branches of industry. The number of these highly qualified personnel, moreover, increased particularly sharply by an average of 3.5% per annum from 1980 to 1988. The proportion of engineers and managers in the Space Products Production (26.1%) and Equipment (24.5%) segments was above the average for the sector. It was the lowest at 15.1% in the Engine Construction segment, but this is nevertheless still an extraordinarily high proportion compared with other branches of industry. The extreme proportion of highly qualified

personnel corresponds to the R&D activities within the framework of overall production. 23% of the total personnel of the European aerospace industry were employed in Research and Development in 1988. In the segment of space activities, this proportion was as high as 51%.

External trade

The market for products of the aerospace industry is - apart from national purchasing and research programmes - an open, world market. External trade flows are accordingly broad, measured on market and production volumes. Both the exports and imports of the EC increased strongly during the 1980s. According to size order, exports and imports more or less balance. In the mid-80s the external trade balance was clearly positive (Table 1). It fell slightly below zero in 1989, again as a result of extensive new purchases of American commercial aircraft by European airways. The ECU/Dollar exchange rate shift to the detriment of European sales after 1985, which also produces negative effects for the future, is significant.

International cooperation

The aerospace industry is also characterised by globalisation of markets and sales structures. For example, close co-operation relations exist with the USA. This applies mainly to engine construction. In addition, however, American supplies of subcontract components for the Airbus and European supplies of subcontract components for the Boeing 767 and 757 models and McDonnell Douglas MD80 and MD11 models, which are partly based on holding-stakes relationships have already reached a considerable dimension. Cooperation arrangements also exist with

Japan (e.g. between MBB and Kawasaki on helicopter construction).

The special feature of internationalisation of the European aerospace industry can be seen in the wide network of cooperation with the third world countries, which involves practically all countries with a significant aerospace industry. This applies, for example, to Italo-Brazilian combat aircraft (Alenia and AerMacchi with Embraer) and Spanish-Indonesian cargo aircraft (Case with Nurtanio). Licence agreements have been entered into with numerous countries for the production of military aircraft, as well as for machines for civil aeronautics: BAC 111s in Rumania, DO 228s in India, European helicopters in more than a dozen countries. Important co-operation arrangements also exist in the space sector, especially with India, China and Brazil. This expansion is continuing with the awarding of subcontracts, especially in the civil aviation sector (in China, South Korea and Yugoslavia).

More important than the "extra-EC cooperation arrangements" are involvements within the EC extending beyond the boundaries of member companies and which have developed since the 70s. In these involvements the operational structures of the national enterprises have remained unchanged - cross-boundary merger movements in the European framework are not yet developed in the aerospace industry - instead, in many cases, enterprises work together jointly on collective projects in the form of consortia with organisational forms of a company law nature. The most important of these are, for civil aircraft:

- ❖ Airbus (including Aerospatiale, British Aerospace, Casa, Dornier, Fokker, MBB, Sabca);

- ❖ ATR (including Aerospatiale, Aeritalia);
 - ❖ Fokker (including Dassault, Fokker, MBB, Sabca),
- and for military aircraft;
- ❖ Tornado (including Aeritalia, British Aerospace, MBB);
 - ❖ Alpha Jet (including Dassault, Dornier, Sabca);
 - ❖ Transall (including Aérospatiale, MBB).

As for helicopters, a closer cooperation arrangement between Aérospatiale and MBB (Eurocopter) can be expected, and in the space segment also, European cooperation has been organised (ESA), e.g. for production of Ariane launch vehicles and development of the next Ariane 5 model. A project company (Hermespace) is envisaged for the development of a European space glider.

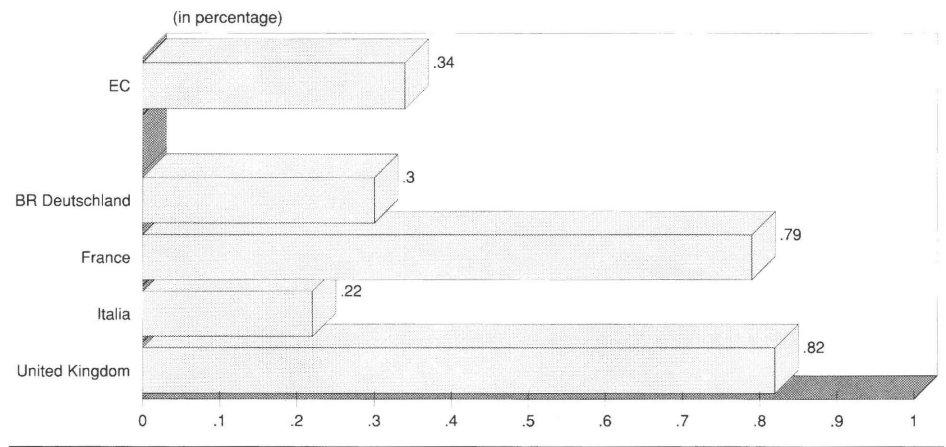
The competitive power of the European manufacturers will be considerably increased by these forms of integration.

Geographical features

Aerospace production in Europe is mainly distributed in four countries: the United Kingdom, France, the Federal Republic of Germany and Italy. Altogether, in 1989 they represented about 95% of the EC added value of the sector. The largest shares in this were France (36%) and Great Britain (32.5%). They represent traditionally the strongest committed countries of Europe in this sector of industry. However, the German and Italian industries have caught up considerably very recently, and in 1989 they represented 17.3% and 9.1% of European production respectively. The remaining capacities are distributed amongst the Netherlands, Belgium, Spain and Greece.

