

studies

Regional concentration in the countries of the European Community

The object of the study is to present up-to-date knowledge in the field of regional concentration, to examine this critically and to develop an overall conception allowing the problem to be tackled at a Community level within a coherent and global framework.

To this end, the study, after an introductory chapter on the problems which are to be considered (Chapter 1):

- gives an overall view of the situation and development of regional concentration in the Community (Chapter 2)
- draws up an inventory of results of existing scientific works and describes a series of criteria and functions related to the three domains of revenue, infrastructure and the environment which permit an understanding of the process of concentration (and deconcentration) (Chapter 3)
- examines the measures aimed at preventing further concentration movements and progressively reducing existing concentration (Chapter 4)
- proposes the drawing-up, by successive steps, of a decision-making model which would allow the Community and the Member States to tackle the problems of regional concentration in a global and coherent manner and to vary the measures to be taken in accordance with the progressive attainment of the objectives (Chapter 5)
- presents a series of proposals for a research programme notably with a view towards providing the necessary information for the implementation of the model (Chapter 6).

The study is available in German, English, French and Italian.

COMMISSION OF THE EUROPEAN COMMUNITIES

**Regional concentration
in the countries
of the European Community**

by

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1. Introduction to problems raised in the study

Divergences in the rates of economic and population growth have, in the European Community, resulted in marked regional disparities affecting almost all aspects of life. The aim of the EEC regional policy is to counteract the resulting tendencies towards an even greater inequality of living conditions. Its purpose is, therefore, not only to promote economic development in depressed areas but also to consider how to avert a further concentration of population and industry in areas which are already congested.

2. Regional concentration: situation and trend

Section 2 looks at the degree of concentration and the development of the concentration process in the countries of the Community. The analysis is carried out on the basis of cartograms. Statistical measurements of concentration would admittedly make for a more precise evaluation of degrees of concentration but a good deal of information relating to the geographical dimension of concentration is necessarily lost if the statistics are compressed into a single measurement. The geographical grid used for describing the concentration process is a regional breakdown of the countries in the EEC which is based on the STREDIF Code and represents an attempt to create regions with as uniform a surface area as possible, in the interests of data comparability. The period of investigation covers the years 1961-70.

Map 1 relates to the situation and trend at European level, and Map 2 to developments in the individual countries of the EEC, i.e. a more detailed regional breakdown is applied.

The foreseeable developments in the sectoral structure of the economy, coupled with the slowdown in the rate of population growth, will generate a heavier geographical concentration of jobs and population, and this will presumably benefit the fringe areas of concentration areas which possess good infrastructure facilities and are particularly favourably located as regards communication routes, to the detriment of rural areas.

3. The treatment of problems of regional concentration in technical literature

A great deal of empirical work, in the form of investigations into the factors determining a firm's choice of location and an individual's choice of place of residence, has been devoted to the reasons why congested areas exert such a great attraction. An analysis of the most important theoretical work carried out in this field shows that the main factors determining the regional distribution of capital are "localisation economies" and "urbanisation

economies". Empirical investigations into firms' choices of location regularly identify other parameters such as proximity to sales and supply markets, the existence of industrial estates, the availability and relative cost of labour, good transport networks, agglomeration economies and financial incentives as being particularly important. Any consideration of the scope for adjusting the regional distribution of capital must take account of the fact that around 44 % of gross investment is replacement spending and as such will always tend to be made at the existing location. Econometric surveys, such as estimation of regional investment functions for the Federal Republic of Germany (Bölting), highlight the impact of the current distribution of capital, gross output and financial incentives on the volume of gross investment.

Motives influencing individuals' choice of residence are closely related to problems affecting choice of location by firms and regional distribution of investments. The key to individuals' residential preferences is the difference in attractiveness between congested and depopulated areas, which is a function of differing employment and earnings prospects and differences in the availability of housing, schools, medical care, etc. There is also a centrifugal tendency, in congested areas themselves, for the population to drift out from the core areas and increase in the fringe areas.

Any appraisal of the concentration process must describe the effects of the process on the level of macro-economic costs and benefits. Regional policy is largely concerned with improving the quality of the environment, infrastructure facilities and economic well-being. The extent of resulting advantages and disadvantages in each region depends on how these three factors are influenced by the endowment of the region in human and capital resources.

Concentration processes can be appraised only in terms of the aggregate costs and benefits, the former being taken to mean opportunity costs. When the aggregate costs and benefits of regional concentration are analysed, the effects of an increase in the level of concentration in congested areas and contraction of areas of depopulation are then discussed.

Further concentration leads to a deterioration in the quality of the environment in congested areas while at the same time making for an improvement in the situation in outlying areas. What is important for the appraisal is the net impact of the process. However, the functional link between quality of the environment and population density, information on which is indispensable to any evaluation of net impact, has still not been properly researched.

The same is true for infrastructure facilities. Here, further concentration is harmful both for congested and depopulated areas.

If the objective of improved economic well-being is to be attained, concentration has to be assessed in terms of the marginal productivities of the labour and capital factors. Once the necessary data are obtained, these can be estimated from macro-economic production functions. Fortunately, this is an area in which the estimation of functions has already proved more successful.

Theoretical considerations and empirical tests show, as one might expect, that while the marginal productivity of labour is high and that of capital low in congested areas, the opposite is the case in rural areas.

In macro-economic terms, therefore, regional concentration of labour is indeed beneficial, but this is not true for capital. Capital should be channelled to rural areas because there it is at its most productive in terms of the national economy as a whole.

With further concentration, investment in congested areas results in a net loss to the economy as a whole, equal to the difference between the marginal productivities of capital in fringe areas and in congested areas. Conversely, greater concentration of labour yields a benefit equal to the difference between the corresponding marginal productivities. If the concentration process is checked on environmental grounds or for infrastructure reasons, the gain forgone (the opportunity costs) represents the price to be paid for improved quality of the environment and better infrastructure.

Thus, investment in rural areas not only helps to correct regional imbalances but makes an even greater income contribution than in congested areas.

The costs and benefits of possible deconcentration can be determined by inverting the points made above concerning concentration. Admittedly, the inflexible nature of the distribution of public and private capital imposes limitations on the pace of deconcentration processes. Deconcentration definitely serves to improve the quality of environment. Its effect on infrastructure facilities hinges on the degree to which available capacity is already being utilized in congested and depopulated areas. The deconcentration of capital has a favourable impact in respect of the target of improved well-being, while the opposite is the case for the deconcentration of labour.

The conclusion to be drawn from the above points is that it is not possible to say how population and economic activity should be distributed. The reason is not only that no information is available on interdependent relationships. Even if the functions were known, it is hardly likely that a specific density could be identified at which all objectives were optimally attained. Consequently, determination of the desirable degree of concentration should be based on normative threshold values for the different parameters concerned. In the long run, the construction of a model depicting the relationships described and with which the trade-offs between the objectives can be calculated is also to be recommended.

4. Measures for checking further concentration trends

Following the discussion of the relationships between the objectives and the degree of concentration, Section 4 describes the range of measures already taken in the countries of the EEC to prevent or to reduce movements towards concentration. On the basis of the distinction between indicative and mandatory planning, the measures discussed are broken into indicative and mandatory instruments.

As a rule, indicative measures, that is to say subsidies and taxes, are to be preferred since they still permit fine-tuning through the mechanism of the market.

If the right "mix" is to be achieved, information is needed on the functional parameters of incentives and disincentives. In particular, attempts should be made to produce a sectoral breakdown. Mandatory measures (investment

prohibitions) can, it is true, prevent further concentration, but offer no guarantee that the relevant investments will in the end be made in the desired place.

Measures to prevent new investments in existing congested areas have already been taken - with varying degrees of success - in France, the United Kingdom, Italy and the Netherlands. In addition, the attempts to promote deconcentration have, in France, for example, been extended to existing capital investments. In several countries too, government departments are also being moved away from major concentration areas to ease congestion.

No Member State is at the present time implementing measures to prevent people from moving to congested areas (apart from attempts to limit the influx of migrants from non-member countries). A better approach to the problem would probably be to aim at making rural areas more attractive.

5. Community policy: targets and instruments

Section 5 puts forward a proposal for the provision of a theoretical basis for an intensified and co-ordinated policy on the regional transfer of resources. It is recommended that this be done in five stages, partly overlapping or coinciding:

- Specification of the targets of European regional policy by fixing ideal values for social indicators

The setting of threshold values should enable the targets which are to be achieved during the regional development process to be fixed for the different areas making up the EEC.

As regards economic well-being, the quality of the environment and infrastructure facilities, proposals for upper and lower limits for social indicators are made. These values are to be regarded as constituting the first step in an iterative target-finding process.

- Specification of target conflicts and target harmony relationships by means of a model and identification of trade-offs between targets.

During a second stage of development of EEC regional policy, a regional policy decision-making model should be constructed on the basis of indicators and should be used to ascertain the interrelationships between the targets and to simulate the effect which differing target levels would have on the attainment of other targets. The structure given, by way of an example, is that of a model constructed in connection with the preparation of the first Federal Republic Planning Programme in the Federal Republic of Germany. It shows, in the form of equations and inequalities, targets and relationships between targets for the promotion and maintenance of the regional structure of the economy (demand and production conditions, conditions governing industry structure, income conditions, etc.), for the maintenance of a balanced social structure, for economic stability and full employment and also for the quality of the environment and of

infrastructure. A similar model should also be used in connection with European regional policy as a decision-making aid in the preparation of a co-ordinated deconcentration policy because this is the only way to analyse the effects which a decision will have before the decision is taken.

- Specification of the "target-means" relationships

During a third stage, the "target-means" relationship should be introduced. Use of the instruments available can be co-ordinated with the help of a regional policy decision-making model, if the instrument variables are also incorporated and if these variables are linked to the target variables by functions which describe the impact of these instruments.

In this way it will be possible to determine the right "mix" of the instrument variables and to check whether or not the measures taken will be successful. The model described needs to be amplified, for instance, by introducing equations describing the effects of such instrument variables as subsidies on private capital investment and also to incorporate relationships between infrastructure and migratory flows or the employment of labour.

- Choice of suitable instruments

The instrument variables that the EEC can use must be selected from the list of possible instrument variables. These include, for measures to be taken in congested areas, a system of investment levies, as well as authorization procedures. For constitutional reasons, restrictive measures to reduce population concentration are ruled out. In any case, a policy of deconcentration must be backed up by measures to make underdeveloped areas more attractive. Such measures include the granting of subsidies in respect of capital investment; in addition, employment premiums may also be granted. Yet, attention ought to be focused on improving infrastructure facilities in areas of potential depopulation as a means of checking the concentration process. The direct and indirect effects of the use of these instruments can best be analysed by means of a model such as the one described above; these effects need to be identified before any decisions relating to the use of the instruments can be taken.

- The right instrument "mix" in view of the targets set

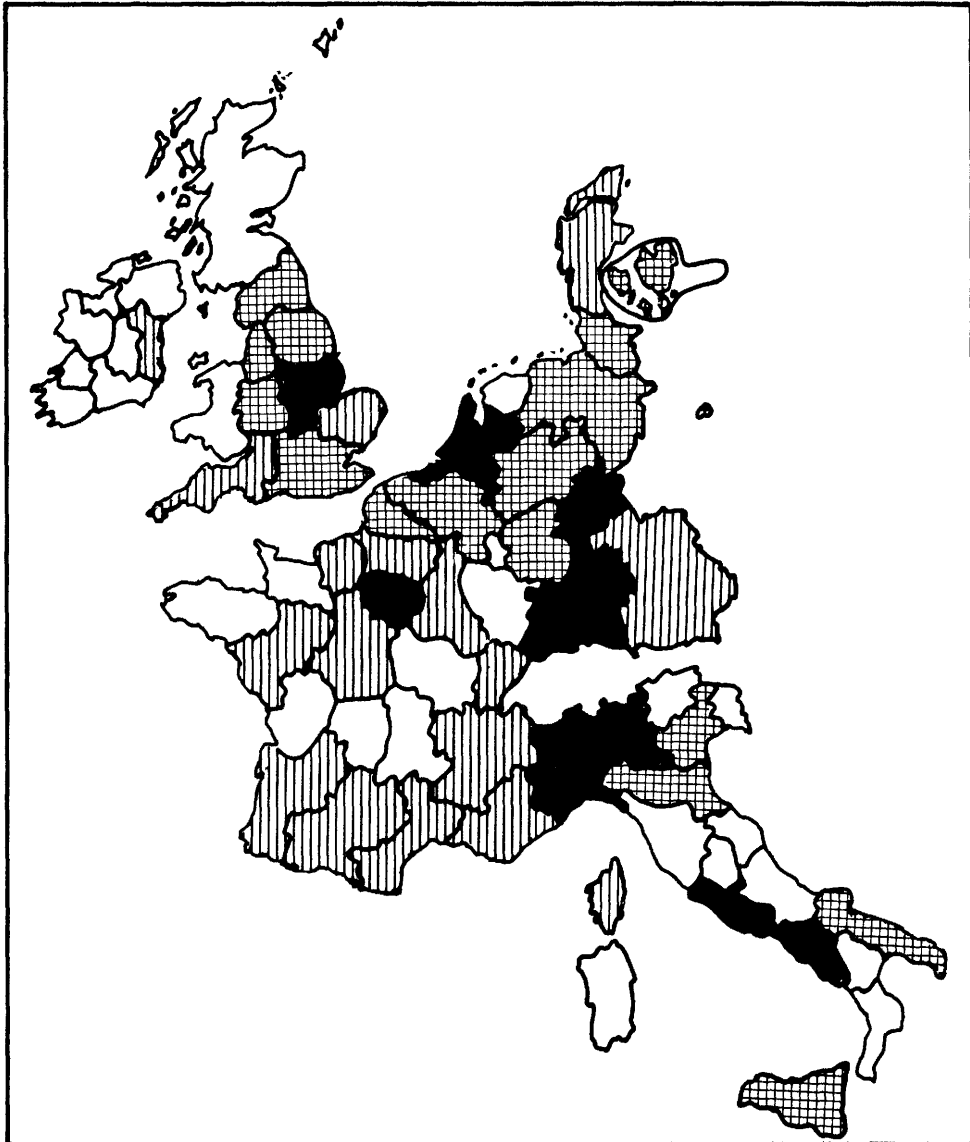
The last stage in the process of devising a complete set of instruments in preparation for the decisions to be taken relating to European regional policy would be to use the model described to establish the right "mix", given the targets set. In spite of the lack of data and tested hypotheses, completion of this last stage should be the ultimate aim of moves to prepare objective bases for regional policy decisions at European level.

6. Proposed subjects for further studies

Section 5 not only describes the steps that need to be undertaken to improve the decision-making bases but also contains guidelines for co-ordinating research appropriations set aside for European regional policy. Research should in future take the form of purpose-oriented co-ordinated efforts to fashion individual parts which can then be gradually pieced together to form the overall mosaic of European regional development (including control measures). A model on the lines of that described in Section 5 provides the necessary conceptual framework for this gradual process. The separate parts should be regarded as subsystems of this type of overall system. The advantage of such a purpose-orientated, gradual approach to research planning in respect of European regional policy would be that it would still be possible to have an overall view of the different concentration and deconcentration processes under way while, at the same time, results would be obtained that could be used in the short term for improving the bases on which decisions are taken.

Map 1

POPULATION DENSITY AND RATE OF GROWTH OF POPULATION IN THE YEARS 1961-70
ACCORDING TO REGIONAL BREAKDOWN 2



Growth rate over EC average (8.1%, 1961-1970)



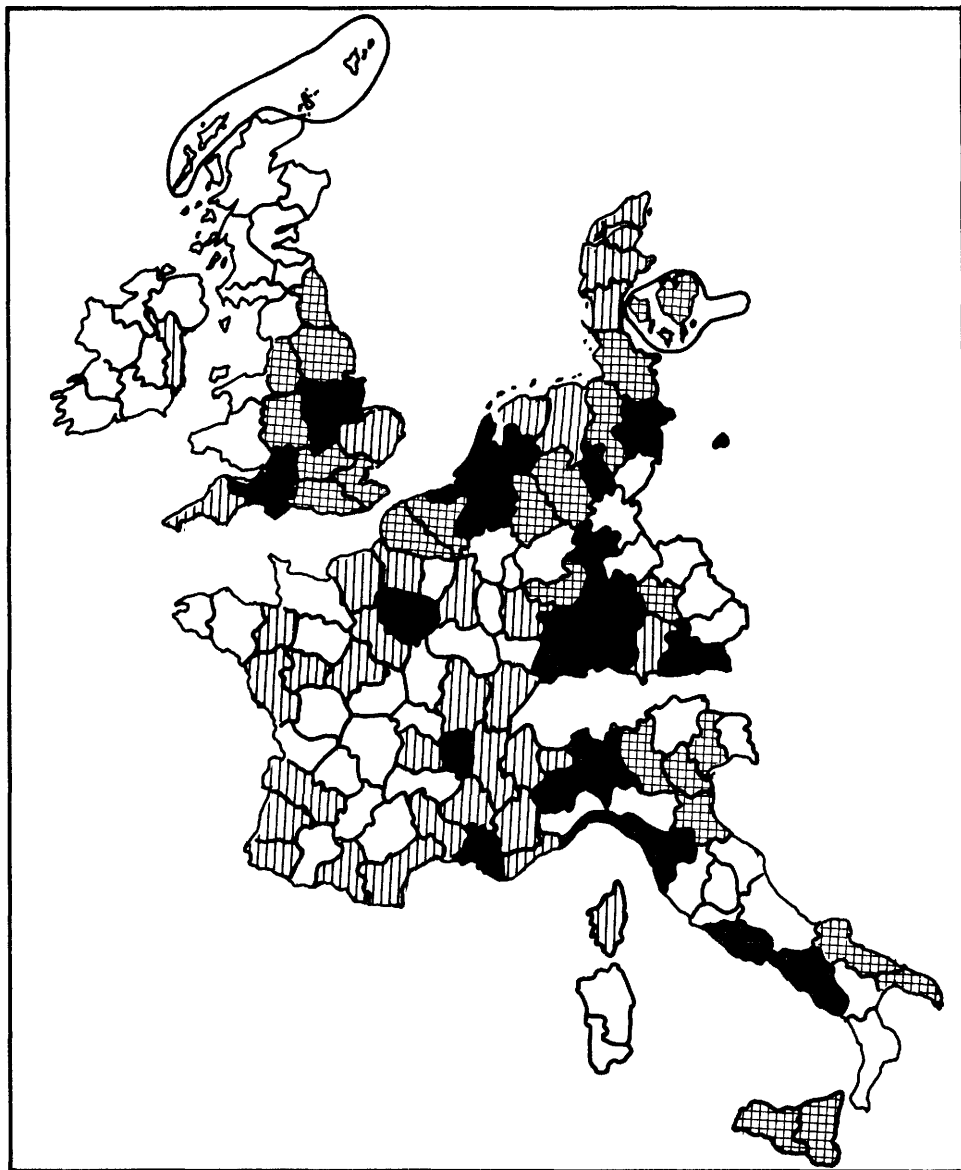
Density over EC average (160)





Density and growth rate over EC averages


Map 2

POPULATION DENSITY AND RATE OF GROWTH OF POPULATION IN THE YEARS 1961-70
ACCORDING TO REGIONAL BREAKDOWN 3



 Growth rate over EC average (8.1%, 1961-1970)

 Density over EC average (160)

 Density and growth rate over EC averages

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1. Introduction to problems raised in the study

1.1 Regional concentration as a problem of regional policy

Economic development and population growth occur at different rates in individual regions. In the past this process has taken the form of regional concentration of the population and their economic activities. This concentration has led to imbalances in regional structures, in the form of differences in growth and welfare, which are no longer tolerable. The various continually expanding areas of concentration with their environmental problems compare with areas of depopulation, principally rural in character, which are being increasingly deprived of their basis for necessary and desirable development by substantial emigration. A parallel movement is depopulation of the centres of population areas so that growth pressure in the peripheral districts of the concentration areas is becoming increasingly severe.

This development, which is the outcome of regional disparities, affects nearly all aspects of life. The disparities take the form of rising differences in regional infrastructure, skilled jobs and consequential service activity potential, in relaxation and recreational facilities and in environmental quality. The inequality of living conditions, which has increased substantially within respective Community States, will tend to become more acute unless effective measures are taken to reduce concentration.

The importance of this problem and the need for joint corrective measures was emphasised by the Heads of State and of Government of Member Countries of the enlarged Community meeting in Paris in October 1972. In their final communiqué they gave high priority to correcting structural and regional imbalances which could impede the realisation of economic and monetary union (1). They undertook to co-ordinate their regional policies and invited the Community institutions to create a Regional Development Fund whose intervention, in conjunction with national aids, should permit the correction of the main regional imbalances in the Community (2). By establishing the Fund and creating the Regional Policy Committee this commitment has since been met. The Committee also has "wide responsibility ... for Community regional policy and in particular for co-ordination between Community and national regional policy". (3)

The process of concentration imposes on European regional policy two tasks:

Assistance for economic development in the less favoured areas to create a reasonable level of income for the resident population. In this way various aid measures may be supported by effective measures to control undue regional concentration.