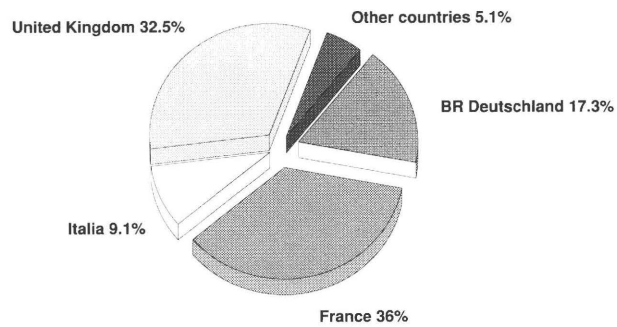
Big differences exist inside the Community with regard to the relative importance of

Figure 7
The aerospace industry
Share of added value in GDP, 1989



Source: Eurostat. Ifo Institut calculations and estimates

Figure 8
The aerospace industry
Share of EC countries in added value in the EC, 1989



Source: Eurostat. Ifo Institut calculations and estimates

the aerospace industry in the economy (Figure 7). In the United Kingdom and France, this importance is relatively high. In those countries, the share of added value of the sector in 1989 was respectively 0.82% and 0.79% of the gross domestic product. In the Federal Republic of Germany (0.30%) and Italy (0.22%), on the other hand, it was less than the EC average of 0.34%. Altogether in the 1980s, the added value for the sector in Italy (nominal value +13.1% per annum from 1980 to 1989) and Germany (+10.7%) has shown above-average and in France (+9.1%) average growth, whilst the British industry (+7.2%) has lost ground.

Structure of the industry

The leading enterprises of the European

aerospace industry are smaller than their competitors in the USA. The twelve largest enterprises in this sector in the western industrial countries include only three European enterprises, namely (1989) British Aerospace in 6th place, DASA/MBB in 7th place and Aerospatiale in 11th place (Table 6). The consolidated turnover of the top 5 European aerospace enterprises (or groups of enterprises) in 1989 attained around 45% of the corresponding comparative value for the industry in the United States. If the top 10 manufacturers are included in this comparison, this ratio is only 41%.

The two latest concentration movements in Europe are already taken into account here: In the Federal Republic of Germany

Table 6
The 20 biggest manufacturers of
aerospace industry products, 1989

Manufacturers	Turnover (billion ECU)			Employees (1 000)
	Domestic base USA	Europe	Japan	
Boeing (USA)	18.4			145.3
Mc Donnell Douglas (USA)	11.2 ⁽¹⁾			109.4 ⁽³⁾
General Dynamics (USA)	10.1 ⁽²⁾			N/A
United Technologies (USA)	9.7			N/A
Lockheed (USA)	9			82.5
British Aerospace (GB)		8.1		83.2
DASA (D)		7.8		63.0
General Electric (USA)	5.5			N/A
Martin Marietta (USA)	4.8			33.3
Northrop (USA)	5.2 ⁽²⁾			N/A
Aérospatiale (F)		4.5		33.0
Rockwell (USA)	3.5			31.5
Rolls-Royce (GB)		3.5		41.1
Grumman (USA)	3.2			28.9
Dassault-Breguet (F)		2.5		13.4
Mitsubishi H.I. (J)			2.5 ⁽¹⁾	N/A
Alenia (I)		1.9		21.6
Snecma (F)		1.9		14.0
Kawasaki H.I. (J)			1.2	4.1
Fokker (NL)		1.2		11.6 ⁽³⁾

(¹) Estimate
(²) Sales, non-consolidated
(³) 1988
Source: DG III-EC: Ifo Institut estimates

in 1989, the firms Dornier, Messerschmitt-Bölkow-Blohm (MBB), MTU Motoren-und Turbinen-Union, as well as Telefunken Systemtechnik combined together to form Deutschen Aerospace AG (DASA), and were integrated in the Daimler-Benz Group. In Italy in 1990 Aeritalia and Selénia merged to form Alenia.

Technological development

In the aerospace industry over 15% of turnover is used for research and development. The branch is therefore high-grade R&D-intensive. The same applies in a special way to the manufacture of space products.

Particularly intensive work is currently taking place in the following fields:

- aerodynamics and flight mechanics using the new wing profiles (supercritical profiles) and continuous research for optimisation of flight characteristics (active testing);

- structures and materials for the introduction of new concepts, e.g. manufacture of aluminium-lithium alloys, organic and metal composites, high-performance polymers;
- with regard to engines, through research for more efficient, quieter engines with lower fuel consumption, especially propfans and improvement of thermodynamic processes by the use of especially high performance materials: ceramics, super alloys, monocrystalline blades, etc., together with reduction of noise level with active and passive systems for internal and external noise reduction;
- electronic equipment for aircraft with active control concepts and "fly-by-wire" control commands, increased use of optoelectronics and optimisation of the man-machine interface in the cockpit, as well as the development of advanced navigation systems;
- CAD-CAM together with the development and use of increasingly efficient sub-

systems;

- production technologies with intensive use of data processing, improvement of flexibility and development of new concepts and systems to ensure quality and non-destructive testing.

These general trends are reflected in a complete set of substantial changes of detail, especially in the development of new models or products. The preparatory work for development of the second generation of supersonic passenger aircraft is currently being increased. With "Concorde", the main changes that need to be made are: an increase of range (to over 10,000 km), an increase of transport capacity (to 250 or 300 seats), and a relative reduction of fuel consumption. In order to achieve this, lighter construction with new materials and new, considerably higher-powered engines are necessary. At the same time, both the emission of noxious substances (especially nitrous oxide) and take-off noise must be substantially reduced. It will be of considerable importance for the range of application if the supersonic boom can successfully be reduced to an environmentally friendly level, so that it will be possible to fly at full travelling speed (2.5 to 3 times the speed of sound) over populated areas.

In the segment of space equipment - in addition to the different satellite projects - there are two major European programmes in the implementation stage: Ariane 5 and Hermes. Development of the new "Ariane 5" launch vehicle has already reached an advanced stage. These missiles should be capable of transporting a payload 25% higher than the previous model, with approximately 10% lower launching costs. The first launch is planned

for mid-1995. For "Hermès", the European space glider, the decision to introduce the second development phase is awaited in mid-1991. The first (unmanned) flight is scheduled for 1998.

Environmental protection

In the aerospace sector, environmental protection focuses on restricting noise levels and reducing emissions of noxious substances. Such improvements had already started in the 1980s, as a result of advances in engine technology.

Consequently, with effect from 1st January 1988, it was possible to ban the noisiest aircraft from flying in Europe since then.

Effects of "1992"

Completion of the European internal market will have a relatively low effect on the European aerospace industry, since there are practically no restrictions on trade in aerospace equipment in Europe. However, influences could result from conceivable changes in public procurement methods and indirectly as a result of liberalisation measures in the field of air traffic. Effects can also be expected in respect of the strategies of the big industrial groups, who

are envisaging even more far-reaching integration concepts extending above and beyond closer cooperation, for the strengthening of global competitiveness.