(1) See "Bulletin of the European Communities", 5 (1972), N° 10, p. 19

(2) See *idem* p. 19 f

(3) See Commission of the European Communities, 1st annual report on the activity of the European Regional Development Fund (1975) (COM(76)307 final) - Brussels, 23 June 1976, p. 5

Deconcentration is considered as an essential task for regions with a high population density and level of economic activity. The clear consequences of concentration in the main areas of urban congestion suggest that measures to prevent further concentration and on behalf of decentralisation are not only in the interest of depopulated areas but also in the interest of the concentration areas themselves (1). In this connection consideration has to be given to the situation of the environment, of infrastructure and of economic potential.

If measures are sought to influence the process of concentration, the regional distribution of activities must be conceived as part of the development process, which can be influenced by way of control and canalising growth and decline of regions. Statistical information is needed as guidance material for the form and extent of measures to be taken; this indicates the situation, at any given time, of the concentration process by comparison with other regions. Statistics can either be represented diagrammatically or by frequency distributions. A comparison between two moments in time will then show whether the concentration process has increased in speed or slowed down.

If the indicators are more evenly distributed over the regions of Member Countries of the European Communities, we would then confirm that deconcentration was taking place. The corresponding frequency distribution would then move in the direction of equal distribution. However, it should be noted that a frequency distribution as such is still not satisfactory evidence since it will not show the position of areas of concentration or if they are close together.

1.2 Problems in selecting regional units as a reference basis for establishing the level of concentration

It is of decisive importance, in making a sound regional comparison of the levels of concentration, that the surface areas of the regions selected should be of approximately the same size. If this is not the case, comparison between regions has substantial limitations since consequential levelling will in each case have a considerably different effect in proportion to the size of the region.

It is not the intention in this work to conduct an enquiry into small regions, down to the areas of individual towns. At European level, it is much more appropriate to consider towns together with their neighbourhood areas.

Any investigation of regional statistics for the European Community will generally be based on the so-called European basic regions as regional units. However, they differ considerably as to surface area and must therefore be treated with great reserve for any analysis of concentration. For instance, the surface area of the largest region, which is Scotland, is 78,770 km², this is 200 times as large as Bremen, the smallest region, with an area of some 400 km². With such a very wide difference in area of the European basic regions it is impossible to draw a valid comparison between regions on

(1) C.f. Commission of the European Communities, Report on the regional problems in the enlarged Community (COM(73) 550 final), Brussels, 3 May 1973, p. 5 ff.

measurement figures for regional concentration. For Community regional statistics, there is need for a division more appropriate to the requirements of European regional policy.

As the annexed maps 1a - 1c, taken from the report on regional planning of the Federal Government (1), indicate, the use of such heterogeneous regional units will lead to mistakes in the assessment of concentration. In order to raise the level of accuracy of regional comparisons the relatively small basic regions must be considered together while the relatively large regions must be sub-divided so that units for regional analysis are of approximately the same surface area. If politico-administrative limits are retained, it will also be impossible to form regions of identical size.

The smaller the demarcation of regional units, the clearer will population development poles be revealed. Contrariwise, an enlargement of the regional units will produce a levelling of differences. The larger the regional divisions, selected as a basis for fixing the level of concentration, the smaller will be the number of confirmed differences between regions. It is therefore desirable that the regional grid, used for the enquiry, should not have too wide a mesh so that regional differences in regional distribution can be clarified and not sidetracked by means of widely drawn demarcation lines. On the other hand, it is also meaningless to select very small units as a basis of reference since within the European framework attention cannot be given reasonably to every small pocket of overcrowding; moreover it is not the task of the research to consider purely urban problems.

A compromise must therefore be found for the number and size of regions chosen i.e. a decision must be made between greater visual potential (by using large units) and greater accuracy (by way of sub-division). The need is however irrefutable that regions, subject to an analysis of concentration, must be of approximately the same size. This principle must also necessarily be reflected in some revision of European regional statistics.

There must, then, exist the same reference data for each regional unit with regard to population and/or infrastructure to ensure comparison over a period of time. A comparison over a period of time of indicator-values in individual regions furnishes details of the process of concentration over the survey period. To avoid unnecessary confusion, a regional division will be selected for analysing the actual development of concentration in this survey, based on the series of regions established by the Netherlands Economic Institute (2).

This division will subsequently be called the "STREDIF Code" division. This division does not, unfortunately, comply with the requirements of approximately identical surface areas for regional units formed. For this work a number of changes are proposed to establish greater uniformity of regional sizes. At the lowest level the endeavour will be made to establish

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- (1) See Regional Planning Report 1974, passages on "regional planning" by the Federal Minister for regional planning, building and urban development, Bd. 06.004.
 - (2) Netherlands Economisch Instituut: Population by region and employment by region and industry in the European Community and its neighbouring countries 1950 - 1960 - 1970. Main report, Rotterdam 1975, pages 21 ff.

regions, so far as possible, of 10 000 km². The selected series of regions is illustrated in Table I and maps 2 and 3.

1.3 Partial technical aspects of concentration

The overall complex of regional concentration contains a number of subaspects. They include, in particular, concentration of population, working population, jobs, capital investments, the social product and income. These various aspects of regional concentration are interdependent. To obtain an impression of the overall complex of regional concentration, it would be desirable, as far as possible, to show all subaspects of regional concentration by way of indicators. Available statistics at European level do not provide more than a comparison of population concentration. Data for other fields within the selected regional level are not adequate.

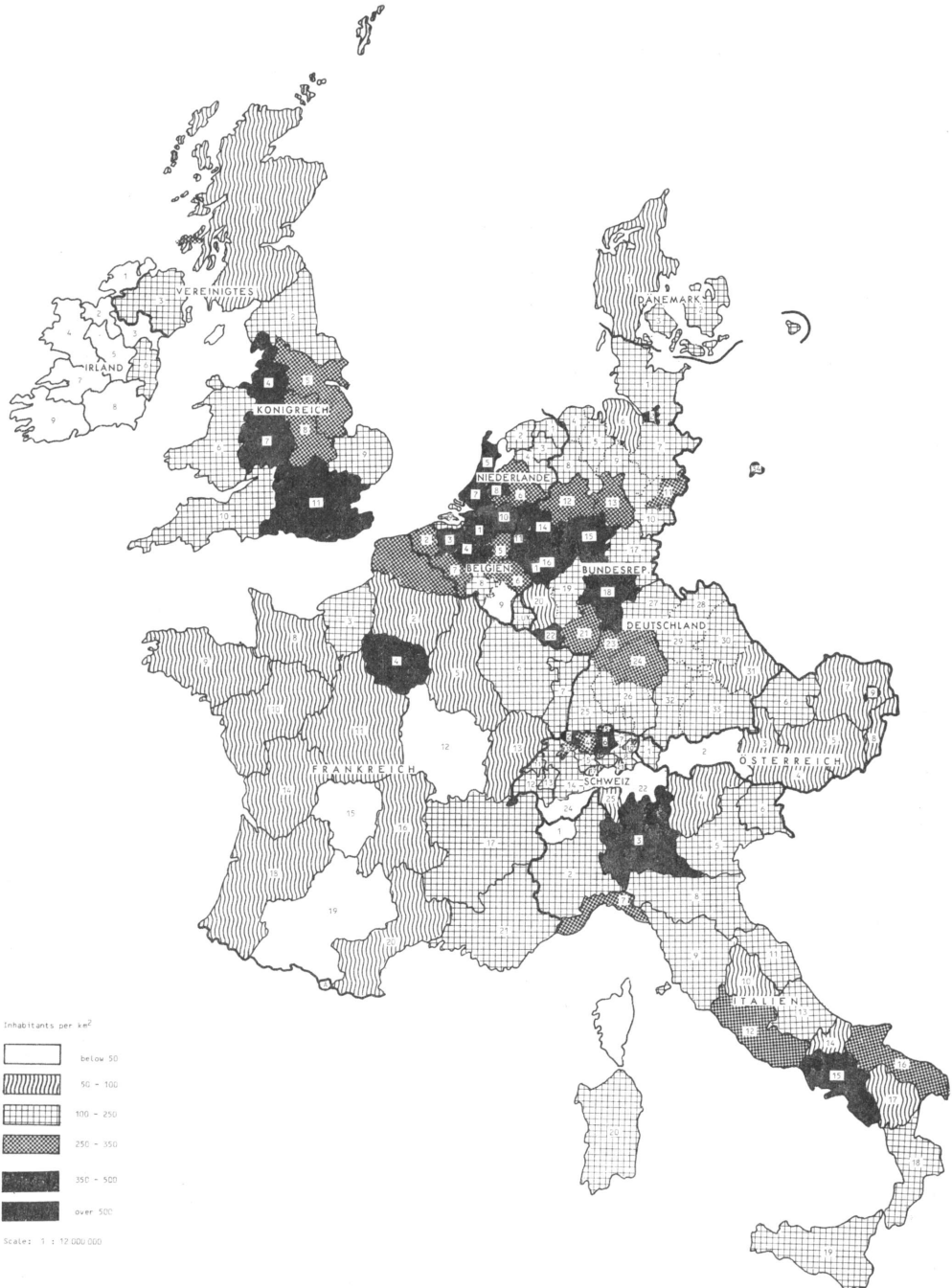
1.4 Presentation potential of regional concentration

There are several possible ways of representing regional concentration. Individual methods vary according to their level of accuracy, information content and level of visual presentation.

The most accurate form of measuring the level of concentration and its changes consists in calculating the level of concentration according to statistics. Such measurement includes, however, no further information on the geographical situation of congested areas and depopulated areas. For example, concentration measurements indicate accurately whether concentration in a given country has risen or fallen but do not reveal where changes took place. Additional graphical presentation is therefore needed.

Presentation by means of maps is a much clearer method. There one sees at once which subregions are especially relevant and if individual areas of congestion are close together or scattered. Map presentation shows if areas of high overcrowding are adjacent and if larger areas of concentration form at European level or if individual areas of concentration are separated from each other. It can also be perceived whether concentration occurs along a development axis. More informative presentation of regional development is secured through maps with some small loss of accuracy since visual presentation has to be established by way of categories; and these obscure precise details.

Map 1a
Population density in western European countries 1972
(Austria 1971)



Sources: Abstracts of Regional Statistics Nr. 9, 1973, Tab. 3. — Annuaire statistique de la Belgique, Bd. 93, 1973, Tab. 25. — Annuario statistico italiano 1973, S. 2 ff, 15. — Bericht über die regionalen Probleme in der erweiterten EG, Brüssel 1973, S. 84. — Statist. Bundesamt (Hrsg.): Fachserie A: Bevölkerung und Kultur, Reihe 1, III, 31.12.1972. — Les Collections de l'INSEE, R 14, 1973. — Statist. Jahrbuch für die Bundesrepublik Deutschland 1973. — Statist. Jahrbuch der Schweiz 1973, S. 14, 117. Statist. Handbuch für die Republik Österreich 1973, Tab. 2.05. — Statesman's Yearbook 1973/74. — Regionaal statistisch zakboek 1972.

Karte zum Raumordnungsbericht 1974 der Bundesregierung, bearbeitet in der Bundesforschungsanstalt für Landeskunde und Raumordnung

Map 1a

REGIONALE GLIEDERUNG

BELGIEN

Provinces

- 1 Antwerpen
- 2 West-Vlaanderen
- 3 Oost-Vlaanderen
- 4 Brabant
- 5 Limburg
- 6 Liège
- 7 Hainaut
- 8 Namur
- 9 Luxemburg

BUNDESREPUBLIK DEUTSCHLAND

Länder, Regierungsbezirke

- 1 Schleswig-Holstein
- 2 Hamburg
- 3 Bremen
- 4 Aurich
- 5 Oldenburg
- 6 Stade
- 7 Lüneburg
- 8 Osnabrück
- 9 Hannover
- 10 Hildesheim
- 11 Braunschweig
- 12 Münster
- 13 Detmold
- 14 Düsseldorf
- 15 Arnsberg
- 16 Köln
- 17 Kassel
- 18 Darmstadt
- 19 Koblenz
- 20 Trier
- 21 Rhein Hessen-Pfalz
- 22 Saarland
- 23 Nordbaden
- 24 Nordwürttemberg
- 25 Südbaden
- 26 Süd württemberg-Hohenzollern
- 27 Unterfranken
- 28 Oberfranken
- 29 Mittelfranken
- 30 Oberpfalz
- 31 Niederbayern
- 32 Schwaben
- 33 Oberbayern
- 34 Berlin (West)

DÄNEMARK

Landesteile

- 1 Jylland
- 2 Sjælland
- 3 Fyn

FRANKREICH

Régions de programme

- 1 Nord
- 2 Picardie
- 3 Haute-Normandie
- 4 Région parisienne
- 5 Champagne-Ardenne
- 6 Lorraine
- 7 Alsac
- 8 Basse-Normandie
- 9 Bretagne
- 10 Pays de la Loire
- 11 Centre
- 12 Bourgogne
- 13 Franche-Comté
- 14 Poitou-Charentes
- 15 Limousin
- 16 Auvergne
- 17 Rhône-Alpes
- 18 Aquitaine
- 19 Midi-Pyrénées
- 20 Languedoc-Roussillon
- 21a Provence-Côte d'Azur
- b Corse

IRLAND

Planning Regions

- 1 Donegal
- 2 North West
- 3 North East
- 4 West
- 5 Midlands
- 6 East
- 7 Mid West
- 8 South East
- 9 South West

ITALIEN

Regioni

- 1 Valle d'Aosta
- 2 Piemonte
- 3 Lombardia
- 4 Trentino-Alto Adige
- 5 Veneto
- 6 Friuli-Venezia Giulia
- 7 Liguria
- 8 Emilia-Romagna
- 9 Toscana
- 10 Umbria
- 11 Marche
- 12 Lazio
- 13 Abruzzi
- 14 Molise
- 15 Campania
- 16 Puglia
- 17 Basilicata
- 18 Calabria
- 19 Sicilia
- 20 Sardegna

LUXEMBURG

Staatsgebiet insgesamt

NIEDERLANDE

Provincies

- 1 Groningen
- 2 Friesland
- 3 Drenthe
- 4 Overijssel
- 5 Noord-Holland
- 6 Gelderland
- 7 Zuid-Holland
- 8 Utrecht
- 9 Zeeland
- 10 Noord-Brabant
- 11 Limburg

ÖSTERREICH

Bundesländer

- 1 Vorarlberg
- 2 Tirol
- 3 Salzburg
- 4 Kärnten
- 5 Steiermark
- 6 Oberösterreich
- 7 Niederösterreich
- 8 Burgenland
- 9 Wien

SCHWEIZ

Kantone

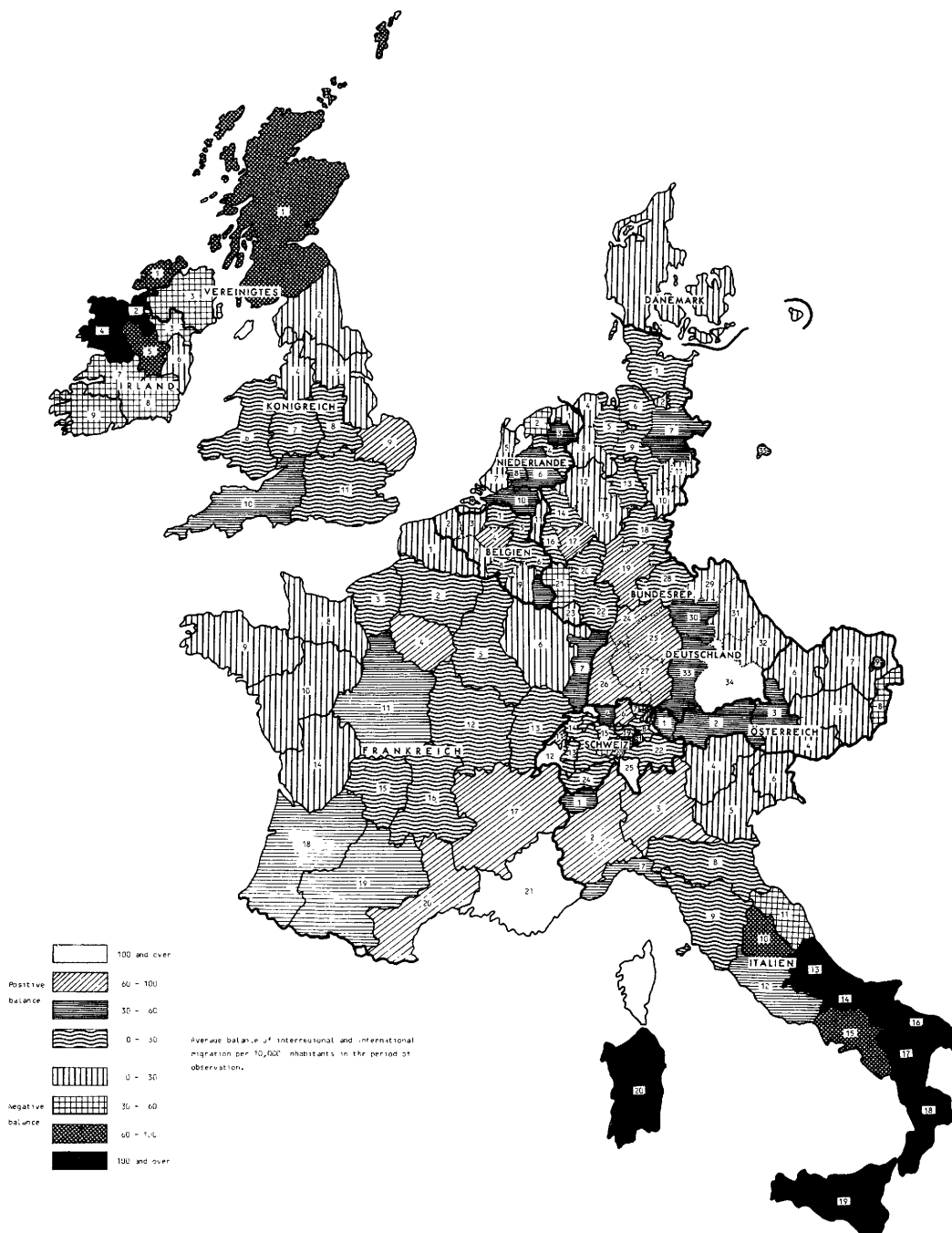
- 1 Basel-Stadt
- 2 Basel-Landschaft
- 3 Solothurn
- 4 Aargau
- 5 Schaffhausen
- 6 Zürich
- 7 Thurgau
- 8 Sankt Gallen
- 9 Appenzell A.Rh.
- 10 Appenzell I.Rh.
- 11 Neuchâtel
- 12 Vaud
- 13 Fribourg
- 14 Bern
- 15 Luzern
- 16 Obwalden
- 17 Nidwalden
- 18 Zug
- 19 Schwyz
- 20 Uri
- 21 Glarus
- 22 Graubünden
- 23 Genève
- 24 Valais
- 25 Ticino

VEREINIGTES KÖNIGREICH

New Standard Regions

- 1 Scotland
- 2 North
- 3 Northern Ireland
- 4 North West
- 5 Yorkshire and Humberside
- 6 Wales
- 7 West Midlands
- 8 East Midlands
- 9 East Anglia
- 10 South West
- 11 South East

Map 1b
Gross regional product in the European Communities 1970



Source: Bericht über die regionalen Probleme in der erweiterten Gemeinschaft, Brüssel 1973, S. 60 a.