Outlook

In the European aerospace industry, structural shifts and adjustment from the military to the civil segment will intensify.

Governments will proceed cautiously with the dismantling of military potential in order to avoid possible rejections of adjustments. It is nevertheless possible to expect further growth of development in the sector as a whole. This optimistic expectation can be justified by the high number of orders in hand for the different Airbus models and the Fokker 100, for which the start of production installations for the A-330, A-340 and A-321 models will enable a considerable increase of production volume. Further contributions to growth can be expected from space flight.

For the products of the equipment industry, the ever-increasing importance of precision electronics and other measurement and control components, leads to an increase in demand, although this segment

will also be affected by cuts in military purchasing.

Real sector growth in the years 1991 and 1992 could be around 6%. Since, as already stated, 1990 was characterised by a short-term slow-down in the increase of output and no intentions are known concerning additional increases of capacity in the civil segment in 1993/94, the medium-term growth level for the period 1989/1994 will certainly be slightly lower and could be an estimated 4.5% per annum. With this growth, it is possible to carry out the necessary structural adjustments in the European aerospace industry largely without friction. This scenario, however, only applies provided that in the longer term no extreme changes occur, e.g. in airline companies or oil price level.

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The industry is represented at EC level by:
AECMA: Association Européenne des Constructeurs de Matériel Aérospatial (European Association of Aerospace Manufacturers).
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The production and sale of public transport equipment are closely linked to public investment in transport infrastructure. The poor state of the public finances of most European countries has limited the growth of public investment in general, and of the investment in transport infrastructure in particular, leading to little or no growth in demand for public transport equipment during the 1980s. At present, most public investment involves the replacement and modernisation of equipment, and the renovation of existing transport systems rather than the building of new systems.

At the same time, private car traffic has expanded much faster than public transport services, partly because of its greater convenience and partly because of the absence of an adequate public transport infrastructure. Nevertheless, traffic congestion and environmental concerns could enable the public transport sector to recapture a market share, provided that public transport companies and the manufacturers of equipment can meet demand in terms of reliable services and increased flexibility. R&D and new marketing techniques try to address these concerns.

The EC park of buses and coaches has increased during the 1980s, but production has fallen and is not expected to recover completely over the next few years. The key concerns for the sector at present are an increase in passenger comfort, the reduction of pollution, fuel conservation and

operational efficiency. The opening up of the East European markets has also awakened interest among equipment manufacturers.

Apart from the plans to expand the high speed railway network, no other major change is expected in the EC rail system. Given the projected fast growth in demand for transport services, the use and development of suburban passenger routes are expected to grow. There is considerable potential for new public transport systems due to the high rates of urbanisation, environmental concerns and other adverse effects of road surface transport. Moreover, EC manufacturers contribute to technological progress and innovation worldwide. As a result, EC rail equipment manufacturers are likely to benefit from a rise in demand for such equipment in non-EC countries.

Structure of the sector

The public transport equipment sector produces vehicles used in urban, suburban and regional passenger transport. It encompasses buses, trolleybuses, and rail vehicles (such as locomotives, passenger carriages and articulated units, trams, LRVs, metros and commuter railways).

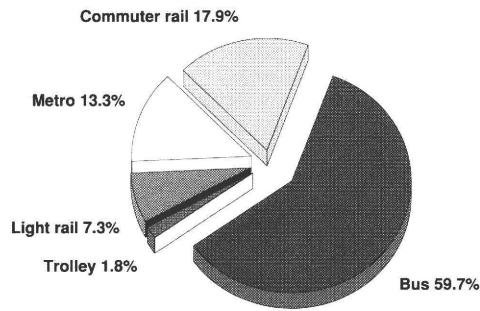
Bus transport is the most widely used public transit mode in cities and large conurbations in the EC. More than half of urban and suburban public transport traffic consists of bus transport. Trolleybuses are the least significant of public transport modes in the EC, with average trip rates of 1.8 per capita. In terms of equipment, buses account for about one third of the public transport vehicle stock (all modes). Current data on vehicle stock of the bus and coach industry do not distinguish between these two categories of vehicles.

Taken together, the three urban modes of rail transport account for about 40% of the public transport vehicle and passenger traffic in urban and suburban Europe.

Commuter rail represents 18% of all public transport modes in the EC, while metros and light rail have shares of respectively 13% and 7%. However, in terms of public transport vehicles, commuter rail represents about 29% of the stock of equipment, whereas the metro and light rail represent respectively 8% and 3% of the total.

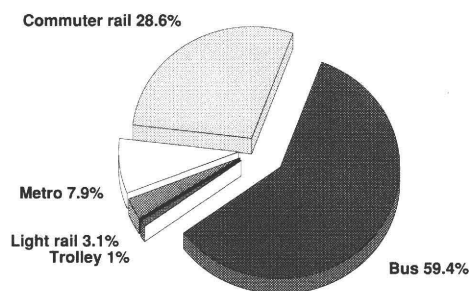
Given that the trends in consumption and production of public transport equipment are influenced by many different factors, a special monograph is devoted to recent trends in the public transport equipment sector. It should however be kept in mind that buses and coaches are part of the automotive industry, while urban rail vehicles belong to the railway rolling-stock in-

Figure 1
Public transport equipment
Passenger traffic
Annual number of trips (in millions), 1988/89



Source: UITP

Figure 2
Public transport equipment
Number of vehicles, 1988/89



Source: UITP

dustry. Trade figures for buses, coaches and public transport rail vehicles are thus included in the statistics presented in the monographs on motor vehicles and railway rolling-stock industries, which are covered elsewhere in this chapter.

Buses and coaches

Definition of the sector Public transport buses operate on fixed routes, and on a fixed schedule. They vary in capacity from minibuses (20 to 35 spaces) to articulated buses (up to 130 spaces). Buses for urban and suburban transport provide both seating and standing accommodation. They can be distinguished from coaches as the latter are often more comfortable vehicles with no standing places.

Trolleybuses are propelled by an electric motor and obtain power from two overhead wires along their route.

Although trolleybuses present excellent environmental features (low noise and no exhaust), infrastructural investment is more expensive and their operation is more complex than that of buses. Moreover, their lower rate of return has led operators to systematically replace trolleybuses by buses and coaches.