Karte zum Raumordnungsbericht 1974 der Bundesregierung, bearbeitet in der Bundesforschungsanstalt für Landeskunde und Raumordnung

Map 1b

REGIONALE GLIEDERUNG

BELGIEN

Provincies

- 1 Antwerpen
- 2 West-Vlaanderen
- 3 Oost-Vlaanderen
- 4 Brabant
- 5 Limburg
- 6 Liège
- 7 Hainaut
- 8 Namur
- 9 Luxembourg

BUNDESREPUBLIK DEUTSCHLAND

Länder, Regierungsbezirke

- 1 Schleswig-Holstein
- 2 Hamburg
- 3 Bremen
- 4 Aurich
- 5 Oldenburg
- 6 Stade
- 7 Lüneburg
- 8 Osnabrück
- 9 Hannover
- 10 Hildesheim
- 11 Braunschweig
- 12 Münster
- 13 Detmold
- 14 Düsseldorf
- 15 Arnsberg
- 16 Aachen
- 17 Köln
- 18 Kassel
- 19 Darmstadt
- 20 Koblenz
- 21 Trier
- 22 Rheinhessen-Pfalz
- 23 Saarland
- 24 Nordbaden
- 25 Nordzürnttemberg
- 26 Südbaden
- 27 Südwürttemberg-Hohenzollern
- 28 Unterfranken
- 29 Oberfranken
- 30 Mittelfranken
- 31 Oberpfalz
- 32 Niederbayern
- 33 Schwaben
- 34 Oberbayern
- 35 Berlin (West)

DÄNEMARK

Landesteile

- 1 Jylland
- 2 Sjælland
- 3 Fyn

FRANKREICH

Régions de programme

- 1 Nord
- 2 Picardie
- 3 Haute-Normandie
- 4 Région parisienne
- 5 Champagne-Ardenne
- 6 Lorraine
- 7 Alsac
- 8 Basse-Normandie
- 9 Bretagne
- 10 Pays de la Loire
- 11 Centre
- 12 Bourgogne
- 13 Franche-Comté
- 14 Poitou-Charentes
- 15 Limousin
- 16 Auvergne
- 17 Rhône-Alpes
- 18 Aquitaine
- 19 Midi-Pyrénées
- 20 Languedoc-Roussillon
- 21 Provence-Côte d'Azur et Corse

IRLAND

Planning Regions

- 1 Donegal
- 2 North West
- 3 North East
- 4 West
- 5 Midlands
- 6 East
- 7 Mid West
- 8 South East
- 9 South West

ITALIEN

Regional

- 1 Valle d'Aosta
- 2 Piemonte
- 3 Lombardia
- 4 Trentino-Alto Adige
- 5 Veneto
- 6 Friuli-Venezia Giulia
- 7 Liguria
- 8 Emilia-Romagna
- 9 Toscana
- 10 Umbria
- 11 Marche
- 12 Lazio
- 13 Abruzzi
- 14 Molise
- 15 Campania
- 16 Puglia
- 17 Basilicata
- 18 Calabria
- 19 Sicilia
- 20 Sardegna

LUXEMBURG

Staatsgebiet insgesamt

NIEDERLANDE

Provincies

- 1 Groningen
- 2 Friesland
- 3 Drenthe
- 4 Overijssel
- 5 Noord-Holland
- 6 Gelderland
- 7 Zuid-Holland
- 8 Utrecht
- 9 Zeeland
- 10 Noord-Brabant
- 11 Limburg

ÖSTERREICH

Bundesländer

- 1 Vorarlberg
- 2 Tirol
- 3 Salzburg
- 4 Kärnten
- 5 Steiermark
- 6 Oberösterreich
- 7 Niederösterreich
- 8 Burgenland
- 9 Wien

SCHWEIZ

Kantone

- 1 Basel-Stadt
- 2 Basel-Landschaft
- 3 Solothurn
- 4 Aargau
- 5 Schaffhausen
- 6 Zürich
- 7 Thurgau
- 8 Sankt Gallen
- 9 Appenzell A.Rh.
- 10 Appenzell I.Rh.
- 11 Neuchâtel
- 12 Val d'Aoste
- 13 Fribourg
- 14 Bern
- 15 Luzern
- 16 Obwalden
- 17 Nidwalden
- 18 Zug
- 19 Schwyz
- 20 Uri
- 21 Glarus
- 22 Graubünden
- 23 Genève
- 24 Valais
- 25 Ticino

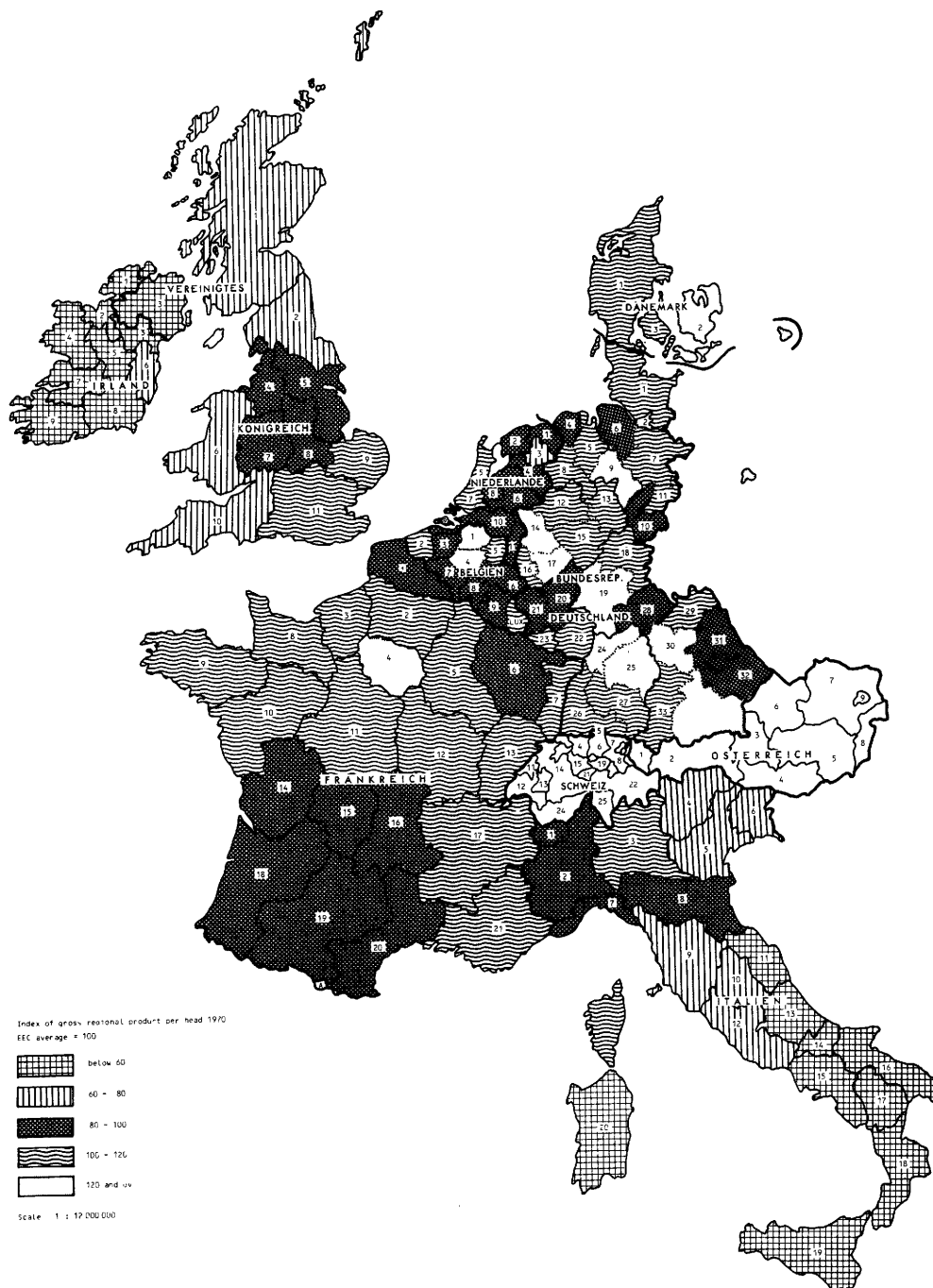
VEREINIGTES KÖNIGREICH

New Standard Regions

- 1 Scotland
- 2 North
- 3 Northern Ireland
- 4 North West
- 5 Yorkshire and Humberside
- 6 Wales
- 7 West Midlands
- 8 East Midlands
- 9 East Anglia
- 10 South West
- 11 South East

Map 1c

Migration in western European countries 1960-1970



1960-1970: Belgien, Frankreich, Luxemburg, Niederlande
1961-1970: Bundesrepublik Deutschland, Dänemark, Schweiz,
Vereinigtes Königreich

1961-1971: Italien, Österreich
1966-1971: Irland

Sources: Belgien, Frankreich, Luxemburg, Niederlande: SAEG (Hrsg.): Regionalstatistik 1972, Tab. 1-3. — Bundesrepublik Deutschland: Statist. Bundesamt (Hrsg.): Bevölkerung und Kultur, Volkszählung 27.5.1970, H. 5. — Dänemark: Statistisk Aarbog 1973, Tab. 23. — Irland, Vereinigtes Königreich: Bericht über die regionalen Probleme in der erweiterten EG, Brüssel 1973, S. 82, 87. — Italien: Annuario di statistiche provinciali 1973, S. 43. — Österreich: Statist. Handbuch für die Republik Österreich 1972, Tab. 2.03. — Schweiz: Statist. Jahrbuch der Schweiz 1971, S. 72 und schriftl. Mitteilung des Eidgenöss. Statist. Zentralamts.

Map 1c

REGIONALE GLIEDERUNG

BELGIEN

Provinces

- 1 Antwerpen
- 2 West-Vlaanderen
- 3 Ost-Vlaanderen
- 4 Brabant
- 5 Limburg
- 6 Liège
- 7 Hainaut
- 8 Namur
- 9 Luxembourg

BUNDESREPUBLIK DEUTSCHLAND

Länder, Regierungsbezirke

- 1 Schleswig-Holstein
- 2 Hamburg
- 3 Bremen
- 4 Aurich
- 5 Oldenburg
- 6 Stade
- 7 Lüneburg
- 8 Osnabrück
- 9 Hannover
- 10 Hildesheim
- 11 Braunschweig
- 12 Münster
- 13 Detmold
- 14 Düsseldorf
- 15 Arnsberg
- 16 Aachen
- 17 Köln
- 18 Kassel
- 19 Darmstadt
- 20 Koblenz
- 21 Trier
- 22 Rheinhessen-Pfalz
- 23 Saarland
- 24 Nordbaden
- 25 Nordwürttemberg
- 26 Südbaden
- 27 Südwürttemberg-Hohenzollern
- 28 Unterfranken
- 29 Oberfranken
- 30 Mittelfranken
- 31 Oberpfalz
- 32 Niederbayern
- 33 Schwaben
- 34 Oberbayern
- 35 Berlin (West)

DANEMARK

Staatsgebiet insgesamt

FRANKREICH

Régions de programme

- 1 Nord
- 2 Picardie
- 3 Haute-Normandie
- 4 Région parisienne
- 5 Champagne-Ardenne
- 6 Lorraine
- 7 Alsac
- 8 Basse-Normandie
- 9 Bretagne
- 10 Pays de la Loire
- 11 Centre
- 12 Bourgogne
- 13 Franche-Comité
- 14 Poitou-Charentes
- 15 Limousin
- 16 Auvergne
- 17 Rhône-Alpes
- 18 Aquitaine
- 19 Midi-Pyrénées
- 20 Languedoc-Roussillon
- 21 Provence-Côte d'Azur et Corse

IRLAND

Planning Regions

- 1 Donegal
- 2 North West
- 3 North East
- 4 West
- 5 Midlands
- 6 East
- 7 Mid West
- 8 South East
- 9 South West

ITALIEN

Regioni

- 1 Valle d'Aosta
- 2 Piemonte
- 3 Lombardia
- 4 Trentino-Alto Adige
- 5 Veneto
- 6 Friuli-Venezia Giulia
- 7 Liguria
- 8 Emilia-Romagna
- 9 Toscana
- 10 Umbria
- 11 Marche
- 12 Lazio
- 13 Abruzzi
- 14 Molise
- 15 Campania
- 16 Puglia
- 17 Basilicata
- 18 Calabria
- 19 Sicilia
- 20 Sardegna

LUXEMBURG

Staatsgebiet insgesamt

NIEDERLANDE

Provincies

- 1 Groningen
- 2 Friesland
- 3 Drenthe
- 4 Overijssel
- 5 Noord-Holland
- 6 Gelderland
- 7 Zuid-Holland
- 8 Utrecht
- 9 Zeeland
- 10 Noord-Brabant
- 11 Limburg

ÖSTERREICH

Bundesländer

- 1 Vorarlberg
- 2 Tirol
- 3 Salzburg
- 4 Kärnten
- 5 Steiermark
- 6 Oberösterreich
- 7 Niederösterreich
- 8 Burgenland
- 9 Wien

SCHWEIZ

Kantone

- 1 Basel-Stadt
- 2 Basel-Landschaft
- 3 Solothurn
- 4 Aargau
- 5 Schaffhausen
- 6 Zurich
- 7 Thurgau
- 8 Sankt Gallen
- 9 Appenzell A.Rh.
- 10 Appenzell I.Rh.
- 11 Neuchâtel
- 12 Vaud
- 13 Fribourg
- 14 Bern
- 15 Luzern
- 16 Obwalden
- 17 Nidwalden
- 18 Zug
- 19 Schwyz
- 20 Uri
- 21 Glarus
- 22 Graubünden
- 23 Genève
- 24 Valais
- 25 Ticino

VEREINIGTES KÖNIGREICH

New Standard Regions

- 1 Scotland
- 2 North
- 3 Northern Ireland
- 4 North West
- 5 Yorkshire and Humberside
- 6 Wales
- 7 West Midlands
- 8 East Midlands
- 9 East Anglia
- 10 South West
- 11 South East

Map 2

REGIONAL CLASSIFICATION 2 (FOUR DIGITS)



Table 1

Systematic plan of regions (1)

Country	Reg. Cl. 1	Reg. Cl. 2	Reg. Cl. 3	Name	
11	111 113	1110	11100	<u>F.R. GERMANY</u> Schleswig-Holstein/Hamburg	
		1130		Niedersachsen/Bremen	
	115	1150		11301	Aurich/Oldenburg/Osnabrück
				11302	Stade/Bremen/Hannover
				11303	Lüneburg
				11304	Hildesheim/Braunschweig
					Nordrhein-Westfalen
	116	1160		11501	Münster/Arnsberg
				11502	Detmold
				11503	Düsseldorf/Köln
	117	1170		11601	Hessen Darmstadt
				11602	Kassel
	118	1180		11701	Rheinland-Pfalz/Saarland Koblenz/Trier
				11702	Rheinhessen-Pfalz/Saarland
					Baden-Württemberg
				11801	Nordbaden/Nordwürttemberg
				11802	Südbaden
	119	1190		11803	Südwestfalen
					Bayern
				11901	Oberbayern
			11902	Niederbayern	
			11903	Oberpfalz	
			11904	Oberfranken	
			11905	Mittelfranken	
			11906	Unterfranken	
110	1100		11907	Schwaben	
			11000	Berlin (West)	
12	121	1211		<u>GREAT-BRITAIN</u> England	
				North	
				12111	Cumbria
				12112	Northumberland/Tyne + Wear/ Durham/Cleveland
				1212	Yorkshire and Humberside
				1213	East Midlands
				1214	East Anglia
				1215	South East
				12151	Essex/London/Kent
				12152	Hamshire/Surrey/Sussex

(1) The regional classification at steps 1 and 2 follows the STREDIF-Code in order to ensure better comparison.

Table 1 continued:

Country	Reg. Cl. 1	Reg. Cl. 2	Reg. Cl. 3	Name			
13	122	1216	12153	Berkshire/Oxfordshire/ Hertfordshire/Buckinghamshire/ Bedfordshire			
			12161	South West Cornwall/Devon			
			12162	Somerset/Dorset/Avon/ Gloucestershire/ Wiltshire			
			12170	1217	West Midlands		
			12180	1218	North West		
			123	1230	12201	1220	Wales Gwynedd/Clwyd
					12202	Dyfed/Powys/Glamorgan/Gwent	
					12301	Scotland Dumfries and Galloway	
					12302	Lothian/Borders	
					12303	Strathclyde	
					12304	Tayside/Central/Fife	
					12305	Grampian	
	12306	Highland					
	124	1240	12307	Shetland/Orkney/Western Isles			
			12400	Northern Ireland			
			<u>ITALY</u>				
			132	1311	13111	Nord Occidentale Piemonte/Valle d'Aosta/Liguria	
	13112	Novara/Vercelli/Torino					
	13113	Cuneo/Asti/Alessandria					
	13114	Valle d'Aosta Liguria					
	133	1314			13141	Lombardia Como/Varese/Milano/Pavia/ Cremona	
					13142	Sondrio/Bergamo/Brescia/Mantova	
					13210	Nord Orientale Tretino-Alto Adige	
					13211	Veneto Belluno/Treviso/Venezia	
	133	1321			13222	Vicenza/Padova/Verona/Rovigo	
					13230	Friuli-Venezia Giulia	
					13241	Emilia Romagna Piacenza/Parma/Reggio nell'Emilia/Modena	
					13242	Bologna/Ferrara/Ravenna/Forli	
			13310	Centrale Marche			
			13321	Toscana Massa Carrara/Lucca/Pistoia/ Firenze/Livorno/Pisa			
			13322	Arezzo/Siena/Grosseto			
			1332	1322			

Table 1 continued:

Country	Reg. Cl. 1	Reg. Cl. 2	Reg. Cl. 3	Name	
14	134	1333	13330	Umbria	
		1334		Lazio	
				13341	Viterbo/Rieti
				13342	Roma/Latina/Frosinone
					Meridionale e Insulare
			1341	13410	Campania
			1342	13420	Abruzzi/Molise
			1344		Puglia
				13441	Foggia/Bari
				13442	Taranto/Brindisi/Lecce
			1345	13450	Basilicata
			1346	13460	Calabria
			1347		Sicilia
				13471	Messina/Enna/Catania/ Siracusa/Ragusa
				13472	Palermo/Trapani/Agrigento/ Caltanissetta
			1348		Sardegna
				13481	Sassari/Nuoro
				13482	Cagliari/Oristano
					<u>FRANCE</u>
			141	1411	14110
		142			Bassin Parisien
			1421		Champagne-Ardenne
				14211	Ardenne/Marne
				14212	Aube/Haute-Marne
			1422		Picardie
				14221	Somme/Oise
				14222	Aisne
			1423	14230	Haute-Normandie
			1424		Centre
				14241	Eure-et-Loir/Loiret
				14242	Loir-et-Cher/Indre-et-Loire
				14243	Indre/Cher
			1425	14250	Basse-Normandie
			1426		Bourgogne
				14261	Yonne/Nièvre
				14262	Côte-d'Or/Saône-et-Loire
		143	1431	14310	Nord
		144			Est
			1441		Lorraine
				14411	Moselle/Meurthe-et-Moselle
				14412	Meuse
				14413	Vosges
			1442	14420	Alsace
		1443	14430	Franche-Comté	
	145			Ouest	
		1451		Pays de la Loire	

Table 1 continued:

Country	Reg. Cl. 1	Reg. Cl. 2	Reg. Cl. 3	Name				
15	146	1452	14511	Mayenne/Sarthe				
			14512	Maine-et-Loire				
			14513	Loire-Atlantique/Vendée				
		1453	1461	14521	Bretagne			
				14522	Finistère			
				14523	Côtes-du-Nord/Morbihan			
				14531	Ille-et-Vilaine			
				14532	Poitou-Charentes			
				14532	Deux Sèvres/Vienne			
		147	1463	1462	14611	Charente - Maritime/Charente		
					14612	Sud-Ouest		
					14613	Aquitaine		
					14614	Dordogne		
				1463	1471	14621	Gironde/Lot-et-Garonne	
	14622					Landes		
	14623					Pyrénées-Atlantiques		
	14624					Midi-Pyrénées		
	148			1481	14630	Lot/Tarn-et-Garonne		
					14630	Aveyron/Tarn		
					14630	Gers/Hautes-Pyrénées		
					14630	Haute-Garonne/Ariège		
					1472	1482	14711	Limousin
							14712	Centre-Est
		14713	Rhône-Alpes					
		14714	Rhône/Loire					
		1483	1482		14721	Ain/Isère		
					14722	Ardèche/Drôme		
					14723	Haute-Savoie/Savoie		
					14723	Auvergne		
		150	1501		14811	Allier		
					14812	Puy-de-Dôme		
	14821			Cantal/Haute-Loire				
	14822			Méditerranée				
	14823			Languedoc-Rousillon				
	14830			Lozère/Gard				
	150	1502	14830	Hérault/Aude/Pyrénées-Orientales				
			15010	Provence-Côte d'Azur				
			15020	Hautes-Alpes/Alpes-de-Haute-Provence				
			15030	Alpes-Maritimes/Var				
			15040	Vaucluse/Bouches-du-Rhône				
			15040	Corse				
	150	1503	15010	<u>NETHERLANDS</u>				
			15020	Noord				
			15030	Oost				
			15040	West				
	150	1504	15010	Zuid				
			15040	Zuid				

Table 1 continued:

Country	Reg. Cl. 1	Reg. Cl. 2	Reg. Cl. 3	Name
16	160	1600	16001 16002 16003	<u>BELGIUM</u> Antwerpen/Brabant/Limburg West Vlaanderen/Oost Vlaanderen/Hainaut Liège/Namur/Luxembourg
17	170	1701 1703	17010 17031 17032 17033	<u>DENMARK</u> Sjælland/Fyn Jylland Sønderjyllands/Ribe/Vejle Ringkøbing/Aarhus/Viborg Nordjylland
18	180	1801 1803 1804 1805 1806 1807 1809	18010 18030 18040 18050 18060 18070 18090	<u>IRELAND</u> Donegal/North West West Midlands South West South East North-East/East Mid West
19	190	1900	19000	<u>LUXEMBOURG</u>

2. Situation and development trends of regional concentration

2.1 Situation and development trend of the regional distribution of the national product

A study by J. Van Ginderachter provides information on the situation and development trend of the concentration of income per head (1). By use of the GINI-coefficients the author obtains the following results for development within individual Member Countries of the European Communities:

Table 2:

Development of Income Concentration

	<u>1960</u>	<u>1970</u>
Belgium/Luxemburg Economic Union	0.1231	0.0940
France	0.1110	0.0941
Federal Republic	0.1137	0.1093
Italy	0.2660	0.1634
Netherlands	0.0699	0.0907

This shows that concentration has only increased in the Netherlands. In all other countries there was a tendency, between 1960 and 1970, for income per head to balance. Certainly this was partly due to the results of regional policy, working under favourable economic and growth conditions. Additionally, however, Van Ginderachter suggests rightly that this favourable impression is also partly due to emigration from the depopulated areas (Mezzogiorno). This form of problem solution is naturally not within the meaning of generally accepted targets since, where possible, economic pressure to migrate should be removed altogether.