Current situation At present, car traffic accounts for almost 83% of the total passenger-kms in the EC Member States. All countries recorded an expansion in traffic during the 1980s, the highest increases in the EC being registered in Italy (+8.9%) and Spain (+7.7%). From 1980 to 1988, private car traffic expanded by 25.4%, while bus and coach traffic increased by only 5.3%.

Since 1983, the total fleet of buses and coaches increased by 2.5% per year on average in the European Community, reach-

Table 1
Public transport equipment
Vehicle stock (unit) - buses and coaches

	1983	1984	1985	1986	1987	1988
EC	350 084	346 112	345 972	359 549	391 712	396 393
Belgique/Belgie	17 866	17 170	16 817	16 250	15 869	15 808
Danmark	7 762	7 836	8 010	8 105	8 110	8 093
BR Deutschland	71 084	69 314	69 207	69 325	70 037	70 186
Hellas (*)	N/A	N/A	N/A	N/A	19 000	19 000
España	43 759	41 161	41 592	41 874	43 002	45 000
France	58 000	57 500	57 000	57 000	65 000	65 000
Ireland	6 909	7 436	7 653	8 132	8 347	8 653
Italia	71 000	72 000	74 000	76 000	78 000	80 000
Luxembourg	704	695	693	701	717	720
Nederland	12 000	12 000	11 000	11 000	12 000	12 000
United Kingdom	61 000	61 000	60 000	71 162	71 630	71 933
U.S.A	583 000	584 000	593 000	594 000	602 055	617 000
Japan	231 000	230 000	231 200	232 500	234 100	238 000

(*) Estimate
Source: Special Vehicles Statistics 1990, RAI, The Netherlands

Table 2
Public transport equipment
New registrations in 1988 - buses
and coaches

EC	21 009
Belgique/Belgie	1 000
Danmark	489
BR Deutschland	4 750
Hellas	200
España	1 300
France	4 077
Ireland	300
Italia	4 782
Luxembourg	30
Nederland	1 000
Portugal	425
United Kingdom	2 656
EFTA	4 833
Austria	574
Finland	569
Iceland	52
Norway	1 408
Sweden	959
Switzerland	1 271
EASTERN EUROPE	8 500
Czechoslovakia	2 000
German DR	3 500
Hungary	1 600
Yugoslavia	1 500

Source: UTI

ing approximately 400 000 units. The current replacement market is about 21 000 units (see Table's 1 & 2). The total fleet of buses and coaches decreased in Belgium (-2.5% per year), but remained stable in the Federal Republic of Germany. In the other EC countries, the fleet expanded, the highest growth rates being recorded in Ireland (+4.6% per year,

the fleet level still being relatively low) and in the United Kingdom (3.3% per year).

The bus fleet is currently the largest in Italy, followed by the United Kingdom, the Federal Republic of Germany and France. The annual rate of growth of the vehicle park was higher in the EC than in Japan or the United States during the 1980s. However, the fleet level in the EC remains much lower than in the United States. Urban and suburban public transport buses account for at least one quarter of the EC fleet, as shown in table 3. Figures

for regional bus transport in four EC member states represent more than one third of the total fleet: 68% in Italy, about 55% in Portugal and 41% in Denmark and the Netherlands.

When considered together, urban, suburban and regional buses account for about two thirds of the total EC bus fleet. The proportion of buses used in public transport is not as high in North America for example where almost three quarters of the buses and coaches are school buses, and this class of vehicle accounts for over half the kilometres travelled. In Europe, school transport is much more integrated with public transport thanks to the high density of the network.

Sales Recent trends in bus and coach sales in the EC have been somewhat depressed. The major commercial vehicles' manufacturers have reported falls in profits. Volvo and DAF, for example, faced sharp declines in profits in the first half of 1990 and plan to reduce output in line with the fall in demand across their commercial vehicle business. According to some estimates, there is an excess capacity of between 25% to 33%

Table 3
EC public transport fleet
Number of buses, 1988

	Urban and suburban	Regional
Belgique/Belgie	1 276	N/A
Danmark	441	3 339
BR Deutschland	20 538	
Hellas	(¹) 3 451	
España	(²) 3 871	
France	(¹) 12 247	N/A
Ireland	2 266	N/A
Italia	(¹) 16 164	(³) 54 665
Luxembourg	(²) 124	N/A
Nederland	1 348	4 983
Portugal	1 803	(⁴) 6 430
United Kingdom	(⁵) 38 300	N/A
EC Total	101 829	N/A

(¹) 1987

(²) Only Luxembourg city

(³) Only seven Spanish large cities: Madrid, Barcelona, Bilbao, Sevilla, Malaga, Valencia & Zaragoza. Only public companies.

(⁴) Total number of companies 1,021, of which 150 on urban and regional service

(⁵) Suburban and regional services

Source: DG VIII/DG VIII/Jane's/UITP/UK National Statistics

in bus and coach manufacturing in the European Community.

Production There are about 90 bus and coach manufacturers in the EC. They supply chassis, body work or integrals. The biggest and most integrated firms are involved in all three activities. Only a few of them are also involved in trolleybus bodywork.

The trolleybus traction equipment constitutes a different market segment. There are about a dozen trolleybus manufacturers in the Community involved in the production of trolleybus traction equipment, along with a number of electronics firms.

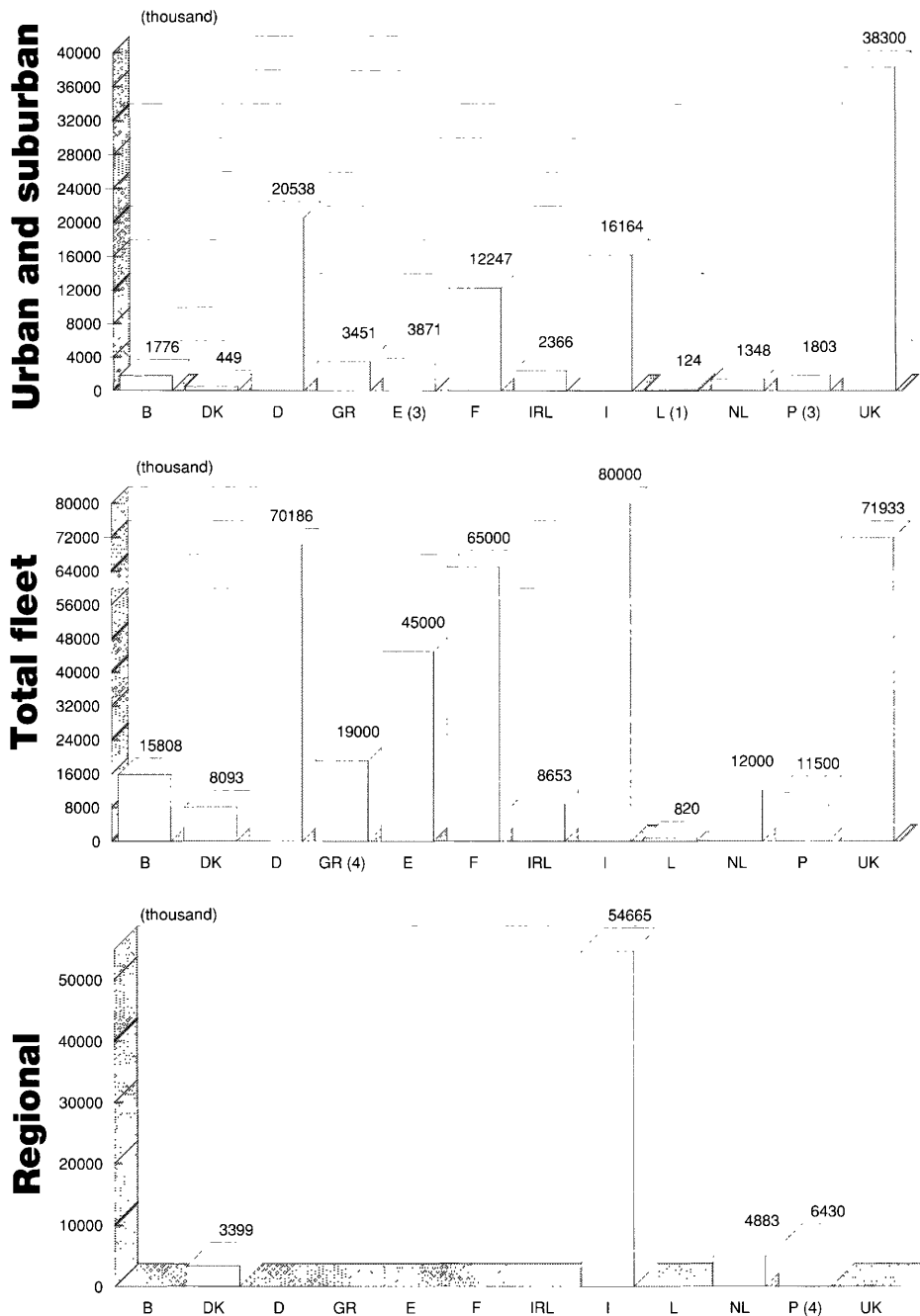
Contrary to the trend in fleet numbers the production of buses and coaches in the EC production declined at a rate of almost 4% a year since 1983, falling to about 36 000 units in 1988. The largest producers are the United Kingdom and the Federal Republic of Germany, which,

together, represent more than two thirds of the EC production. Although production decreased by respectively 2 and 5% per year on average in these two countries since 1983, the most significant declines are registered in Italy (-8.4% per year) and Spain (-7.8%). Only the Netherlands experienced an expansion of bus and coach production (+7.4% per year). From 1987 to 1988, however, EC production increased

by 6% and the declining trend was reversed in the Federal Republic of Germany, Italy and Belgium.

Production figures for the major manufacturers in some European countries point to a new fall in 1989. In the Federal Republic of Germany, production decreased by 4% in 1989, and fell even more rapidly in the United Kingdom (production by the eight largest producers, which account for about 20% of total production,

Figure 3
Public transport equipment
EC total and public transport bus fleet, 1988



(1) Luxembourg city only
(2) Only urban transport
(3) Estimation of only 7 large Spanish cities
(4) Suburban and regional
Source: UITP

fell by 13.5% in 1989 in the United Kingdom).

Structural changes in the industry

Until recently, there was a marked preference for national producers, but in the face of market pressures (eg. fall in vehicles sales, excess capacity in the bus industry) and in view of the need (and

potential) to capture market shares abroad, the number of mergers and takeovers has increased since 1988. There has been a considerable increase in the number of mergers and acquisitions among European bus manufacturers, as shown by the list of agreements in 1990: May:

❖ UK bus builder Optare joined United Bus.

July:

❖ Two Belgium manufacturers consolidated their interest as Van Hool of Konigshaft took over LAG Bus Manufacturing NV of Bree;

❖ Volvo Bus Corporation signed an agreement with the Turkish industrial group Subani to pave the way for the introduction of Volvo buses in the Turkish market;

❖ United Bus signed a letter of intent with DAB Silkeborg a/s of Denmark concerning future cooperation.

October:

❖ Den Oudsten BV of the Netherlands joined United Bus.

Source: UTI Magazine

Public transport investment in buses and trolleybuses

Buses have an average life of around 12 years, while for coaches it is a little less because of the need to keep higher standards of passenger comfort. Investment in bus vehicles tends to be a highly volatile phenomenon, depending on regulations, taxes, grants, differing replacement cycles and normal market forces. It is therefore difficult to provide information trends. It is known, however, that expenditure on new vehicles in Western Europe is currently running at 3.8bn ECU a year, with replacement rates ranging from 2% in Belgium and the UK to over 8% in the Netherlands. These variations reflect different replacement cycles rather than longer term trends.

Total investment in trolleybuses in Western Europe is probably of the order of 38 m ECU a year. Further investment will concentrate on the replacement and modernisation of existing systems rather than on the build up of new systems.