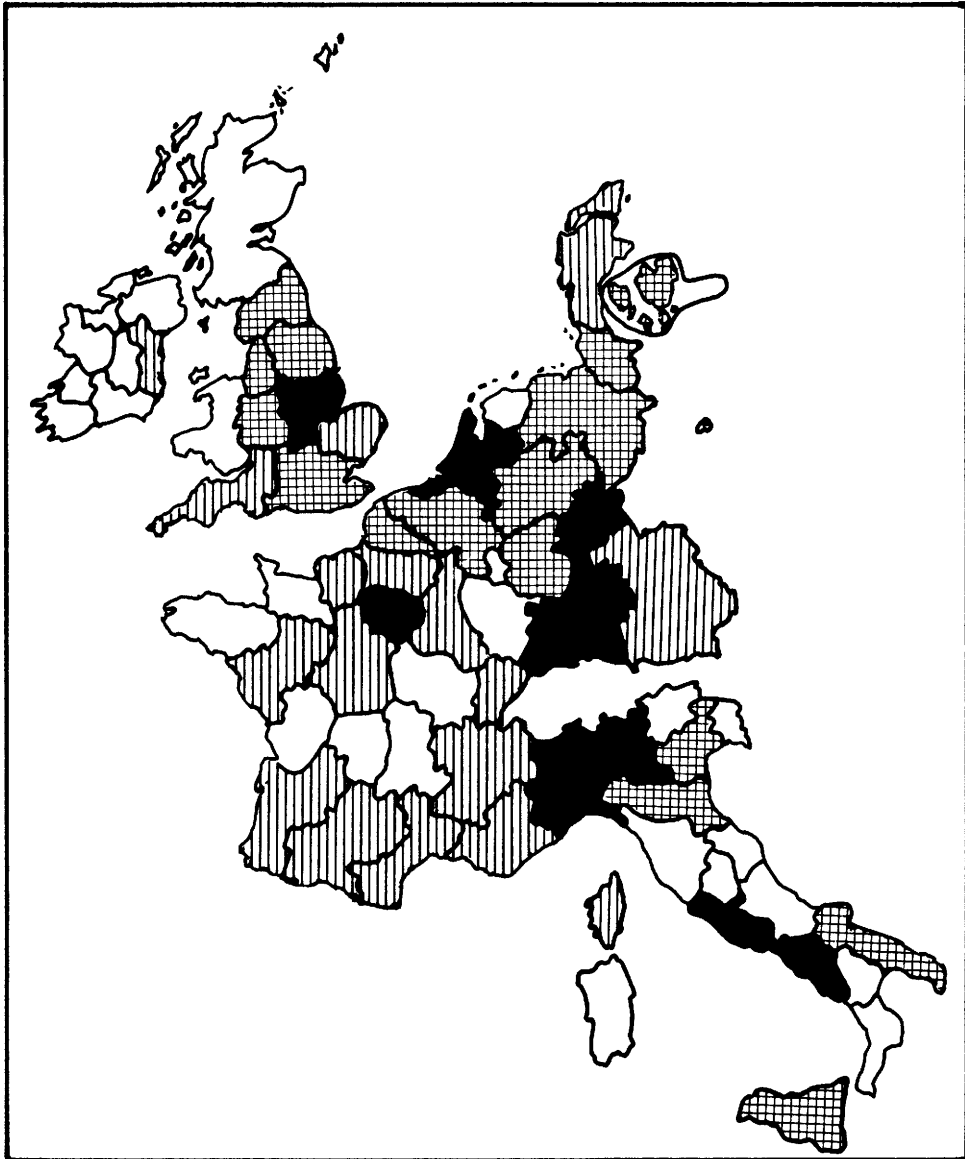
Individual regional results are presented by Van Ginderachter in the form of attached graphs. The national peak regions, namely, Hamburg, Paris, Lombardy, Brabant, South East (U.K.), East (Ireland) and Zeeland have developed less quickly than the average of all regions considered. The poorest regions, namely Stade, Corsica, Calabria/Basilicata, Limburg, Northern Ireland, Donegal and Jutland have made a more or less strong recovery.

This development could, however, have been better if regional policy had been implemented at an earlier date and with greater intensity. Clearly this rise in income per head would only have been possible provided that the input of

(1) See J. Van Ginderachter, Economic Integration and Regional Disequilibria, in: OECD, International Aspects of Regional Policies, Paris, Oct.1975,p.23

Map 4

POPULATION DENSITY AND GROWTH RATE 1961-1970



Growth rate over EC average (8.1%, 1961-1970)



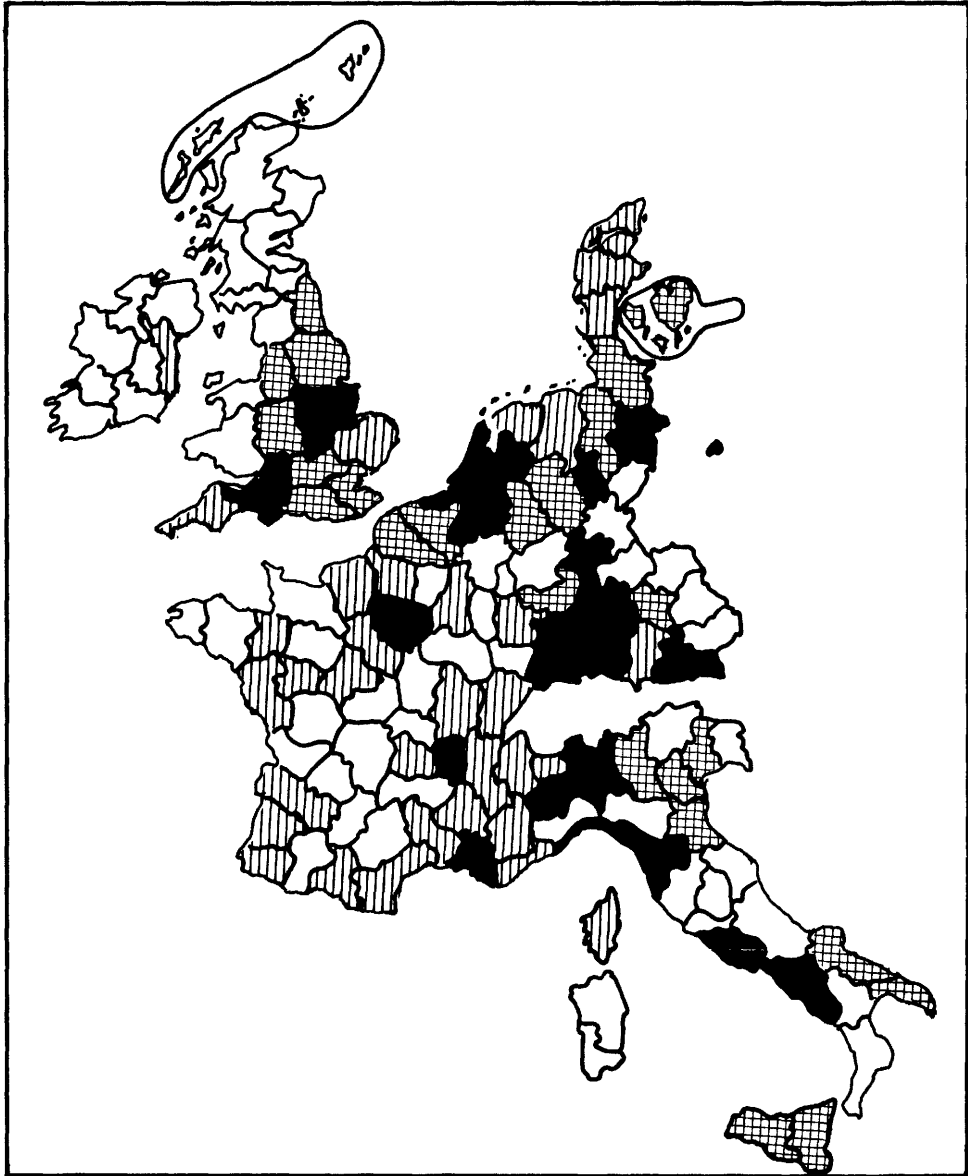
Density over EC average (160)






Density and growth rate over EC averages

Map 5

POPULATION DENSITY AND GROWTH RATE 1961-1970



-  Growth rate over EC average (8.1%, 1961-1970)
-  Density over EC average (160)
-  Density and growth rate over EC averages

capital per worker in the less favoured areas had been increased. Technical progress can be assumed to take place to the same degree in all regions. This does not, therefore, explain the tendency of incomes to become more uniform. The target increase in capital intensity is, in that context, the only indicator for the favourable development. For this reason, regional policy must go further in this direction. In particular, this also involves expansion of the share of the capital intensive sectors in total production in the less favoured areas.

2.2 Situation and development trend of the regional distribution of population

The concentration of the population would certainly increase if regions, with an already high level of population density, were to show growth rates above the average (1). If growth is the same in all regions, the level of concentration remains unchanged.

For this reason, population density and growth rates are very relevant in obtaining a general view of the situation and development trend of concentration. Tables 3 and 4 are useful in this respect. The tables and maps only differ from each other in the level of regional sub-division.

2.2.1 Concentration on a European scale

"Concentration on a European scale" is understood in this study to mean processes of concentration taking place in adjacent regions which in some cases may even belong to different countries.

The situation and development of regional concentration in the European Community are indicated in maps 4 and 5. As a reference basis the European Community average has been used, namely a population density (2) of 160 and a growth rate of 8.1 % in the period of survey 1961-1970. The somewhat rougher regional distribution in map 4 shows clearly that the main lines of concentration in Europe take the form of something like a Y. One arm runs from North England by way of London, Northern France, Belgium and the Netherlands, the other arm runs from Copenhagen through Hamburg, Lower Saxony, North Rhine Westphalia and Hesse. The two arms of the Y meet approximately in the Rhine-Main region. The foot of the Y is formed by Baden-Württemberg, Alsace and Northern Italy. The picture would be incomplete, however, without reference to a few "islands of concentration" which are also clearly revealed in map 4: Paris, Berlin and Rome and, as is often forgotten, Sicily, Naples, Apulia.

There is no unequivocal impression given by the concentration process. On the one hand, concentration has increased in the areas with a high level of density and fast growth (marked black). These areas are close to a number of

(1) Population growth/density depends, of course, on two factors, natural movements and migratory movements. Considering the aim of this study, we will only consider the resultant of these two movements without investigating the influence of each component on the overall result.

(2) The density of 160 is the mean of the figures for 1961 (154) and for 1970 (166); cf. Table 2.

areas (marked white) which were once thinly populated and are still low in population. Map 4, however, also shows that the concentration trend has in no way continued generally. Population growth rates above average are, on the contrary, found mainly in areas with below average concentration, especially in France. Below average growth appeared frequently in congested areas themselves, e.g. in Great Britain, Belgium, the Federal Republic, Italy.

Consideration of growth rates shows clearly that concentration has not increased over the whole range covered by the congested Y but that concentration and a high growth rate in a European optic have taken the form of "islands of concentration". Examples are the regions: East Midlands, Netherlands, Paris, Hesse, Alsace and Baden-Württemberg, Piedmont and Lombardy, and the coastal strip Rome-Naples.

By comparison many other areas of concentration e.g. South West England, Hamburg, Berlin, North Rhine-Westphalia, Belgium, Copenhagen have grown more slowly than the European Community average in the period under study.

A further difference in development along the main lines of concentration is illustrated by a more detailed regional division (map 5). This shows that the main lines do not present a comprehensive picture of concentration but are broken at a number of places. The most noticeable are the areas of low population density over Luxemburg, Rhineland-Palatinate to Kassel and which de facto divide the two arms of the Y from its foot. This more precise regional division could be described rather as a V figure which runs from North England over North Rhine-Westphalia and North Germany to Copenhagen. A further important result of this more precise regional sub-division is to indicate clearly and additionally the importance of the islands of growth and concentration which are Lyon, Marseille, Brussels, Munich, Hanover, Florence. This presentation also shows clearly that the gap between the most congested (black) and the least congested (white) regions has widened over the period of enquiry but that additionally the concentration and deconcentration process is indicated in a number of special development poles.

2.2.2 Concentration in individual Community States

Consideration of population density and growth shows that the concentration trend is in no way uniform. It can be explained in more detail as follows.

2.2.2.1 The Federal Republic of Germany

Leaving the special situation of Berlin on one side, it can be seen that, with an average density for Federal Länder of 244 in 1970, the figures varied between 497 in North Rhine-Westphalia and 149 in Bavaria. The highest growth rates occurred in Länder Baden-Württemberg, Hesse and Bavaria, i.e. Länder which in 1961 showed below average density. Concentration is abating.

2.2.2.2 Great Britain

England with a density of 353 is well above the Community average. With a growth rate of 5.5 % it is, however, only narrowly over the average of 4.8 %.

This major region therefore maintains its position essentially. Having regard to other regions, however, one must differentiate. On the one hand the already thinly populated regions of Scotland and Wales are losing further ground since growth rates there are only small. On the other hand, the Northern Ireland region, which is also relatively thinly populated, is growing faster than the average of Great Britain as a whole.

It is clear that population growth in England is mainly due to development in East Anglia (11.7 %) and the South West (9.6 %), i.e. regions which are relatively thinly populated. The highly concentrated South East region (596 pop/km² in 1961), which includes London, has also grown but its growth only corresponds to the national average (5.6 %).

2.2.2.3 Italy

In Italy the North West and the Centre are peak overcrowded regions. Both have above average growth rates so that concentration has increased over the study period. The lowest populated South has only a growth rate of 4.5 % compared with 13.0 % in the North West (1).

The high average growth of the Italian North West is due to both its sub-regions experiencing relatively high growth rates.

In the North East, the growth of Friuli-Venezia-Giulia is relatively low at 2.3 %. This sub-region has also only average density so that internal concentration has intensified within the region as a whole.

In the Central region of Umbria, which is thinly populated, growth has declined by 1.5 % while the Rome region has grown substantially.

Particularly remarkable is development in the South of Italy. A slightly positive growth indicates that Campania, Apulia and Sardinia are still growing while the sub-regions Abruzzi/Molise and Basilicata show absolute decline.

2.2.2.4 France

The development of concentration in France is contradictory. The average growth rate between 1960 and 1970 was 11.9 %. The greatest part of the country has a growth rate below this figure, the lowest rate is that in the West and South West which was previously relatively thinly populated. The leader, however, is not the Paris concentration region with 16.2 % growth. The Mediterranean and the Central East regions, with below average densities, had growth rates of 23.6 % and 15.4 % respectively and so improved their situation considerably.

(1) This is, however, due exclusively to the fact that there has been strong migration from the South to the North-West which has disturbed the natural tendencies of the respective populations.

A closer observation of areas of low density with high growth rates shows that development in the Mediterranean region is relatively uniform. The highest growth rate occurs in Corsica (30 %), which is substantially different from the Italian Mediterranean islands.

In the Central-East region only the sub-region Rhône-Alpes is above average and concentration is increasing substantially.

The slow development in West and South-West France is principally due to the sub-regions Poitou-Charentes and Limousin which had a low level of population previously.

2.2.2.5 Netherlands

Average growth rate is 12 %, the East region has 16.1 %, the Southern region 15.6 %. Population density in 1960 was between 209 and 333 pop/km²; the average was 313. The North with the lowest density had a growth rate of 16.3 %. By comparison the densely populated West region only showed below average growth of 10.5 %. Population concentration has therefore declined sharply though the Netherlands' population within the European framework has increased as a whole.

2.2.2.6 Belgium

Two of the three Belgian regions have densities above the Community average. One region (Brussels) has grown faster than the Community as a whole. Concentration is increasing as the growth of Brussels is accompanied by a slower rate in the other two regions.

2.2.2.7 Denmark

Development in both Danish regions has been parallel. Concentration has eased slightly since the thinly populated Jutland has experienced stronger growth.

2.2.2.8 Ireland

In Ireland only the North East/East region (with 14.8 %) is over the national average growth rate of 5.7 %. This region, which includes Dublin, had the highest density previously. The concentration process in Ireland is especially striking for three of the remaining regions have negative growth rates of 7.0, 5.1, and 2.5 %, namely Donegal, the West region and the Midlands, which with density figures of 23, 23 and 26 pop/km² are right at the end of the European scale of population density.

2.2.2.9 Luxemburg

In relation to the Community average Luxemburg has a relatively low density. Growth rates are below average; this country therefore occupies a low position with regard to concentration.

In conclusion, the trend to population concentration is in no way uniform. In the next section the task is to show how the estimated population and sectoral development could affect this trend.

2.3 Possible effects of sectoral and population development on concentration and assessment of further development

The rate of population growth in the countries of the European Community is slackening due to lower birth rates and this process will eventually lead to a decline in population. The effect of this development on concentration depends upon the regional distribution of jobs (1). The regional distribution of declining and expanding sectors and their effect on jobs and population distribution will provide new data, which will have to be taken into account in planning environmental structures.

It is not difficult to estimate the further opportunities of development for agriculture. The number of consumers of agricultural products in Europe will fall. Even if available income should rise, agricultural consumption will at best remain constant. Since, on the other hand, technical advance is especially high in agriculture an increasing number of buildings and workers will be forced out of production. Thereby the historically decisive factor in dispersed settlement, namely the proportion of agricultural production in the national product (2), is increasingly losing its meaning. The more people leave agriculture, the less urgent will become the maintenance of a narrow mesh network of farm support because care of the country-side water supply and recreation do not require so high a degree of labour as farm production. A decision will then also become more urgent as to where the decreasing number of people required by farm production in the future should be located. This question will become all the more delicate when a start is made with dismantling subsidies to farming and agricultural surpluses. It can therefore be assumed with certainty that remaining agriculture activity will be concentrated in regions with especially favourable conditions for farm and forestry production and that this will lead to a further decline in the agricultural population in many other regions.

Less clear are the prospects in the secondary (industrial) sector for, in this instance, substantial structural change must be carried out. Rogge has recently prepared a whole list of industrial branches, for which development prospects are worsening in the Federal Republic because the products from these branches in Europe are with time being exported less and are increasingly imported. Certainly a list of this kind is not necessarily applicable to other Community countries but it can be anticipated that a similar development will occur there.

(1) See R. Thoss "Planning under changed circumstances - Economic aspects" in Studies and Sessions reports of the Academy for Regional Development and Land Planning, N° 109, p. 24 ff.

(2) See E. von Böventer, Theory of regional balance, Tübingen 1962, p. 15

The more the costs of production rise in individual countries through rising wages, environmental protection costs and increases in energy costs, the more will production concentrate on branches advantaged by their locality; conversely, development prospects for other branches in Europe will become worse with rising wage costs. These are branches either producing low technology goods or high energy-consuming or polluting branches. Rogge in this context instances motor vehicle construction, machinery, the electro-technical industry, steel sheet and metal processing, the textile and clothing industry, precision and optical instruments, high quality ceramics and the raw materials industry (1). Localities with a high proportion of these branches are very cramped in their development potential if they cannot compensate development costs associated with the settlement of enterprises from branches with good development prospects. Sectors which require a high degree of service value in their products satisfy this condition. These include branches such as machine tool construction, measurement and precision instruments, computers, data processing equipment, nuclear reactors and electrotherapy equipment. Goods which are difficult to transport can also, of course, be included in this category.

The best chances lie with the services sector: Not only is demand in the private sector turning increasingly to services but also the importance of services in the manufacturing sector (research, development, consultation) is growing. These services will increase in importance once anticipated restructuring of industry takes place. Major centres will profit most from an increase in jobs in the services sector since ease of contact has an important part to play in service activities and because those employed in such activities especially appreciate the amenities of town life. Smaller localities outside the peripheral zones of the concentration areas will be relatively disadvantaged by this development.

The sectoral changes in economic structure and in general economic development also favour considerably a stronger regional concentration of economic activity in urban centres. On the other hand, it is precisely there, in our opinion, that population decline is more apparent than in the peripheral farming districts because in the former the average age of the population is higher so that the excedent of birth over mortality is lower (sometimes even negative). However, districts with major centres have the majority of jobs today and the trend towards inertia resulting from the historical distribution of production centres should not be underestimated.

The successes already obtained by regional policy should not obscure the fact that by far the larger part of accumulated capital from earlier generations is implanted in the congested areas and their surroundings and that any change in this regard can only take place slowly since only a portion of private investment is available annually for regional redistribution of productive capacity (2).

(1) See P.G. Rogge, Tendenzwende - Wirtschaft nach Wachstum und Wunder, Stuttgart 1975, p.52-55; See also G.Fels, K.-W.Schatz, Sektorale Entwicklung und Wachstumsaussichten der westdeutschen Wirtschaft bis 1980 in : Die Weltwirtschaft (1974), H.1, p. 52 ff

(2) H. Hunke, Regional planning policy - proposals and reality. Enquiry into the anatomy of West German regional development in the 20th century in the context of population and overall economy, Deliberations of the Academy for regional and land planning, N° 70, Hanover 1974, p. 56

The value of economic promotion measures is in no way diminished by the foregoing. They must be continued without fail and indeed strengthened since they are working in the right direction, i.e. towards regional balance, the largest possible growth and balanced income distribution between regions. Yet it is foreseeable that a decline in the population of the congested regions would exert so strong a pressure on the population of other areas that measures favouring capital formation in regions with weak economic structures will be unable to sustain the concentration of population resulting from decline in rural districts. Indeed, those incentives resulting from the relationship of labour supply and demand will be sustained in their effects by the attraction of already existing infrastructure installations and communication potential. Regional policy must also endeavour to restrain emigration. In particular, its task is to raise the capital invested per remaining worker in order to increase settlement potential.

By increasing capital investment in potential migration areas, marginal returns will progressively converge until regional balance is achieved (1). Since starting levels of marginal productivity in the regions analysed are so uneven, this adaptation process will last a long time. The process can indeed be hastened by encouraging or accepting at the same time a contrary movement of labour (i.e. further concentration), but this would run counter to the targets of regional policy.

Since the pull of migration must be corrected, it is necessary to devise a regional policy conforming to this objective together with a regional concentration of appropriate measures. Otherwise - contrary to the targets of national and European regional policy - regions without congested centres will have to bear the brunt of population decline alone. The settlement structure will also decline there, where it is currently still intact, while the concentration regions could maintain their numbers of inhabitants by way of immigration at a more or less constant level.

In conclusion it may be confirmed:

Without effective counter measures a change in economic structure and a decline in population growth or an absolute decline in population will lead to a stronger regional concentration of jobs and population, which will favour the peripheral districts of the congested regions with good infrastructure and with particularly good communications, and will run counter to the interests of rural regions. This concentration process, accompanied by a standstill in the level of population, must be linked to a realistic concept for population distribution. Constancy should be sought in population distribution at the level of regional division 2. However, further concentration at level 3 can hardly be avoided because the decline in population will not take place equally.

In particular, the incomes gap must be further reduced by increased capital investment in the peripheral areas whereby the favourable development to date of reducing regional imbalances should not be halted.

(1) See E. von Böventer e.al., p. 158 ff

Table 3: Situation and development of concentration in major regions

Regional sub-division ¹	Regional sub-division ²	Name	Surface area 1,000ha(1)	Population in 1,000		Population density 1970	Population Growth % 1961-1970	
				1961(2)	1970 (3)			
111	1110	Schleswig-Holstein/Hamburg	1,643	4,149	4,288	223	261	3,3
113	1130	Niedersachsen/Bremen	4,781	7,347	7,805	154	163	6,2
115	1150	Nordrhein-Westfalen	3,404	15,902	16,914	467	497	6,4
116	1160	Hessen	2,111	4,814	5,382	228	255	11,8
117	1170	Rheinland-Pfalz/Saarland	2,241	4,490	4,765	200	216	6,1
118	1180	Baden-Württemberg	3,575	7,759	8,895	217	249	14,6
119	1190	Bayern	7,055	9,516	10,479	135	149	10,1
110	1100	Berlin (West)	48	2,197	2,122	4,577	4,421	-3,4
121	1211	North	1,935	3,246	3,288	168	170	1,3
	1212	Yorkshire and Humber side	1,420	4,630	4,797	326	338	3,6
	1213	East Midlands	1,218	3,108	3,364	255	276	8,2
	1214	East Anglia	1,256	1,489	1,663	119	132	11,7
	1215	South East	2,741	16,346	17,257	596	630	5,6
	1216	South West	2,366	3,436	3,767	145	159	9,6
	1217	West Midlands	1,301	4,761	5,093	366	391	7,0
	1218	North West	799	6,545	6,734	819	843	2,9
122	1220	Wales	2,076	2,635	2,717	127	131	3,1
123	1230	Scotland	7,877	5,184	5,214	66	66	0,6
124	1240	Northern Ireland	1,412	1,427	1,527	101	108	7,0
131	1311	Piemonte/Valle d'Aosta/ Liguria	3,407	5,750	6,426	169	189	11,8
	1314	Lombardia	2,383	7,406	8,443	311	354	14,0
132	1321	Trentino-Alto Adige	1,361	786	845	58	62	7,5
	1322	Veneto	1,837	3,847	4,122	209	224	7,1
	1323	Friuli-Venezia Giulia	784	1,204	1,232	154	157	2,3
	1324	Emilia-Romagna	2,212	3,667	3,859	166	174	5,2
133	1331	Marche	969	1,348	1,369	139	141	1,6
	1332	Toscana	2,299	3,286	3,479	143	151	5,9
	1333	Umbria	846	795	783	94	93	-1,5
	1334	Lazio	1,720	3,959	4,705	230	274	18,8

see footnotes last page Table 4

Table 3 continued

Regional sub-division 1	Regional sub-division 2	Name	Surface area 1,000 ha (1)	Population in 1,000 1961(2)	Population 1970(3)	Population density 1961	Population density 1970	Population Growth % 1961-1970
134	1341	Campania	1,360	4,761	5,191	350	382	9.0
	1342	Abruzzi/Molise	1,523	1,564	1,532	103	101	-2.0
141	1344	Puglia	1,935	3,421	3,642	177	188	6.5
	1345	Basilicata	999	644	621	64	62	-3.6
	1346	Calabria	1,508	2,049	2,049	136	136	0.2
	1347	Sicilia	2,571	4,721	4,883	184	190	3.4
	1348	Sardegna	2,409	1,419	1,502	59	62	5.8
	1411	Région Parisienne	1,200	8,233	9,563	686	797	16.2
	1421	Champagne-Ardennes	2,560	1,194	1,308	47	51	9.5
	1422	Picardie	1,941	1,480	1,616	76	83	9.2
	1423	Haute-Normandie	1,226	1,385	1,538	113	125	11.0
	1424	Centre	3,906	1,805	2,047	46	52	13.4
143	1425	Basse-Normandie	1,759	1,228	1,280	70	73	4.2
	1426	Bourgogne	3,159	1,419	1,527	45	48	7.6
144	1431	Nord	1,238	3,575	3,856	289	311	7.9
	1441	Lorraine	2,354	2,165	2,314	92	98	6.9
145	1442	Alsace	831	1,281	1,446	154	174	12.9
	1443	Franche-Comté	1,619	910	1,018	56	63	11.9
	1451	Pays de la Loire	3,213	2,426	2,627	76	82	8.3
	1452	Bretagne	2,718	2,354	2,497	87	92	6.1
	1453	Poitou-Charentes	2,579	1,449	1,494	56	58	3.1
146	1461	Aquitaine	4,141	2,293	2,486	55	60	8.4
	1462	Midi-Pyrénées	4,538	2,031	2,199	45	48	8.3
147	1463	Limousin	1,693	716	739	42	44	3.2
	1471	Rhône-Alpes	4,369	3,842	4,557	88	104	18.6
	1472	Auvergne	2,599	1,257	1,325	48	51	5.4
148	1481	Languedoc-Roussillon	2,745	1,499	1,740	55	63	16.1
	1482	Provence-Côte d'Azur	3,144	2,648	3,376	84	107	27.5
150	1483	Corse	868	165	215	19	25	30.3
	1501	Noord	892	1,278	1,415	143	159	10.7
	1502	Oost	1,014	2,121	2,463	209	243	16.1

see footnotes last page Table 4

Table 3 continued

Regional sub-division 1	Regional sub-division 2	Name	Surface area 1,000 ha (1)	Population in 1,000		Population density		Population Growth % 1961-1970
				1961(2)	1970(3)	1961	1970	
	1503	West	1,039	5,803	6,411	559	617	10.5
	1504	Zuid	731	2,431	2,810	333	384	15.6
160	1600	Belgien	3,051	9,166	9,639	300	316	5.2
170	1701	Sjælland/Fyn	1,330	2,567	2,743	193	206	6.9
	1703	Jylland	2,977	2,018	2,193	68	74	8.7
180	1801	Donegal/North West	815	201	187	25	23	-7.0
	1803	West	1,134	273	259	24	23	-5.1
	1804	Midlands	899	239	233	27	26	-2.5
	1805	South West	1,216	447	466	37	38	4.3
	1806	South East	941	320	329	34	35	2.8
	1807	North-East/East	1,098	1,077	1,236	98	113	14.8
	1809	Mid West	787	261	270	33	34	3.4
190	1900	Luxemburg	259	317	340	122	131	7.3

see footnotes last page Table 4

Table 4. Situation and development of concentration in smaller regions

Regional sub-division 2	Regional sub-division 3	Name	Surface area 1,000 ha(1)	Population in 1,000		Population density		Population Growth % 1961-1970
				1961(2)	1970(3)	1961	1970	
1110	11100	Schleswig-Holstein/Hamburg	1,643	4,149	4,288	253	261	3.3
	11301	Aurich/Oldenburger/Osnabrück	1,480	1,854	2,029	125	137	9.4
1150	11302	Stade/Bremen/Hannover	1,369	2,740	2,883	200	211	5.2
	11303	Lüneburg	1,098	953	1,071	87	98	12.4
	11304	Hildesheim/Braunschweig	834	1,800	1,822	216	218	1.2
	11501	Münster/Arnsberg	1,495	5,857	6,112	392	409	4.4
	11502	Detmold	648	1,606	1,737	248	268	8.2
	11503	Düsseldorf/Köln	1,261	8,438	9,063	669	719	7.4
	11601	Darmstadt	1,191	3,558	4,038	299	339	13.5
	11602	Kassel	920	1,256	1,344	137	146	7.0
	11701	Koblenz/Trier	1,301	1,727	1,834	133	141	6.2
	11702	Rheinessen-Pfalz/Saarland	940	2,763	2,931	294	312	6.1
1180	11801	Nordbaden/Nordwürttemberg	1,748	4,735	5,404	271	309	14.1
	11802	Südbaden	936	1,626	1,869	174	200	14.9
	11803	Südwürttemberg	891	1,398	1,622	157	182	16.0
	11901	Oberbayern	1,634	2,754	3,266	169	200	18.6
1190	11902	Niederbayern	1,076	962	1,008	89	94	4.8
	11903	Oberpfalz	964	890	951	92	99	6.9
	11904	Oberfranken	750	1,087	1,109	145	148	2.0
	11905	Mittelfranken	762	1,375	1,485	180	195	8.0
	11906	Unterfranken	849	1,090	1,176	128	139	7.9
	11907	Schwaben	1,020	1,358	1,485	133	146	9.4
	1100	Berlin (West)	48	2,197	2,122	4,577	4,421	-3.4
	1211	Cumbria	598	360	364	60	61	1.1
	12112	Northumberland/Tyne+Wear/Durham/Cleveland	1,337	2,886	2,924	216	219	1.3
	1212	Yorkshire/Humberside	1,420	4,630	4,797	326	338	3.6
1213	East Midlands	1,218	3,108	3,364	255	276	8.2	
1214	East Anglia	1,256	1,489	1,663	119	132	11.7	

see footnotes last page Table 4

Table 4 continued

Regional sub-division	Regional sub-division 3	Name	Surface area 1,000 ha(1)	Population in 1,000 1961(2)	Population in 1,000 1970(3)	Population density 1961	Population density 1970	Population Growth % 1961-1970
1215	12151 12152 12153	Essex/London/Kent Hampshire/Surrey/Sussex Berkshire/Oxfordshire/ Hertfordshire/Bucking- hamshire/Bedfordshire	881 998	16,346	17,257	596	630	5,6
1216	12161 12162	Cornwall/Devon Somerset/Dorset/Avon/ Gloucestershire/Wiltshire	862 1,028	1,166	1,276	113	124	9,4
1217	12170	West Midlands	1,338	2,270	2,491	170	186	9,7
1218	12180	North West	1,301	4,761	5,093	366	391	7,0
1220	12201 12202	Gwynedd/Clwyd Dyfed/Powys/Glamorgan/ Gwent	799 629 1,447	6,545 534 2,101	6,734 576 2,141	819 85 145	843 92 148	2,9 7,9 1,9
1230	12301 12302 12303 12304 12305 12306 12307	Dumfries and Galloway Lothian/Borders Strathclyde Tayside/Central/Fife Grampian Highland Shetland/Orkney/Western Isles	7,877	5,184	5,214	66	66	0,6
1240	12400	Northern Ireland	1,412	1,427	1,527	101	108	7,0
1311	13111 13112 13113 13114 13141	Novara/Vercelli/Torino Cuneo/Asti/Alessandria Valle d'Aosta Liguria Como/Varese/Milano/Pavia/ Cremona	1,343 1,197 326 541 1,076	2,685 1,299 101 1,735 5,230	3,186 1,248 110 1,882 6,107	200 103 31 321 486	237 104 34 348 568	18,7 1,5 8,9 8,5 16,8
1321	13210	Sondrio/Bergamo/Brescia/ Mantova	1,307	2,176	2,336	166	179	7,4
1322	13221	Trentino-Alto Adige Belluno/Treviso/Venezia	1,361 861	786 1,592	845 1,704	58 185	62 198	7,5 7,0

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Table 4 continued

Regional sub-division 2	Regional sub-division 3	Name	Surface area, 1,000 ha (1)	Population in 1,000		Population density		Population Growth % 1961-1970
				1961 (2)	1970 (3)	1961	1970	
	13222	Vicenza/Padova/Verona/ Rovigo	976	2,255	2,418	231	248	7.2
1323	13230	Friuli-Venezia Giulia	784	1,204	1,222	154	157	2.3
1324	13241	Piacenza/Parma/Reggio nell'Emilia/Modena	1,102	1,571	1,633	143	148	3.9
	13242	Bologna/Ferrara/Ravenna/ Forlì	1,110	2,096	2,226	189	201	6.2
1331	13310	Marche	969	1,348	1,369	139	141	1.6
1332	13321	Massa Carrara/Lucca/ Pistoia/Pisa/Firenze/ Livorno	1,144	2,487	2,694	217	235	8.3
1333	13330	Arezzo/Siena/Grosseto	1,155	799	785	69	68	1.8
1334	13341	Umbria	846	795	783	94	93	-1.5
	13342	Viterbo/Rieti	636	426	408	67	64	-4.2
1341	13410	Roma/Latina/Frosinone	1,084	3,533	4,297	326	396	21.6
1342	13420	Campania	1,360	4,761	5,191	350	382	9.0
1344	13441	Abruzzi/Molise	1,523	1,564	1,532	103	101	-2.0
1345	13442	Foggia/Bari	1,232	1,928	2,029	156	165	5.2
1346	13450	Taranto/Brindisi/Lecce	703	1,493	1,613	212	229	8.0
1347	13460	Basilicata	999	644	621	64	62	-3.6
	13471	Calabria	1,508	2,045	2,049	136	136	-0.2
	13472	Messina/Enna/Catania/ Siracusa/Ragusa	1,308	2,406	2,496	184	191	3.7
1348	13481	Palermo/Trapani/Agrigento/ Caltanissetta	1,263	2,315	2,387	183	189	3.1
	13482	Sassari/Nuoro	1,479	664	687	45	46	3.5
1411	14110	Cagliari/Oristano	930	755	815	81	88	7.9
1421	14211	Région Parisienne	1,200	8,233	9,563	686	797	16.1
	14212	Ardennes/Marne Aube/Haute-Marne	1,338	738	816	55	61	10.6
			1,222	456	492	37	40	7.9

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Table 4 continued

Regional sub-division 2	Regional sub-division 3	Name	Surface area 1,000ha(1)	Population in 1,000		Population density		Population Growth % 1961-1970
				1961(2)	1970(3)	1961	1970	
1422	14221	Somme/Oise	1,203	969	1,085	81	90	12.0
	14222	Aisne	738	511	531	69	72	3.9
1423	14230	Haute-Normandie	1,226	1,385	1,538	113	125	11.0
1424	14241	Eure-et-Loir / Loir-et-Cher	1,262	649	762	51	60	17.4
	14242	Loir-et-Cher/Indre-et-Loire						
	14243	Indre/Cher	1,243	623	731	50	59	17.3
1425	14250	Basse-Normandie	1,401	533	554	38	40	3.9
1426	14261	Yonne/Nièvre	1,759	1,228	1,280	70	73	4.2
	14262	Côte d'Or/Saône-et-Loire	1,426	511	536	36	38	4.9
1431	14310	Nord	1,733	908	991	52	57	9.1
1441	14411	Moselle	1,238	3,575	3,856	289	311	7.9
	14412	Moselle/Meurthe-et-Moselle	1,145	1,555	1,715	136	150	10.3
	14413	Neuse	622	219	206	35	33	-5.9
1442	14420	Vosges	587	391	393	67	67	0.5
1443	14430	Alsace	831	1,281	1,446	154	174	12.9
1451	14511	Franche-Comté	1,619	910	1,018	56	63	11.8
	14512	Mayenne/Sarthe	1,139	690	723	61	63	4.8
	14513	Maine-et-Loire	713	543	595	76	83	9.6
1452	14521	Loire-Atlantique/Vendée	1,361	1,193	1,309	88	96	9.7
	14522	Finistère	678	736	777	109	115	5.6
1453	14531	Côtes-du-Nord/Morbihan	1,364	1,025	1,051	75	77	2.5
	14532	Ille-et-Vilaine	676	593	669	88	99	12.8
1461	14611	Deux Sèvres/Vienne	1,299	650	673	50	52	3.5
	14612	Charente-Maritime/Charente	1,280	799	821	62	64	2.8
	14613	Dordogne	918	379	370	41	40	-2.4
	14614	Gironde/Lot-et-Garonne	1,536	1,219	1,317	79	86	8.5
1462	14621	Landes	924	257	281	28	30	9.3
	14622	Pyrénées-Atlantiques	763	443	518	58	68	16.9
	14623	Lot/Tarn-et-Garonne	895	323	333	36	37	3.1
	14624	Aveyron/Tarn	1,448	605	608	42	42	0.5
	14625	Gers/Hautes-Pyrénées	1,076	398	407	37	38	2.3
	14626	Haute-Garonne/Ariège	1,119	705	851	63	76	20.7

see footnotes last page Table 4

Table 4 continued

Regional sub-division 2	Regional sub-division 3	Name	Surface area, 1,000 ha. (1)	Population in 1,000		Population density		Population Growth % 1961-1970
				1961(2)	1970 (3)	1961	1970	
1463	14630	Limousin	1,693	716	739	42	44	3.2
1471	14711	Rhône/Loire	1,798	1,718	2,112	215	265	22.9
	14712	Ain/Isère	1,323	1,000	1,136	76	86	13.6
	14713	Ardèche/Drôme	1,205	541	615	45	51	13.7
	14714	Haute-Savoie/Savoie	1,043	583	694	56	67	19.0
1472	14721	Allier	733	376	387	51	53	2.9
	14722	Puy-de-Dôme	795	62	563	62	71	13.7
	14723	Cantal/Haute-Loire	1,071	386	375	36	35	-2.8
1481	14811	Lozère/Gard	1,102	496	562	45	51	13.3
	14812	Hérault/Aude/Pyrénées-Orientales	1,643	1,003	1,178	61	72	17.4
1482	14821	Hautes-Alpes/Alpes-de-Haute-Provence	1,247	174	197	14	16	13.2
	14822	Alpes-Maritimes/Var	1,029	1,026	1,312	100	128	27.9
	14823	Vaucluse/Bouches-du-Rhône	868	1,448	1,867	167	215	28.9
1483	14830	Corse	868	165	215	19	25	30.3
1501	15010	Noord	892	1,278	1,415	143	159	10.7
1502	15020	Oost	1,014	2,121	2,463	209	243	16.1
1503	15030	West	1,039	5,803	6,411	559	617	10.5
1504	15040	Zuid	731	2,431	2,810	333	384	15.6
1600	16001	Antwerpen/Brabant/Limburg	865	4,005	4,352	463	503	8.7
	16002	West Vlaanderen/Oost Vlaanderen/Hainaut	990	3,585	3,679	362	372	2.6
1701	16003	Liège/Namur/Luxembourg	1,196	1,576	1,608	132	134	2.0
1703	17010	Sjælland/Fyn	1,330	2,567	2,743	193	206	6.9
	17031	Sønderjyllands/Ribe/Vejle	1,006	742	742	68	74	8.7
	17032	Ringkøbing/Aarhus/Viborg	1,354	2,018	995	73	74	
	17033	Nordjylland	617	456	456	74	74	
1801	18010	Donegal/North West	815	201	187	25	23	-7.0
1803	18030	West	1,134	273	259	24	23	-5.1
1804	18040	Midlands	899	239	233	27	26	-2.5
1805	18050	South West	1,216	447	466	37	38	4.3

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Table 4 continued

Regional sub-division 2	Regional sub-division 3	Name	Surface area 1,000 ha (1)	Population in 1,000		Population density		Population Growth % 1961-1970
				1961 (2)	1970 (3)	1961	1970	
1806	18060	South East	941	320	329	34	35	2.8
1807	18070	North-East/East	1,098	1,077	1,236	98	113	14.8
1809	18090	Mid West	787	261	270	33	34	3.4
1900	19000	Luxembourg	259	317	340	122	131	7.3

(1) See Statistical Office of the European Community, Regional Statistics 1973-1974, Luxembourg 1975, p. 276 ff; see also United Kingdom: Federal Statistics Office, Great Britain and Northern Ireland in: Country reports, General statistics on foreign countries, Wiesbaden 1964, p. 52 and individual calculations: Italy: Central Institute of Statistics, Italian statistical Yearbook, 1971, edition Rome 1971, p. 2f; France: National Institute of Statistics and Economic Studies, French statistical Yearbook 1972, Paris 1972, p. 4; Denmark: John Paxton (ed.), The Statesman's Yearbook 1973-1974, London and Basingstoke 1974, p. 856; Ireland: see idem, p. 1064 and individual calculations.