1992 The liberalisation of public procure-

Table 4
Public transport equipment
Sales of buses and coaches in selected EC countries
1985 - 1989

	1985	1986	1987	1988	1989
BELGIQUE/BELGIE	265	416	296	449	352
Daf	7	7	9	57	58
R.V.I.			7	3	9
Mercedes	50	128	55	99	74
Scania	23	10	6		
Setra	39	46	42	44	40
Van Hool	100	166	126	163	132
Volvo	46	52	58	83	39
DANMARK	212	257	197	183	204
Bova	7	14	10	8	16
Kässbohrer Setra	56	62	40	29	36
Leyland	149	181	147		
Daf					3
DAB-Silkjeborg				127	126
Scania				19	23
FRANCE	2 987	3 006	2 580	2 481	2 483
Renault	2 831	2 680	2 270	2 194	2 190
C.B.M.	57	24	1		
Heuliez		241	234	221	236
Iveco-Unic	99	61	75	66	57
BR DEUTSCHLAND	4 046	4 258	4 850	4 750	4 448
Auwärter	373	454	541	649	563
Daimler-Benz	2 009	2 022	2 217	1 901	1 804
Ford			113	87	1
Kässbohrer	846	910	1 028	1 165	1 138
ITALIA	3 709	3 527	3 541	4 782	5 122
ESPAÑA	1 272	1 262	1 219	1 223	1 570
Enasa	1 007	1 048	888	711	1 018
Mercedes	45	34	31	352	300
Nissan-M. Iberica	59	67	178	40	88
R.V.I.	161	113	122	120	164
UNITED KINGDOM	2 511	2 141	1 989	2 656	3 034
Bova	49	27	7		
GM-Bedford	253	252	263		
Dennis	88	45	47	192	244
Leyland Daf	157	149	187	211	263
Leyland Bus	1 007	873	441	779	1 074
Scannia	60	66	61	130	145
Volvo	328	367	411	591	771
MCW	435	237	497	570	249
Overige	134	125	75	183	288
NORWAY	1 352	1 737	1 718	1 058	1 048
SWEDEN	988	1 031	949	959	1 101

Source: Special Vehicle Statistics 1990, RAI, The Netherlands 1990

ment is an important issue for the public transport equipment industry. At present, each country has its own supply industry which often remains confined to national markets. The British and Portuguese markets are more liberalised, as part of their equipment has traditionally been purchased from non-national suppliers. The long-standing relationship between suppliers and operators

(there is, in general strong public supervision of procurement) has also reinforced the existing partitioning of markets by the use of company specifications and practices. Some rationalisation and cost reduction can be expected from the liberalisation of public purchasing. Much progress has already been achieved through the fixing of Community weights and dimensions for road vehicles.

Table 5
Public transport equipment
Production of buses and coaches by country and manufacturer

	1983	1984	1985	1986	1987	1988	1989
EC	43 150	38 640	40 468	33 444	33 352	35 261	N/A
BELGIQUE/BELGIE	1 266	1 048	811	902	950	998	N/A
Ford	N/A	N/A	230	271	357	391	468
Mol.	N/A	N/A	11	2			
Van Hool	N/A	N/A	460	542	492	607	657
Volvo	N/A	N/A	110	68	101		
FRANCE	2 566	2 633	2 822	2 987	2 582	2 434	2 976
C.B.M.	N/A	N/A	43	57			
Heuliez	N/A	N/A	173	173	228	179	225
Iveco-Unic	N/A	N/A	74	99	67	61	72
Renault	N/A	N/A	2 532	2 831	2 287	2 194	2 382
BR DEUTSCHLAND	13 271	9 461	10 867	12 718	9 474	10 297	9 873
Daimler-Benz	N/A	N/A	5 345	5 084	4 565	4 939	5 060
M.A.N.	N/A	N/A	2 566	2 434	1 658	2 039	1 619
Kässbohrer	N/A	N/A	1 954	2 001	2 031	2 137	2 192
Auwärter	N/A	N/A	820	852	870	977	1 002
Iveco-Magirus	N/A	N/A	140	2 260	350	205	
Volkswagen	N/A	N/A	42	87			
ITALIA	7 400	6 389	6 883	3 720	3 725	4 782	5 122
Iveco-Fiat	N/A	N/A	6 210	2 959	2 819	3 890	4 579
Bredabus	N/A	N/A	373	543	612	543	324
Menarini	N/A	N/A	300	218	294	321	219
ESPANA	2 043	1 631	1 755	1 780	1 415	1 358	1 065
Enasa	N/A	N/A	1 247	1 275	996	899	964
Mercedes	N/A	N/A	70	31	37		
Nissan-M. Iberica	N/A	N/A	61	332	221	346	74
R.V.I.	N/A	N/A	168	142	161	113	27
Setra	N/A	N/A	209				
UNITED KINGDOM	15 616	16 499	3 885	2 514	2 178	2 511	2 171
Leyland Daf	N/A	N/A	N/A	N/A	N/A	72	24
MCW	N/A	N/A	N/A	N/A	N/A	622	304
RTI	N/A	N/A	N/A	N/A	N/A	217	168
ERF	N/A	N/A	N/A	N/A	N/A	36	56
Leyland Bus	N/A	N/A	N/A	N/A	N/A	1 196	1 245
Dennis SV	N/A	N/A	N/A	N/A	N/A	334	343
Duple Int	N/A	N/A	N/A	N/A	N/A	34	28
Optare	N/A	N/A	N/A	N/A	N/A		3
DANMARK (¹)	N/A	235	231	271	205	N/A	N/A
SWEDEN	5 014	5 264	6 138	6 543	7 385	8 090	8 227
Saab-Scania	N/A	N/A	2 882	3 258	3 456	3 918	3 890
Volvo	N/A	N/A	3 256	3 285	3 929	4 172	4 337
AUSTRIA	291	343	274	290	276	287	N/A
HUNGARY	12 852	13 062	13 226	13 586	12 923	12 476	11 930
Ikorus	N/A	N/A	13 226	13 586	12 923	12 476	11 930
CZECHOSLOVAQUIA	3 150	4 240	3 386	3 539	3 350	N/A	N/A
POLAND	9 000	8 300	7 700	8 400	9 000	N/A	N/A
BULGARIA (¹)	2 507	2 501	2 650	2 638	2 704	N/A	N/A
R.D.A (¹)	1 688	1 691	2 042	1 626	1 749	N/A	N/A
USSR	86 000	85 400	86 100	84 000	90 000	N/A	N/A
JAPAN	55 948	72 209	79 591	42 342	49 987	57 413	N/A
U.S.A (¹)	26 212	32 437	33 533	37 022	N/A	N/A	N/A

(¹) Source: Industrial Statistics Yearbook 1987, Vol. II
Commodity Production Statistics 1878-1987
Published by the United Nations, 1989

Safety requirements and type approval are also being adopted at Community level, which will facilitate cross-border contracting.