(2) See Statistical Office of the European Community, p. 116 ff; see also: United Kingdom: John Paxton (ed.), p. 71 and individual calculations; Italy: Central Institute of Statistics, Italian statistical Yearbook, 1972 edition, Rome, 1972, p. 9f; France: National Institute of Statistics and Economic Studies, French statistical Yearbook 1962, p. 15; Denmark: Statistical Section, Statistical Yearbook 1961, Copenhagen 1962, p. 1; Ireland: S.H. Steinberg (ed.), The Statesman's Yearbook 1962, London 1962, p. 1128 f and individual calculations.

(3) See Statistical Office of the European Community, p. 116 ff; see also: United Kingdom: John Paxton, p. 71 and individual calculations; Italy: Central Institute of Statistics, Italian Statistical Yearbook, 1971 edition, Rome 1971, p. 18 f; France: National Institute of Statistics and Economic Studies, French statistical Yearbook 1973, Paris 1973, p. 37 f; Denmark: John Paxton, p. 856; Ireland: idem, p. 1064 and individual calculations.

3. Treatment of problems of regional concentration in technical literature

3.1. Reasons for the high level of attraction of the areas of concentration

In a number of empirical studies it has been shown that the congested areas in the past have been especially attractive both to capital and to labour. A number of reasons have been given for this; they have been considered in manifold theoretical and empirical enquiries on the choice of locality by concerns and the choice of residence by people. The results of the principal studies on this range of problems will be considered in the following paragraphs.

3.1.1. Determining factors in the regional distribution of capital

To obtain clarification on the growth of capital assets in the congested areas, one must enquire into the distribution of gross, net and re-investment. Even re-investment may lead to changes in the regional distribution of capital if it does not take place in the old locality. In most cases, however, many reasons are given for remaining in the old localities. The high proportion of replacement investment in the volume of total investment and the resulting tendency to regional immobility is without doubt one of the most important reasons for the small degree of flexibility in regional structure.

Table 5 shows that the proportion of replacement investment in 1971, selected as an example, was in no European Community country less than one third of total investment. On average this proportion was notably more. It can be assumed that by far the larger part of the investments in question took place in the previous localities of the replaced capital goods.

The first attempts to introduce the importance of the level of congestion into the theory of residential selection were made by A. Weber (1) and E.M. Hoover (2). On the basis established by these authors W. Isard (3) elaborated the effect of conurbation pressures on location selection by business concerns as follows:

Internal Economies are a function of mass production. They make their impact on concentration of production in a concern so long as the fall in item costs exceeds the rise in other costs, e.g. transport costs. The question as to the optimal locality remains however unsolved when production costs are the same in several localities (4).

There are two distinctive groups of External Economies:

Localisation Economies can be looked for if concerns in the same economic branch concentrate in the same place. They derive for example, from mutual more efficient use of a specialised labour supply or from better use of specialised marginal aid services etc. (5).

(1) See A. Weber: On the Location of industry (Germany), Tübingen 1909

(2) See E.M. Hoover: Location of Economic Activity, New York, 1948

(3) See W. Isard: Location and Space Economy: Cambridge and London, 1956

(4) See above, p.175

(5) See W. Isard: Methods of Regional Analyses, 6th Edition 1969, p. 404

Table 5: Fixed investment (1) in European Community countries - 1971

Country	Gross investment		Net investment		Replacement investment	
	Mrd. (2) Eur (3)	%	Mrd. (2) Eur (3)	%	Mrd. (2) Eur (3)	%
Germany	55.6	100	32.3	58	23.3	42
France	38.2	100	21.1	55	17.1	45
Italy	20.4	100	11.7	57	8.7	43
Netherlands	9.2	100	6.1	67	3.1	33
Belgium	6.1	100	3.3	54	2.8	46
Luxembourg	0.3	100	0.1	33	0.2	66
United Kingdom	24.5	100	12.1	49	12.4	51
Ireland	1.1	100	0.7	63	0.4	37
Denmark	3.7	100	2.3	62	1.4	38
EC total	159.0	100	89.7	56	69.3	44

- (1) Private and national investment
- (2) Mrd. = 1,000 million
- (3) Eur = European unit of account

Source: Statistical Office of the European Community (ed.), National Accounts - Aggregates 1960-1973, Luxembourg 1974, p. 10 and 17

This leads to greater favour being shown to already existing production localities such as conurbation centres (1). New business will seek to realise localisation economies in these places.

Urbanisation Economies derive, for example, from more efficient use of urban facilities (transport links, water and gas supply), from the volume of labour available, from the possibility of efficient distribution of labour, etc. (2). In general, one may say that savings result from the production of a variety of goods and services in one place.

Strong concentration is inducive of disadvantages and advantages. The former derive from rising living costs, higher wages, higher material costs, time and transport costs, higher ground costs and rentals etc.

Isard suggests that Urbanisation Economies (and also Localisation Economies), which reflect the complex interchange of historical and institutional factors, have potential influence on the location choice of undertakings without this influence assuming a more concrete form (3). "The decision to settle in an urban area thereby involves substitutions among various outlays and revenues" (4).

It has been suggested in this context that it is impossible to isolate these different effects using statistical analysis because of the degree of aggregation of the data (5). Special difficulties arise in providing a concrete definition of conurbation pressures and in attempting to measure the effects. Richardson provides a comprehensive presentation of these problems (6). He describes External Economies of regional concentration as being (7):

- access to special services,
- access to capital,
- labour market advantages (a wider labour market and a large number of facilities),
- greater supply of skilled workers,
- possibility of specialising in view of the size of the market,
- advantages of communication and information,
- advantages on transport costs by way of short hauls for supply and marketing, and
- better communication links.

Richardson suggests that it is uncertain how far these advantages will be offset by higher concentration costs (8). To test the effects of these various

(1) See W. Isard: Location and Space Economy, p. 180

(2) See above, p. 182

(3) See above, p. 183 and 269

(4) See above, p. 269

(5) See suggestions on the use of macro-economic production functions in paragraph 3.2

(6) See H.W. Richardson, Regional Growth Theory, London, 1973, p. 183 ff and The Economics of Urban Size, Westmead and Lexington, 1973, p. 39 ff

(7) See H.W. Richardson, The Economics of Urban Size, p. 39

(8) See above, p. 39

conurbation factors empirically, he thinks that indicators should be used to represent the attraction potential of different localities. He makes the following suggestions, with the proviso that this choice must be tested empirically:

- a measure of size of the labour market,
- an index of market potential,
- employment in selected auxiliary service industries catering for industry,
- and a measure of relative tax-urban service efficiency (1).

An empirical estimate of the effects of the factors abovementioned on choice of residence is dealt with neither by Isard nor by Richardson. All these analyses derive furthermore from parallel changes in labour and capital. This limitation is only valid for analysing concentration if marginal productivity of these factors is already identical in all regions. Empirical studies in the Federal Republic suggest, however, that this is in reality not the case. In such situations there are additional possibilities for using the advantages of productivity by way of a form of subdivision of the input of the two factors (labour and capital). Further concentration creates advantages for the factor for which productivity in the already congested areas is relatively greater than in areas with a low level of congestion (2).

The following paragraphs will deal with the results of empirical studies into factors determining choice of locality by concerns. A common feature of all such studies is that they either directly question undertakings, which have settled in a particular region, or include an assessment of statistical records to reveal empirically the actual relevant motives for choice of locality. It is therefore not a matter of solving a problem where a concern should settle but of answering the question "how - within a given region at a given time - concerns chose the locality that suited them best" (3).

Generally, for the U.S.A., England and the Federal Republic of Germany there are empirical studies available devoted to the choice of locality by concerns (4). In the first place (as is also the case with the various locality theories) industrial concerns are the heart of the problem. While individual studies reveal partial differences on numbers, type and description of relevant factors, the following determining features of locality selection will always be indicated as especially important (5).

(1) See H.W. Richardson, *The Economies of Urban Size*; p. 39

(2) See *idem*, *Regional Growth Theory*, p. 190

(3) D. Fürst, *Choice of locality by industrial concerns - a review of empirical enquiries* in "Year Book of Social Sciences", 22(1971), p. 189

(4) See e.g. L.C. Yaseen, *Plant Location in Tennessee 1955-65*, Memphis 1966, D. Law, *Industrial Movement and Location Advantage in: The Manchester School of Economics and Social Studies*, 32(1964), p. 137 ff

(5) See D. Fürst, p. 1977 ff, and D. Fürst, K. Zimmermann directed by K.H. Hansmeyer, *Choice of Locality by Industrial Concerns, results of direct enquiry with concerns*, Bonn 1973, H. Brede, *Decisive factors in location of industry - an empirical enquiry*, Berlin 1971.

- proximity to outlet market
- proximity to supply market
- availability of suitable industrial sites
- availability (and cost) of labour potential
- sufficient communication links
- once-off (or continuous) financial incentives (allowances)
- advantages of conurbation (good contacts).

In evaluating these results with a view to analysing regional concentration Table 5 should be recalled; this shows that half of annual investment is in the form of re-investment (1), which is not considered in enquiries on the settlement motives of concerns. In order to include the tendency towards immobility among investors in the analysis, Bólting has evaluated regional investment functions for the territory of the Federal Republic; therein he has used both given investment motives, available capital and the accelerator factor as a clarifying variable (2). With the help of multiple regression analysis he tests the hypothesis that the investment function is in the following form:

$$I = a_0 + a_1 K(t-1) + a_2 U(t-1) + a_3 S_K + a_4 P$$

I, K, U and S_K represent respectively gross investment, capital stock, gross output and investment aids (DM million), P = market potential (DM million/km) the index (t-1) = the previous period of time. The estimated values of the working parameters a_i are shown in Table 6 (3).

Table 6

Estimated values of the parameters of the investment function:

Year	a_0	a_1	a_2	a_3	a_4	R^2
1969	-54.352 (59.206)	0.020 (0.011)	0.043 (0.010)	1.608 (2.781)	0.021 (0.010)	0.962
1970	-115.600 (63.232)	0.024 (0.010)	0.046 (0.008)	2.018 (0.998)	0.033 (0.017)	0.973
1971	-111.885 (50.246)	0.025 (0.008)	0.041 (0.007)	1.375 (0.366)	0.032 (0.014)	0.981
1969 - 1971	-86.976 (33.236)	0.020 (0.005)	0.046 (0.005)	1.466 (0.361)	0.026 (0.010)	0.972

(1) See M.S. Feldstein, and D.K. Foot, The Other Half of Gross Investment: Replacement and Modernization Expenditures, in: Review of Economics and Statistics, 53(1971), p. 49 ff

(2) See H.M. Bólting, Analysis of the impact of regional economic policy mechanisms, Münster 1976, p. 148

(3) Parameters $a_1 - a_3$ have dimensions DM/DM; a_0 : DM; a_4 : DM/DM/km.

Parameters a_1 and a_2 are to be interpreted as showing that one part of gross investment is dependent on capital stock and on gross output. For instance where capital is already plentiful, (re-)investment is also substantial. However, parameter a_3 shows that this trend will be partly compensated for by development measures in areas with lower capital intensity. The tendency towards concentration of capital is thus being corrected in the Federal Republic by way of regional economic policy.

3.1.2 Determining factors in choice of residence

Together with an assessment of the determining factors in the choice of locality by enterprises and in the regional distribution of investments, it is necessary for an analysis of the concentration process to elaborate the reasons governing choice of residence by individual people since migration has a strong influence on regional population development (1). This group of problems is closely connected with problems already discussed on choice of locality and regional distribution of investment since availability of labour potential (both in quantity and skill) is a major determining factor in the choice of locality by enterprises.

The following paragraphs refer to the advantages or disadvantages of congestion most frequently mentioned in written theoretical theses and which influence choice of residence by individuals. Advantages mentioned are:

- greater supply of jobs (in quantity and skill)
- smaller risk of unemployment
- greater possibility of higher earnings
- better educational and health conditions
- better purchasing possibilities (in particular of goods and services of a high quality)
- better facilities for recreation
- better cultural facilities.

Disadvantages of congested areas are:

- worse pollution
- an overburdened communications network
- impossibility (for many people) to live near their work
- higher cost of living.

A decisive factor in selecting choice of residence is the attraction gap between overcrowded and depopulated areas. Important elements in the decision to migrate are dissatisfaction with present residence (push) and/or potential

(1) O. Boutstedt provides a review of the proportion represented by migration in general changes in population within the Federal Republic of Germany; Stability and Movement in Population Development: Region and Settlement N°11(1962), 254; see also for Belgium: M. Termote, Definitive Migration inside Belgium, Brussels 1966, p. 95 ff.

attraction of the intended place of residence (pull)(1). Of interest in this connection is the degree to which the concentration advantages and disadvantages abovementioned influence choice of residence. The following reasons (apart from personal grounds) for a decision to migrate and on choice of residence are revealed by studies on motives for deciding to migrate (2):

- job and income potential; factors involved are opportunities for professional advancement, varied job supply, job security, higher earnings potential;
- availability and quality of housing
- access to retail outlets
- degree of concern with public health infrastructure
- education and further vocational training, cultural facilities, recreation and relaxation, communication facilities.

This shows, therefore, that theoretical studies of given conurbation (concentration) advantages for the general population are largely in agreement with the empirical reasons for migration. However, it is to be noted that infrastructure availability is only a marginal reason for migration.

For the Federal Republic, Birg, working on the results of studies, has provided different hypotheses concerning the causes for migration, which he has tested with the aid of multiple regression and correlation analysis (3). He has shown that the following are positive reasons for regional migration (4):

- in the field of housing: the quality of available units (5)
- in the field of public and private services: the amount of cultural facilities
- in the fields of transport and geographical situation: communications infrastructure.

(1) See H.J. Harloff, The influence of psychological factors in mobility of labour, Berlin 1930, p. 60; A. Kruse, Migration II, International migration: Dictionary of Social Sciences, Vol. II, p. 506

(2) See INFAS, Institute for applied social sciences; Regional mobility preferences, reasons and trends, Bonn-Bad Godesberg 1972, R.G. Wietring, J. Hübschle, Structure of and reasons for migration trends in the Federal Republic of Germany, Basel 1968, among others H. Zimmermann, Regional preferences, residential trends and readiness to move of workers as determining factors in regional policy; publications of the Association for regional structural development, Vol. 2, Bonn 1973

(3) See H. Birg, Analysis and forecasts of population development in the Federal Republic of Germany and its regions to 1990; German Institute for Economic Research; Contributions to Structural Research, Vol. 35, Berlin 1975

(4) See idem, p. 69 ff

(5) H. Birg suggests that the importance of sizes in describing housing conditions is to be sought "less in its value as an explanatory or a forecasting factor for estimating migration balance than in its descriptive content". See idem abovementioned.

Conversely, the regional migration balance is subject to negative influences by variable factors in the level of urbanisation (population density, relatively static population distribution, population potential index), commuter balance and centralisation of communications.

As a result of his analysis of internal migration Birg reaches the conclusion that migration, at least in the Federal Republic of Germany "is substantially correlated with structural sizes, which are difficult to influence, such as the levels of industrialisation and urbanisation, rather than with infrastructure variables which are somewhat changeable"(1).

Birg suggests that determining factors for emigration are the proportion of economic sectors with large numbers of foreigners in total employment (iron and metal production and processing, building construction), transport communication and changes in the level of wages (2). The hypothesis that variables relating to the level of urbanisation and the settlement structure also play a role must be rejected. The conclusion may then be drawn that the disadvantages of concentration in densely populated areas have hitherto had no significant influence on the regional distribution of the foreign population in the Federal Republic whereas they influence the internal migration balances of the congested areas in a negative sense.

The analysis of population and migration statistics shows that population is declining at the heart of concentration areas principally due to losses on account of emigration, and that it is rising in the peripheral areas (3).

A reason for this is given in the findings of Zimmermann et al. Inter alia, these writers confirm that the degree of centralisation is a negative influence on residential satisfaction. Sought after housing lies rather close to towns and on the edges of the countryside and in the suburbs of large towns (4).

The locality preferences abovementioned seem plausible for the following reasons: The preferred places have the required infrastructure in substantial measure. Besides, specific services can be installed in large towns quite quickly. Job supply is relatively good, both in quantity and quality, because of the current trend to establish enterprises in the peripheral districts of concentration areas and in the suburbs of major towns. Moreover proximity to the heart of the concentration area makes it possible to commute and thereby to take advantage of this labour market. Compared with the centres of large towns the edge of the countryside and suburbs of major towns have the advantage of quicker availability of countryside and surroundings for relaxation and recreation and the advantage of better quality housing at lower prices than is available in the centres of concentration.

A direct result of this de-concentration process (from a small regional optic) is the problem of increased surface area for the concentration areas.

(1) H. Birg, Analysis and forecasts of population development, p. 20

(2) idem, p. 88

(3) See ERIPLAN, North West Europe Megalopolis, A Prospective Study, Vol.2, The Hague 1974, p. 131, P.A. Stone, Urban Development in Britain, Standards, Costs, and Resources, 1964-2004, Vol. I: Population Trends and Housing, Cambridge 1970, p. 35

(4) See H. Zimmermann et al., Regional Preferences, p. 110 ff

It is, therefore, indispensable for an analysis of the concentration process over wider regions that regions for analysis should be so selected that changes in regional structure within the congested areas should not confuse the picture of the concentration process.

3.2 Criteria for measuring and assessing concentration

Clear cut criteria for assessing the regional concentration process have not as yet been laid down by any author. There are three reasons for this:

Firstly, there is no complete agreement as to which target criteria should be used for measuring the advantages and disadvantages of the concentration process. We shall propose three criteria. Secondly, the connection between the degree of concentration and the values presented by the target-criteria has only been partially researched.

It will, thus, be necessary to undertake extensive empirical research using a uniform model. It is probable that the conclusion reached will indicate that the relationships, and indeed the trends, in all regions are the same but that they differ significantly in numerical terms. Our statements can naturally, without such empirical studies, only deal with the anticipated direction of the relationships abovementioned.

Finally, knowledge of the objective links between the level of concentration and the degree of target realisation does not lessen the need for a standard assessment, since measurement cannot replace assessment and standard confirmation of the situation which is sought. Naturally, these value judgements change in the course of time and will vary between respective assessors. A list of targets, independent from the measurement of functional links, is therefore necessary in each case. In this regard we shall be making a proposal for regional policy at European level.

3.2.1 Theoretical principles

A discussion on advantages and disadvantages is only valid if, in the first instance, the aims are clarified whereby results can be considered as "good" or "bad". In general, three areas will be named in connection with questions of regional development policy and where national policy should seek improvement:

- the field of environmental quality
- the field of infrastructure supply
- the field of economic well-being.

At Community level a clear priority must be accorded, in the first instance, to employment and income in the field of economic well-being. The following statements will, however, show that no clear threshold for limiting the process of congestion in the near future can be established on the basis of income and employment criteria alone. Such thresholds can only be decided by fixing target values for environmental quality and infrastructure. The list of targets to be discussed presently will help in this connection.

If the intention is to enquire into the advantages and disadvantages of regional concentration movements, it is indispensable for an assessment to enquire into the effects of regional concentration on the level of income, on the quality of infrastructure supply and on the quality of the environment. The importance of the observed advantages and disadvantages in each region depends on the degree to which these three essential elements of regional input can be influenced by people and capital goods.(1)

3.2.1.1 Quality of the environment and settlement density

There is uniform agreement in scientific literature that there exists a negative relationship between quality of the environment on the one hand and regional concentration of the population and their economic activities on the other hand (2). More precisely put, this means that, under constant protective measures, the quality of the environment falls with increasing congestion, i.e. the costs of maintaining a given environmental standard rise in proportion as the region fills with people and capital. This relationship must be treated in detail to show the respective negative influences caused by human productive and consumer activity (3).