Environmental protection Growing environmental awareness and increased traffic congestion are expected to stimulate major investment in public transport equipment such as buses. Until now, however, the financial resources for such large-scale investments have not been made available.

One of the major issues facing the transport equipment industry is the use of cleaner diesel engines and the switch to alternative fuels. New methods of construction are also being encouraged. Neoplan's new carbon-fibre design is a specific example which may become a success story.

Regarding the development of particle filters, a survey among large EC manufacturers showed that almost all major manufacturers are working in this area. Work is well advanced and large-scale production could start this year. Public transport undertakings have been particularly active in carrying out these tests.

Governments are also funding a number of R&D programmes for new clean technology for buses. A German Federal R&D programme funds, for example, the dual powered trials, flywheel and hydraulic energy storage systems, methyl alcohol powered buses, and dual engined buses.

Eastern Europe

A market which could prove to be quite promising is Eastern Europe. The lack of financial resources to enable the massive replacement and upgrading of ageing fleets in the East European countries will, however, delay the development of the market.

Moreover, potentially powerful suppliers

with large production exist in a number of Eastern European countries. Some degree of competition can thus be expected for low-price buses from major bus manufacturers such as Ikarus of Hungary (provided they find themselves a partner in Western Europe) or the trolleybus manufacturer Skoda of Czechoslovakia. Here again, the availability of financial resources will be a determinant for the future threats and opportunities in Eastern Europe.

The ability of Eastern European manufacturers to increase their share of the Western market is, however, highly dependent on the forging of alliances with Western suppliers, in order to benefit from their technological know-how and to have access to the markets. They can, in turn, offer keenly priced vehicles, a strategy which is successful. West German manufacturers already have plans to set up units in the East and expand their market share there. East European manufacturers may, therefore, lose important shares in their home markets. Ikarus and DAF are currently negotiating a joint venture to sell the Ikarus Citibus on a DAF base in Britain, offering very good prices in a deregulated market.

Although traffic congestion and environmental concerns should enable the public transport sector to develop further, the production of buses and coaches is not expected to recover fully from the fall experienced during the 1980s. A lack of financial resources tends to limit investment in public transport equipment. Compared to rail transport equipment, buses and coaches have a much shorter average lifespan but require lower infrastructure costs and civil engineering work.

Table 6
Public transport equipment
Forecast bus production capacity in Eastern Europe, 1988-2000

(1 000)	High estimate			Low estimate	
	1988	1990	2000	1990	2000
Bulgaria	2.7	3.0	3.5	2.8	3.0
Czechoslovakia	3.5	3.5	4.0	3.6	4.5
East Germany	2.0	2.1	2.3	2.0	1.8
Hungary	13.5	13.0	10.0	12.0	9.0
Poland	8.0	8.1	9.0	7.9	7.5
Romania	3.8	3.4	3.8	3.4	3.2
Soviet Union	90.0	90.0	95.0	90.0	90.0
Yugoslavia	5.1	6.0	7.8	5.0	6.0
Total	128.3	129.2	135.4	126.7	125.0

Source: "The East European Motor Industry", The Hungarian Economic Service (Special Report No 1167) appeared in Truck & Bus Builder, Feb. 1989

Another factor is the ongoing deregulation of the EC transport services sector, which may allow for further falls in vehicle purchases, as independent operators often rely more on second-hand vehicles. A study on the Eastern European Motor vehicle production estimates that bus production capacity will range between 125 000 to 135 000 units by the year 2000.

Public transport rail vehicles

Definition of the sector The sectors dealt with in this section are: commuter and regional rail, and urban rail systems. Commuter and regional public transport are part of the Mainline infrastructure, while Urban Rail systems include Metro systems, Light Rail systems and Urban people movers.

Current situation

Commuter and regional passenger networks Although no major network expansion is currently being considered for the traditional rail networks in the EC (excluding the High Speed railway network), suburban passenger routes are expected to grow. Demand for passenger transport through most Inter-City routes has remained static, while, due to increased suburbanisation, many suburban rail routes have experienced a period

of substantial growth.

Many European cities have given a renewed impulse to commuter rail services, in order to cope with passenger traffic in major conurbations. The Spanish 'Cercanias' commuter rail operations currently serves 500 000 customers daily, which represents 75% of the network's passengers carried by the State railway RENFE.

Urban rail systems Due to the high rate of urbanisation in nearly all European countries, the environmental damage and other adverse effects of road surface transport, there is considerable potential for new Public Transport systems. Investment in urban rail, metro and light rail is expected to be of the order of 31 billion ECU through the 1990s, with the largest programmes being set up in Italy, France, UK and the Federal Republic of Germany.

Urban traffic congestion has generated an increased demand for urban Public Transport systems in Europe. Some new systems are being built in Toulouse, Rennes, Genoa, Amsterdam, Bilbao, Sheffield, Avon county and Paris (Light Rail), while others are being extended (eg. London's Jubilee Line).

Some existing systems are being up-graded such as Berlin, Lyon (line D), Lille and London (Central and Northern lines).

Paris also plans further extensions of the RER (Réseau Express Régionale) and a new automated metro line (Meteor).

The market for urban rail systems equipment is also developing rapidly worldwide. North America is developing new systems and enlarging existing ones. In the US, New York is planning to buy more than 1,500 cars over the next decade, Washington 200 and Chicago 90. In Canada, Toronto plans to purchase 55 light rail and 30 metro cars. Developing countries are also investing substantially in urban rail systems. There are firm plans for Monterey (Mexico), Bangkok and Beijing. On the other hand, the EFTA and Japanese markets are already catered for by local manufacturers and are rather closed for foreign competitors.

The rolling stock in the commuter rail, metro and LTR modes amounted to 68 507 cars in 1988. The cars are being used in about a hundred systems throughout the Community. When considered together, the three urban modes account for 10 962 million annual trips, which represents about 40% of the total public transport vehicle and passenger traffic in urban Europe.