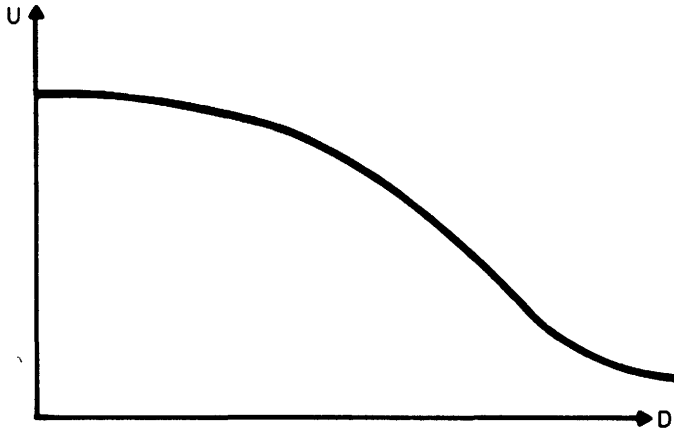
American research (4) shows a small negative relationship between the level of air and noise pollution on the one hand and local growth (density) on the other. The costs of sewage disposal also rise with increasing density and size of regional reception areas although, on the other hand, there are advantages in using major installations. Cost functions for waste water disposal are dependent on settlement size and density and take the form of the letter U; only when an area has reached a certain size can purification plant be properly introduced at the right technical level.

With these results in mind, one can reasonably assume that dependence of environmental quality on settlement density can be described by a series of functions, somewhat in the form given in graph 1. Every kind of environmental feature must have its own relevant curve.

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- (1) The expression will be shortened in the following text to "Settlement density".
(2) See for example H.W. Richardson, The economics of urban size, p. 30 ff, J. Hoch, Income and city size in: Urban Studies 9 (1972) p.318 ff, W. Isard, and P. Liossatos, On Location Analysis for Urban and Regional Growth Situations in: Annals of Regional Science, 6 (1972) No. 1, p. 2; E.S. Mills and D.M. de Ferranti, Market Choice and Optimum City Size, in: American Economic Review, Papers and Proceedings, 61 (1971), p. 340 ff
(3) See A.V. Kneese, R.U. Ayres and R.C. d'Arge, Economics and the Environment: A Materials Balance Approach, Washington 1970; W. Leontief and D. Ford, Air Pollution and the Economic Structure, in: A. Brody and A.P. Carter (Editors) Input-Output-Techniques Amsterdam 1972, p. 19
(4) See J. Hoch, Income and City Size, p. 138 ff

Graph 1:

The influences of settlement density (D) on quality of the environment (U)



An increase in density leads (by using the same technique) to a constant decline in the quality of the natural environment. Progress in production and protection techniques sets these curves on an upward trend in due course, i.e. it becomes possible to assure the same quality of the environment inspite of greater density provided cleaner production methods prevail.

3.2.1.2 Quality of infrastructure and level of concentration

The concept of infrastructure comprises a number of fields such as public health, education and training, transport installation, recreational facilities, public administrative services, police etc. Within such a wide conglomeration of infrastructure domains it becomes very problematical whether a general relationship can be established between quality of infrastructure and the regional distribution of population and its activities. Many studies have attempted to establish a link between public expenditure per head and the size of the town (1). It has not yet been possible to establish a clear relationship as the tests have led to very different results. Furthermore, the variations in public expenditure on infrastructure are closely linked with changes in the level and quality of infrastructure installations. With regard to the problem which is being discussed here, the link to be estimated is that between quality

(1) See H.W. Richardson, The Economics of Urban Size, p. 86 and relevant work of W. Alonso, The Economics of Urban Size in Papers of the Regional Science Association, 26 (1971) p. 72 ff, W. Isard, Methods of Regional Analysis, p. 527 ff.

of infrastructure (at equal outlay per head) and settlement density. A satisfactory solution is not yet to hand (1). It may however be anticipated that very different links will occur for different domains of infrastructure.

As a starting point for research on this theme the hypothesis can be advanced that the demand for infrastructure services is probably a linear function of the volume of production and the number of persons to be supplied, so that this link may be stated by way of a series of input co-efficients (2).

These linear links are, however, only a starting point for consideration. Much more likely is the assumption that financial expenditure needed to achieve a given level of infrastructure is relatively high under conditions of very low or very high density. This can be anticipated in areas of low settlement density because of underutilisation of capital, because many facilities cannot be shared advantageously and because the organisation of public services is ineffective (3). However, with high density, secure economies of scale in infrastructure installations can be more than compensated for by the scarcity and, hence, the price of available sites and by additional costs created by necessary wider use (4). Moreover, it is not always possible to create greater and more efficient infrastructure installations so that adaptation of the infrastructure supply to changes of population must take the form of multiple extensions to installations already existing.

On the basis of these considerations expenditure per head for various types of infrastructure can probably best be indicated by a series of curves. These will fall, in the first instance, with increasing density (D), attain a minimum and then rise.

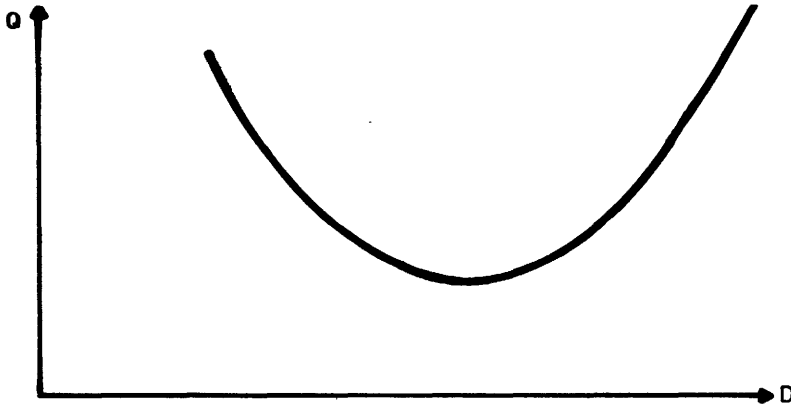
(1) See H.W. Richardson, The Economics of Urban Size, p. 88 ff

(2) See R. Thoss, and H.M. Bölting, Mechanisms for Creating and Maintaining Balanced Functional Spaces; Academy for Regional Research and Land Planning (in print)

(3) See D. Marx, Growth oriented regional policy, Göttingen 1966, p.54ff
W. Isard, Methods of Regional Analysis, p.527 ff, P. Treuner, An Infrastructure Cost Model of a System of Central Places, in "Proceedings and Papers of the Regional Science Ass. 24 (1970), p.35 ff; P.A. Stone, The Economics of the Form and Organisation of Cities in Urban Studies 9(1972) p.335

(4) D. Marx, Growth oriented regional policy, p. 54.

Graph 2: The influence of settlement density (D) on expenditure per head on infrastructure (Q) at constant equipment



These curves shift upwards in due course if more public resources are spent on popular needs. Generally, it may be said, however, that popular needs are not met satisfactorily with low density figures because, in this case, expenditure per head of inhabitant will be greater because of higher installation and running costs. On the other hand, it is difficult to provide adequately for popular needs when the density is high because the creation of the necessary range of infrastructure installations involves very high costs, e.g. on account of wide extent and application.

This means that areas with an average level of concentration are probably in a better position to meet the infrastructure needs of their population than very thickly or thinly populated regions. Generally, one may say that economic losses on infrastructure arise if "greater efficiency could be obtained by investing a given sum for basic public services in another place than in the present place of investment" (1).

3.2.1.3 Level of income and the factor inputs

Unlike the links abovementioned, the relationship of the level of production (income) to the input of labour and capital in the national economy has been a field of research for a very long time. In this field there have already been many empirical attempts to establish the link in a detailed form (2). The law

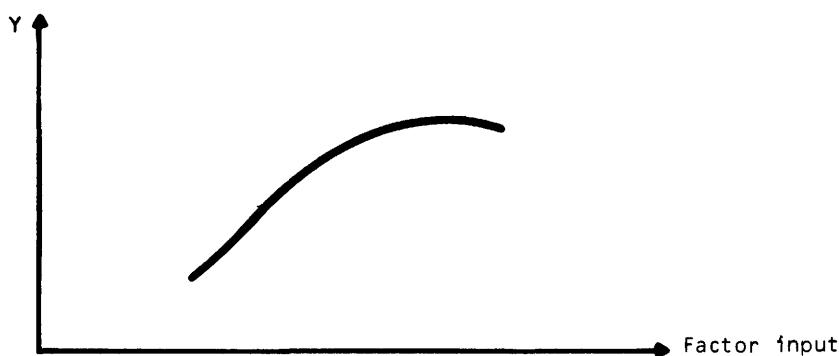
- (1) H.J. Back, The Social-Cost Problem with special reference to selected conurbation regions in the Federal Republic of Germany, Institute for Economic Research, Contribution to experience and theory in regional research, Vol. 8, Munich 1967.
- (2) As is the case with all empirical studies, the numerical findings cannot be applied with any certainty to other regions and other periods of time; to evaluate them in terms of practical policy further calculations are needed. Certainly, at least, one may say that the trend of these findings was foreshadowed in earlier research.

of returns postulates that output rises disproportionately fast at first as the intake of the two factors (labour and capital) increases but that profit growth then recedes and even becomes negative (1). A polynomial of the third degree can represent this process.

However, empirical studies as a rule assume that the links between factor amounts and profit (returns) are best described by a logarithm-linear function (Cobb-Douglas-Function) or by a C.E.S. Function (2). It is assumed, thereby, that production rises as the input of labour and capital increases according to

Graph 3:

Dependence of the level of income (Y) on factor inputs



- decreasing returns to scale
- constant returns to scale
- increasing returns to scale.

The first case is illustrated in Graph 3. A decisive element for the presence or absence of returns to scale is the degree of consistency of the production function.

As capital increases at constant labour input (population), the profit growth will decrease even if proportional returns increase (3). The same applies to a rising labour input if the capital supply remains unchanged. The marginal return declines ceteris paribus with increasing input of this factor, independently from the question whether returns to scale are increasing or decreasing.

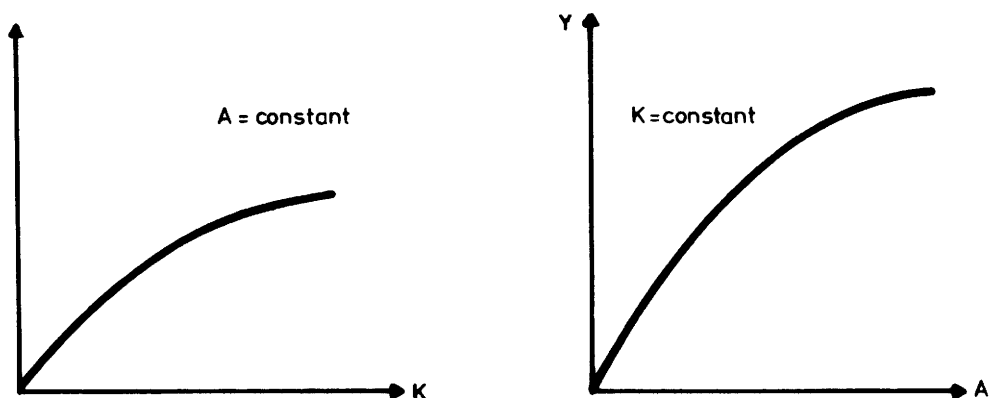
(1) See J.H. Müller, Theory of production in: Compendium of political economy, Vol. 1, Edition 3, Göttingen 1967, p. 89 ff, W. Krelle, Theory of production, 2nd Edition, Tübingen 1969, p. 23 FF.

(2) See W. Krelle, Theory of production, p. 142 ff, M. Brown, On the Theory and Measurement of Technological Change, Cambridge 1968, p. 31 ff

(3) See M. Brown, On the Theory and Measurement of Technological Changes, p. 32 and 46 ff; J.H. Müller, Theory of Production, p. 102

Graph 4:

The dependence of income level on factor inputs when one factor only varies



The evidence furnished by these curves is indispensable for any assessment of the consequences of the concentration process and for drawing-up an appropriate Community regional policy, since the economic consequences of congestion derive from their shape. In this case we are, in fact, referring to the effects on the most important aim of European regional policy.

The left hand diagram of Graph 4 shows that, with the assumed shape, (*ceteris paribus*) the rate of return on a given unit of additional capital is largest where, in relation to labour input, less capital is expended, i.e. in less industrialised areas. Conversely, one additional worker brings the highest return where, for the same capital input, fewer workers are employed - that is to say where capital intensity is greatest.

The consequences for regional policy to be drawn from this situation are:

- that it is advantageous, in all cases, from all economic aspects, to restrain the flow of investments into the congested areas or even to direct industrial settlement in a contrary sense;
- that a further trend to concentration of the labour factor should only be checked, in the mutual overall interest, if this is going to be harmful to other aims (quality of the environment and of infrastructure).

The existence of returns to scale will only have a part to play in the consequences abovementioned if trends running counter to the two factors (capital and labour) should balance marginal productivity of all factors generally. It is, indeed, the most profitable course to increase both factors in parallel and, for returns to scale, in the region where the highest absolute level has been reached.

It is, therefore, of decisive importance for regional policy guidance to obtain the necessary data (labour, capital, social product) for assessing the functions of production and to calculate the corresponding parameters. For the curves

Table 7: Estimated results: regional production functions for North Westphalia (Cobb-Douglas function)

Sector	$\ln a_0$	a_1	a_2	a_3	a_4	R^2
Farming and Forestry	1.87761 (0.39347)		0.41296 (0.08441)	0.11795 (0.10594)	0.44197 (0.11149)	0.829
Energy and Mining	1.64021 (0.45390)	0.03874 (0.01819)	0.71102 (0.07644)	0.26708 (0.09545)		0.957
Chemicals, quarrying, clays	2.3465 (0.40651)	0.07450 (0.02379)	0.59508 (0.13382)	0.33945 (0.11112)		0.943
Iron, Steel, other metals	2.19195 (0.09051)	0.03010 (0.00575)	0.68953 (0.03761)	0.28678 (0.02926)		0.984
Engineering, motor vehicles	1.68870 (0.34141)	0.06922 (0.01677)	0.69175 (0.18844)	0.30706 (0.15026)		0.954
Electrotechnical, computers	1.70257 (0.34044)	0.03945 (0.01832)	0.75384 (0.15102)	0.30315 (0.13218)		0.949
Wood, paper, leather, textiles	2.26773 (0.19994)	0.02736 (0.01168)	0.81191 (0.09641)	0.17822 (0.07934)		0.975
Food industry	2.17655 (0.21021)	0.03399 (0.01577)	0.57147 (0.09679)	0.34348 (0.06907)		0.946
Construction	1.40724 (0.25451)	0.03337 (0.01048)	0.80734 (0.06663)	0.15422 (0.05717)		0.952
Trade and Transport	1.69137 (0.45791)		0.49504 (0.17941)	0.45637 (0.16017)		0.924

a_0 = efficiency parameter
 a_1 = technical progress
 a_2 = partial elasticity of production relative to labour
 a_3 = partial elasticity of production relative to capital (figures in brackets = standard deviation)
 \ln = natural logarithm
 a_4 = partial elasticity of production relative of farm areas
 R^2 = coefficient of correlation

shown in Graph 4, it is necessary that the elasticity of production relative to labour and capital be less than one.

In fact, all empirical studies lead to this result (1). For example, the empirical calculations of H.J. Schalk on sectoral production functions for the regions of North-Rhine Westphalia lead to the results indicated in Table 7 (2).

Should these results also be confirmed in other parts of the European Community (as all indications suggest) this would mean that, in general economic interest, additional capital should be withheld from the congested areas and instead invested in the currently aided regions.

The converse applies to the labour factor; here, the advantages of productivity in the congested areas are so great (in view of their high capital structure) that, from the economic optic alone, a further measure of concentration must be recommended. Only out of environmental and infrastructural considerations is it necessary to limit congestion.

To establish target values in these fields is, therefore, an indispensable condition for a valid policy for checking concentration.

3.2.2 Economic benefits and costs of a regional concentration trend

On the basis of the criteria considered in 3.2.1 above, which allow the consequences of the concentration process to be measured for a given level of the three targets, the question of what economic benefits and costs result from concentration can now be examined. As suggested in the introduction, what is understood by a trend in regional concentration is a change in the regional distribution of population and the economy, leading to a density increase in the regions already congested, while the density in other regions remains constant or may even decline. The easiest way of presenting the advantages and disadvantages of these changes is to enquire firstly into the effects of growth in the congested regions (values in other regions remaining constant) and then to discuss the effects resulting from the parallel growth of the congested regions and contraction of the depopulated areas.

The curves referred to in 3.2.1 will be used to indicate the advantages and disadvantages of concentration. They show how varying regional densities (number per km²) influence target values. The abscissa values for the overcrowded areas are indicated by V, those in the depopulated areas by E.

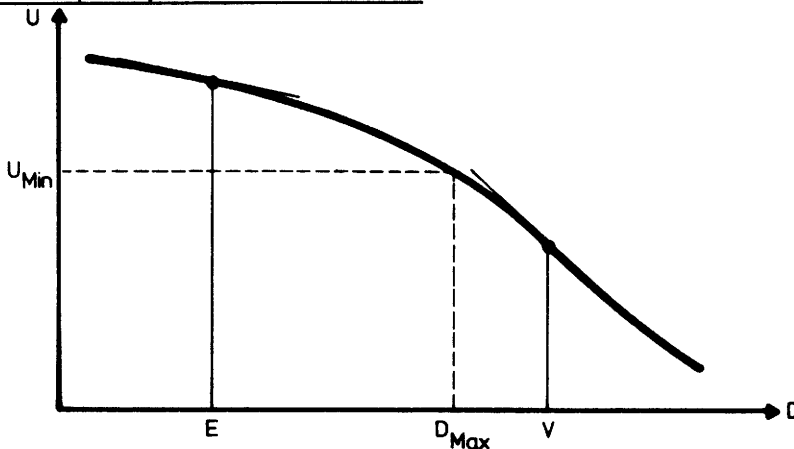
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- (1) See R. Thoss, A Proposal for Co-ordinating Regional Policy in a Growing Economy in: Yearbooks for national economy and statistics, 182(1969), p. 502
M. Brown, On the Theory and Measurement of Technical Change, Cambridge 1968
B. Carlsson, The Measurement of Efficiency in Production, in: Swedish Journal of Economics, 74(1972), p. 468 ff
 - (2) See H.J. Schalk, Establishing Regional Productivity by Calculating the Functions of Production, Münster 1976, p. 130

3.2.2.1 Impact of concentration on the quality of the environment

By considering the relationship, described at 3.2.1.1, between quality of the environment and settlement density, it can be seen that an increase in population and its economic activities leads in all cases, *ceteris paribus*, to a worsening of the quality of the environment. The extent of this negative effect of population and/or capital is shown on the curve of quality of the environment at the point where the density increases.

Graph 5:

The consequences of a change in the level of concentration for the quality of the environment



Certainly, an increase of population and/or capital in areas with a low settlement density (Graph 5, point E) leads to a decline in environmental quality but this, in the given curve, is much less than at V.

In evaluating concentration, only the net burden created by the congestion process should be taken into account.

If the increase of concentration in the congested areas takes place through migration of the population and/or capital out of the areas with a small settlement density, then the burden on the environment in the congested areas is accompanied by some improvement in environmental quality in the depopulated areas.

Naturally, at this point, only the trend of the impact of concentration on environmental quality can be suggested. However, Graph 5 shows very clearly that a rational political decision on concentration questions makes it necessary to fix thresholds for a minimum (U_{Min}) of environmental quality

which must be maintained in each region (1). If the curve representing environmental quality is described by a suitable model (2), the maximum density allowed, D_{Max} , follows automatically from this fixed minimum.

Having regard to the target of maintaining or improving the environmental quality (the technical situation remaining unchanged) it becomes necessary to avoid further concentration and to seek a reduction of concentration already existing. Without a transfer to clean production processes and/or improved anti-pollution techniques every increase in concentration leads to a decline in target fulfillment relating to environmental quality. By way of more rigorous environmental obligations on enterprises, in the field of communications, etc., it is possible to reduce the pressures on environmental quality.