Metro In terms of metro vehicle sales, European GEC Alstom, followed by Canadian Bombardier and Japanese Kawasaki, are the largest suppliers. On a world scale, there are only two EC metro suppliers: GEC Alstom and Breda, which operate successfully in the US market.

Light Rail A Light Rail system (LTR) is a tracked, electrically driven local means of transport. An LTR system can be developed

from traditional tramway systems or built as a new system from the outset.

The largest suppliers of LTR are Duewag and Bombardier. As regards export performance, the strongest EC companies are Duewag, LHB and ABB. The most important non-EC competitors in terms of performance in non-domestic markets are Bombardier, Kinki Sharyo and UTDC.

Structural changes Urban rail builders tend to be part of rail manufacturers who produce not only urban rail vehicles, but also a variety of rail equipment and components. As such, the changes described below do not only affect urban rail manufacturers or branches, but the rail equipment industry as a whole.

The industry is undergoing a significant consolidation process in the EC. Such consolidation affects all branches of the Rail

Table 7
Public transport equipment
Sales

Lead contractor	Metro deliveries since 1985	Light Rail deliveries since 1985
GEC-Alstom	1 378	150
Metro Cammell	394 ⁽¹⁾	
Bombardier	1 192 ⁽²⁾	(*) 304
BN		
ANF Industrie	75 ⁽³⁾	
Kawasaki	762 ⁽⁴⁾	
BREDA	413	
ABB	81 ⁽⁵⁾	318
BREL	4	
Waggon Union		
MAN	142	60
LHB	60	95
Duewag	71	1 672
UTDC	58	312
Hitachi	124 ⁽⁶⁾	
Tokyu	38 ⁽⁷⁾	
Kinki/Sharyo		200
Schindler		219
Comeng		330
Fiat		108
SGP		69
Firema		164
ACMV		136

(1) Does not include MTM and ATEINSA
 (2) Includes Budd and Pullman
 (3) Does not include ANF's work for Alstom orders
 (4) Bombardier and BN
 (5) Does not include Japanese sales
 (6) Does not include electrical components
 Source: DG III - EC Commission

Construction industry, but the merger movement was initiated by electrical equipment companies.

The main reasons behind this consolidation movement are:

- ❖ the need to achieve economies of scale in manufacturing;
- ❖ the need to build a critical mass for investment in R&D;
- ❖ the need to bypass obstacles to supplying equipment from outside a country;
- ❖ a strategic response to the more commercial purchasing processes of railways;
- ❖ the need to prepare for the advent of the European Single Market.

For example, the three big manufacturing firms in Germany -ABB, AEG and Siemens, are well on the way to forming a competitive grouping in order to meet the European and world market for rail system

Table 8
Public transport equipment
New Technology systems in urban transport - manufacture

Name/location	Date	Supplier	Route length (km)	Stations	Cars	Train	Remarks
VAL Lille France	1983	Matra	25	34	76	Automatic No crew	Partially elevated, cut-and cover, and "bored tunnel; Line 2" opened 1989, Line 3: approx 15km in construction
Pomma 2000 Laon France	1989	Poma	1.6	3	3	Automatic	Cable-hauled rubber-tyred system, on alignment of former tram route
Magnetbahn Berlin West Germany	1987	AEG	1.6	2	2	Automatic	Trial public service started 1988
Docklands LTR London England	1987	GEC	12	16	11	Automatic	Mostly elevated bored tunnel connection to Bank metro station under construction and system upgrading in progress.
VAL France							
Lyon Line D	1990	Alsthom/ Matra	12	13	76	Automatic No crew	
Orly VAL Paris	1992		8	3			
Bordeaux	1993	Matra	11	17	50	Automatic No crew	
Toulouse	1993	Matra	10	15	50	Automatic No crew	Line 2 planned

Source: Jane's 1990/UITP

contracts.

Technological developments New innovative mass transit systems are being developed. EC manufacturers account for about half of the world's high technology/innovation industry. France and the United Kingdom are leading but Belgium and the Federal Republic of Germany are also largely contributing to new developments. The US and, to a lesser extent Japan, are among the most active too.

People movers - automatic, no crew, rail technology - based means of transport, have been developed in a number of EC cities. Table 7 lists operating and planned innovative urban transit systems.

Public transport investments in metro and light rail

Total investment in urban rail through the 1990s is expected to reach 31 billion ECU, with the largest programmes being set up in Italy (960 million ECU), the UK (654 million ECU), France (about 615 mil-

lion ECU) and the Federal Republic of Germany (461 million ECU). Spain and Belgium are expected to invest between 90 and 150 million ECU during the 1990-2000 period. Investment is likely to be more limited in Denmark, Portugal and the Netherlands.

Much of these investments in metro systems will focus on the modernisation of current fabric and equipment. For example, the new "Boa" trains to be used on the Meteor line in Paris will be automat-

ically controlled, semi-permanently coupled, with a continuous carriage. At present, new light rail systems are under construction in Manchester, Genoa and Paris. There are plans for many new systems, especially in the UK.

The most ambitious LTR project in the Community is the Docklands system, which is in the first phase of operation (its total cost is in excess of almost 1 billion ECU).

1992 Similarly to buses and coaches, the rail equipment market is partitioned on a national basis. The competition to win in non-Community countries is, however, much fiercer. Although a large number of ISO standards exist, differences in standard track gauges, loading gauges and electrical sys-

tems still create significant differences in the degree of compatibility and cooperation between Member States. The development of combined transport calls for the adoption of additional common standards. The opening-up of public procurement is likely to strengthen the trend towards increased rationalisation. Cost reductions would also improve the competitive position of railways compared to other transport services, and favour the development of the rail vehicle industry.

Outlook

Almost 30 000 metro cars and 16 000 light rail units are expected to be delivered over the next 20 years worldwide. About half will be bought in the EC, mainly in the UK, France, the Federal Re-

public of Germany, Spain and Italy. The major market opportunities for urban rail equipment lie in the EC itself (35%) and in the USA (22%). Most of the demand is related to the need to replace existing rolling stock. Light rail demand will be located mainly in the EC (55%) and EFTA (18%) countries. The US could also be a large market, but it will depend upon federal funding, which is currently being restricted. The expansion of the markets in less developed countries also depends on funding.

UITP: Union Internationale des Transports Publics

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