3.2.2.2 Impact of concentration on infrastructure costs

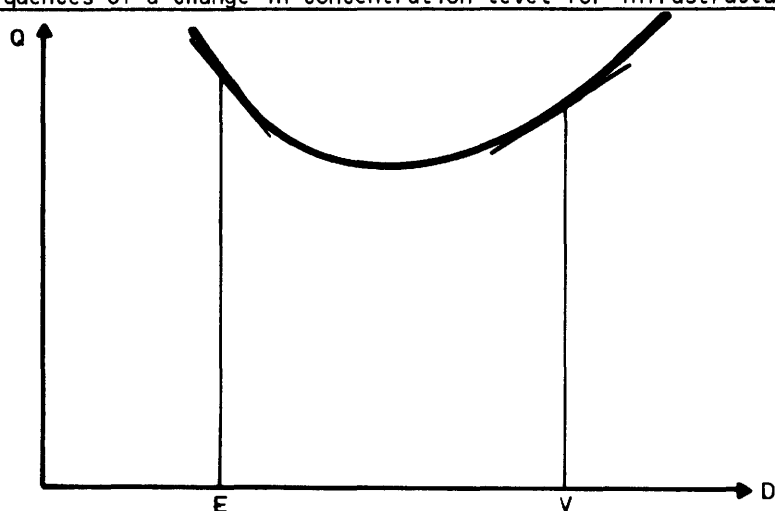
In order to study the impact of further concentration in the congested areas on infrastructure supply costs it is necessary to fix the minimum standard for infrastructure to be maintained in all regions. This standard can only be assured in both thinly and thickly populated areas with relatively high financial expenditure. A decline in the density gap by supporting areas with medium density would lower total costs of infrastructure.

However, attention must first be given to the existing level of infrastructure in a region. If an area is already equipped (despite higher costs), the installation costs for the infrastructure already provided i.e. total costs per head of population, will be correspondingly less.

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- (1) The European Communities have already begun to fix these normal standards i.e. see guidelines of the Council of 8 December 1975 on the quality of bathing water in O.J., 19(1976) N° L 31, page 1 ff. Council guidelines on quality requirements for surface water used to supply drinking water in Member States in O.J. 18(1975) N° L 194, p. 34 ff.
 - (2) See R. Thoss, in: Planning environmental protection in regional research and planning, 30(1972), p. 180, by the same author: A generalised INPUT-OUTPUT model for residuals management in K.R. Polenske and J.V. Skolka (Editors) Advances in Input-Output Analyses, Cambridge (Mass.) 1976, p. 411 f

Graph 6:

The consequences of a change in concentration level for infrastructure costs



An increase in density in the congested areas leads to a further burden on existing infrastructure. Due to supply shortages (in particular, land scarcity) and the high costs of necessary changes an increase in capacity can only be obtained by an above average rise in infrastructure installation costs. Since identical infrastructure can be introduced into less developed areas with a considerably lower capital input, this approach (considered only from the angle of infrastructure) is economically unproductive.

Conversely, an increase in population in the depopulated areas would lead to a better use of existing infrastructure and create at the same time a rational basis for establishing more efficient installations, which would, otherwise, have been impractical due to higher construction and maintenance costs. Under the conditions in question the effects of concentration would be negative both in congested and in less dense areas.

As was confirmed in the case of quality of the environment, two phases are needed to study these effects within the framework of European regional policy

- a fixing of the standard sought and
- a description of the interdependence of factors by way of a model. A condition for this is the availability of the statistics required.

3.2.2.3 Impact of concentration on the level of income

Both phases abovementioned are also needed to study the level of income with a view to a regional policy strategy for influencing regional concentration. Fortunately, however, in this field (of regional policy) theoretical and practical research has been plentiful; this cannot be applied directly at Community level but can be useful in providing examples for the approach required.

Certainly, this portion of the global problem of regional concentration has been more intensively researched to date in regional scientific studies than the fields of quality of the environment and infrastructure.

From the optic of income, the problem of concentration must be assessed having regard to the consequences which would emerge from the alternative regional distribution of people and capital over the surface area (the regions) of the territory in question. To reach an optimum regional level of concentration the factors of production have to be channelled into those sectors and regions where they make the highest contribution to growth (1). The guidance target for the best distribution of the factors may be instanced by way of the following quotation from Funck:

The input of the labour factor in the production of a particular commodity in several regions is optimal in all those regions where the decision of entrepreneurs leads to a labour input in such proportions that physical marginal productivity of labour in producing the commodity in question is identical in all regions (2).

The same considerations apply in optimising the proportional inter-regional input of the capital factor (3).

Geisenberger and others have followed this line of thought in detail and in the context of the best distribution of the capital factor have come to the following result:

The enquiry has led principally to the need to compare the alternative regional rises in gross domestic product, relating to a particular monetary investment. In deciding the regional input of a monetary investment, the region with the comparatively highest growth of gross industrial product should, rationally speaking, have priority. In other words: investment takes place in a region where GDP growth is relatively higher as a result of an investment. This approach requires a permanent comparison of regional marginal productivities: if, following investments, marginal productivity of capital in the region with the relatively highest marginal productivity (Region A) falls below the level of the region with the second highest marginal productivity (Region B), further investment will take place in Region B but only so long as marginal productivity in Region B has not fallen to the level of the region with the third highest marginal productivity (Region C) and so on. From these considerations it follows that only those regions can be regarded as having economic development potential where the marginal productivity of capital is so high that further investments can be envisaged if a monetary investment of a given volume is distributed, according to the principle above mentioned

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- (1) H.K. Schneider, On the necessity of regional economic policy, in: H.K. Schneider (publishers), Contributions to regional policy, Articles by the Social Policy Association, Vol. 41, Berlin 1968, p. 4
 - (2) R. Funck, Mechanisms of regional policy in: H.K. Schneider (publishers) Contributions to regional policy, p. 115
 - (3) Idem, cf. also B.A.J. Brown, The framework of regional economics in the United Kingdom, Cambridge 1972, p. 245; D. Marx, Growth oriented regional policy, p. 46

of balancing regional marginal productivities, over the whole economic field (1).

These results apply in the same manner to the labour factor. The same authors then turn to the question of providing the required marginal productivities of the factors in question:

The instrument (or thought process) for establishing marginal productivities is a macro-economic production function for each region. Regional gross domestic product will then be treated as a function of all factors of production introduced into the region. If this function is known it should then reveal how far regional GDP rises or falls following certain measures in the field of a single production factor or combined measures in the field of some or all production factors. On the basis of this knowledge, it could be established by regional comparison in which region growth of GDP would be relatively highest as a consequence of a given investment.

The authors state that "the long term aim of research into regional development" is to apply these functions and are sceptical in this connection of existing statistical material. However, this should not prevent the use of "a macro-economic production function as a theoretical base for developing the concept of economic development potential" (2).

Without doubt the scepticism of the authors with regard to the availability of statistical material is well grounded. If, however, there is a political will to put Community regional policy on a more rational basis, it should really not be difficult to obtain the appropriate statistics. To date there would appear to be cross section functions - even if they only provide averages - which can serve as a suitable aid to bridge the gaps.

3.2.2.3.1. Capital productivity

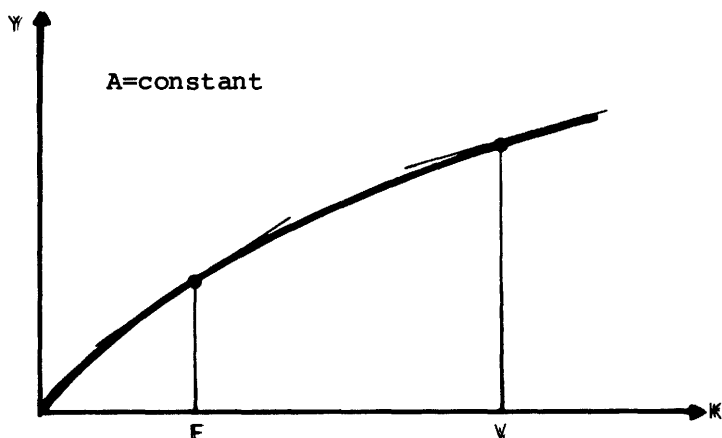
Within the major concentration areas of the European Community capital intensity is already very high because of earlier rapid growth of capital supply by comparison to labour input. A rise in the capital supply, therefore, will lead in these areas, *ceteris paribus*, to a comparably more narrow rise in output than in the peripheral less industrialised areas because of the existing relatively low marginal productivity of capital. Graph 7a shows that the growth curve of the production function is less at Point V than at Point E.

(1) S. Geisenberger, W. Mälich, J.H. Müller, G. Strassert, On establishing economic need and development potential of regions, Hanover 1970, p. 7

(2) *idem*, On estimating regional economic need and development potential, p. 8

Graph 7a:

The consequences of a change in the concentration level for the marginal productivity of capital



The opportunity costs of an investment in a congested area depend on the returns which might have been available if the funds had been put to the best alternative use (see our example at Point E). An overall economic loss amounting to the difference in marginal productivity between the two regions is therefore caused by concentration.

A decline in the capital supply of a region usually takes the form of wear and tear and simultaneous decline of reinvestments. If this should occur in the depopulated areas with relatively smaller capital intensity, the total negative effect of concentration will be caused by the opportunity costs of investment in the areas of concentration and the relatively high loss in output in the depopulated areas.

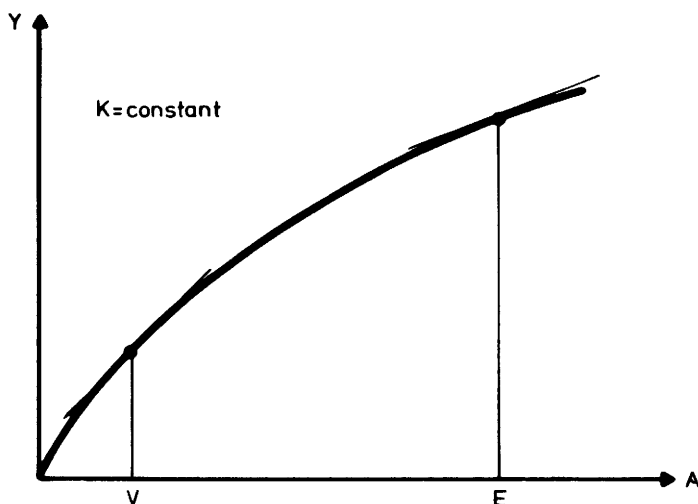
The investment policy which appears most sensible from the point of view of capital productivity would be to refrain from compensating for the wear and tear in the areas of concentration and instead to direct all investment resources into the depopulated areas.

3.2.2.3.2 Labour productivity

With regard to concentration of the labour factor, the situation is the exact opposite to the above. This can be seen from Graph 7b where, unlike all other graphs, Point V is closer to zero than Point E.

Graph 7b:

The consequences of a change in the level of concentration for the marginal productivity of labour



In fact, Graph 7b is the reverse of Graph 7a, i.e. labour input is low in the areas of concentration by comparison with existing capital supply and is, conversely, high in the depopulated areas. The marginal productivity of labour (the growth curve of the production function) is therefore higher at Point V than at Point E.

In the case of concentration caused by migration the product increases due to the difference between the (higher) marginal productivity in the congested areas and that in the less developed areas.

From the optic of this partial aspect regional concentration is therefore economically advantageous. If concentration declines for other reasons (e.g. the environment, infrastructure), this loss of income must be considered as the "price" for increased use, arising from improvement of the environment and/or infrastructure.

3.2.2.3.3 Advantages of conurbations

Readers will not have failed to observe that only partial marginal productivities of factors were taken into account in the previous remarks while the relevant literature on this complex of questions deals mainly with elasticities of scale.

The reason for our slow progress is that in reality, the marginal productivities of factors vary between regions and the partial elasticities of production are smaller than one. In such a case it does not matter whether the total elasticities of production are larger or smaller than one.

In every case it is therefore more profitable to invest in regions with smaller capital intensity for the return on every additional unit of capital is greater therein.

This is clarified by a single example in which we compare the marginal productivity of capital for, respectively, a production function with sinking returns to scale (A) and for a production function with rising returns to scale (B):

$$(A) \quad Y = A^{0,7} K^{0,2}$$

$$\frac{\delta Y}{\delta K} = 0,2 A^{0,7} K^{-0,8}$$

$$(B) \quad Y = A^{0,8} K^{0,3}$$

$$\frac{\delta Y}{\delta K} = 0,3 A^{0,8} K^{-0,7}$$

Both in case (A) and in case (B) the marginal productivity of capital is in inverse proportion to K. It is therefore greater where K, ceteris paribus, is of low value i.e. in less industrialised regions.

Only if all regional variations of capital intensity have been eliminated, which is a truly utopian proposition, could one counsel an even distribution of total investment to all regions.

3.2.3 Economic benefits and costs of a regional deconcentration trend

In principal, the benefits and costs of a deconcentration trend can be obtained by inverting the considerations applied to concentration. In the first place it should be noted that the speed of a possible deconcentration is limited by the inflexibility of existing supplies of private and public capital.

It became clear from the details of the effects of concentration on the quality of the environment (3.2.2.1) that deconcentration would contribute to achieving the target of the maintenance and improvement of environmental quality. The heavy burden imposed on the environment in the concentration areas, which has quite often reached critical proportions, would be reduced whereas a smaller burden would arise in areas of lower settlement density; this raises few problems in view of the lesser degree of imposition on the environment. In considering environmental quality of the whole area, deconcentration has therefore a positive (beneficial) impact.

The effects of deconcentration on infrastructure quality cannot be so clearly assessed. Much involved here are de facto existing installations in the congested areas and in those affected by deconcentration. If deconcentration should lead to the dismantling of surplus infrastructure in the congested areas and to improved infrastructure in the depopulated areas, there is a double positive result. If, on the other hand, deconcentration is linked to insufficient utilisation of infrastructure in the congested areas and overburdening of the

smaller infrastructure capacity in areas with lower settlement density, deconcentration, at least for a time, will have a negative effect on the quality of infrastructure supply. In reality, both cases instanced and further possible combinations of bottlenecks and under-utilised capacity are to be found in the respective fields of infrastructure.

A decision must be made in each individual case as to whether the situation for the population as a whole can be improved by deconcentration. It can, however, be assumed that selective deconcentration will at least tend to raise the quality of infrastructure and thereby lead to better supply for the population.

It follows from the details at 3.2.2.3.1 (capital productivity) and 3.2.2.3.2 (labour productivity) that growth orientated regional policy will require channelling of the factors of production into the areas where marginal productivity is greatest. Since marginal productivity of the capital factor, in the areas with smaller settlement density and lower capital intensity, is relatively high, it is reasonable to direct investment out of the concentration areas and into these depopulated areas since the growth contribution of capital is relatively high and a rise of regional income is therefore to be anticipated.

The reverse applies to the labour factor. The marginal productivity of this factor is greater in the concentration areas with high capital intensity than in the depopulated areas. A policy of deconcentration of the population would lead to a reduction of growth up to the level of the difference between respective marginal labour productivities in the two regions.

On grounds of productivity alone it would be undesirable to stimulate deconcentration since this would lead to an excessive decline in income. Measures to reduce labour input in the concentration areas can therefore be justified only for reasons related to the environment or to infrastructure.

3.3 Upper and lower limits of concentration

It follows from the considerations abovementioned that no binding conclusions may be drawn concerning desirable minimum or maximum levels of concentration from the function profiles of the three types of objectives. This is not only due to the fact that the shape of these curves has hitherto not been defined empirically since, even then, the problem of deciding at which point on a curve regional policy should start giving support remains unsolved. The answer to this question would only be simple if there were a given density which ensured minimum environmental pollution and maximum achievement of infrastructure quality and income level at the same time. A regional distribution of population and the economy would then be sought whereby this settlement density would generally be achieved.

Instead, considerations have shown hitherto that in most cases theoretical propositions support the notion that no clear limit value exists. Even if these theoretical considerations are false it would be highly improbable for all curves to attain their maximum value at the same density.

This means, however, that improved target achievement in one of the three fields is only possible at the price of concessions in one of the other fields. A political decision on the target level to be sought is therefore necessary in each case.

A decision of this kind will, however, be easier and more rational if the level of the concessions which are required to reach the target in another field (opportunity costs) can at least be suggested approximately. The effective importance of the curves sketched above derives from their assistance in establishing the opportunity costs which are inherent in a given level of realisation of a target. As an example, this provides an answer to the question what reductions will occur in the quality of the environment if a given minimum income is sought. It is precisely this information which will provide shadow-prices for a linear programme.

Two current examples in the Federal Republic of Germany illustrate the fixing of relevant threshold values for the target variables of the regional concentration process:

- process for target fixing within the framework of the Common Task "Improvement of regional economic structure" and
- the recommendation "Social indicators for regional planning" of the Consultative Committee for regional planning (1).

Within the framework of regional economic policy in the F.R.G. further concentration trends will be countered by accumulating capital in the depopulated areas. Investments stimulated in this manner will both improve income opportunities for the labour factor and check migration. For this purpose the territory of the Federal Republic will be divided into 166 regions of which 94 receive aid at the present time (2).

As a criterion for assessing the aid eligibility of regions, a linear, ordinal substitutive Welfare-Function (W) will be used containing target indicators "reserve labour potential" (Z_L), "level of income" (Z_Y), and "infrastructure equipment" (Z_Q), with target weightings 1,0; 1,0 and 0,5, i.e.

$$W = 1,0Z_L + 1,0Z_Y + 0,5Z_Q \quad (3)$$

In the usual presentation of indifference curves of ordinal utility functions a two-dimensional picture can be obtained if one variable is held constant. When Z_Q is constant the indifference curves of the function W can be presented

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- (1) See The Federal Minister for Regional Planning, Building and Urban Development (Publishers) Consultative Committee for regional planning recommendations of 16 June 1976, p. 27-60
 - (2) For details see: R. Thoss, Identification and measurement of the effects of regional policy in the Federal Republic of Germany: OECD (mimeo DSTI/INDG/76.16). Measuring the effects of regional policy, June 14, 1976

$$(3) Z_L = \frac{L_S - L}{L_S}, Z_Y = 0,33 \frac{W}{L} + 0,33 \frac{Y}{B} + 0,33 \frac{Y}{B+2P}$$

In this case, infrastructure covers the following fields: transport infrastructure (streets, railway), energy infrastructure (electricity, gas), residential infrastructure, education facilities, public health etc. See D. Biehl, E. Hussmann, K. Rautenberg, S. Schnyder, v. Südmeyer, Bases for establishing regional development potential, Kiel Studies, Economics Institute of Kiel University, publishers H. Giersch, Vol. 133, Tübingen 1975, p. 109-125.

as a number of straight lines with a slope of $-1,0$ on which individual regions lie (see Graph 8).

The development measures to prevent further regional concentration trends will be focussed on 94 regions, lying on the indifference curves with the lowest levels. Disincentives in the congested regions (i.e. in regions located on the higher indifference curves such as Cologne, Hamburg, Wolfsburg, etc.) are not yet considered useful or necessary. In the United Kingdom and in other European States, on the other hand, the introduction of investments into this type of region is hindered by refusals to grant investment permits. This can lead to a redirection of investment towards regions on lower indifference curves, unless the total volume of investment might on that account be lessened.

The way chosen within the framework of German regional policy corresponds precisely with the proposed procedure for fixing the target levels from which, with knowledge of the functions concerned, the optimal density can be derived. This procedure, however, has one weakness, which should be avoided in the future particularly in any application to European regional policy. It considers that the target variables in the Welfare-Function W are mutually replacable and that, for instance, in a particular region, a low level of public health facilities can be compensated by a higher income per head or by better opportunities for labour. All experience shows that an approach of this kind does not correctly reflect the utility assumptions of the population.

The Consultative Committee for regional planning has therefore made a proposal for fixing the corresponding target threshold values; this works on the assumption that individual target achievement levels cannot be mutually compensatory but that it is necessary, for each variable, to reach a certain level (1). Contrary to the linear indifference curves in Graph 8 a rectangular indifference curve occurs (in the case of two variables), indicating the minimum level to be attained by each variable. The advantage of a formula of this kind is that it avoids continuous delay in individual target achievement in some regions.

3.4 Summary of findings

One of the most striking results of an examination of existing literature is that empirical studies into the form of the functions shown in Graphs 1 to 7 hardly, as yet, exist. In connection with this obvious lack of information it must, however, not be forgotten that even with a full knowledge of the shape of the curves the fixing of threshold values also has to take place. This fixing of operational targets for the concentration process is therefore in no way rendered superfluous by the statistical determination of the functions. The knowledge of the curves would only improve the bases of decision to the extent that the curves could be used to calculate trade-offs between respective targets. Today - without precise knowledge of the interrelationships - decisions in regional policy influencing regional concentration must naturally be taken daily. Fixing target values is a first step on the road to a more rational direction of concentration. In the long run, however, a model should be constructed containing the various functions dealt with in this chapter. Only then will the necessary political decisions be taken in full appreciation of the target implications.

(1) See the Federal Minister for Regional Planning, Building and Urban Development (publishers), p. 36

4. Measures for checking further concentration trends and for reducing existing concentration by disincentives and taxes in the concentration areas

There are two kinds of argument for introducing disincentive mechanisms in the concentration areas (1).

On the one hand, there are measures leading to a limitation of expansion in the concentration areas and to a rise in the available part of development potential which can be directed by way of incentives into the less favoured areas. Within this meaning, disincentives may lead to greater efficiency of promotion policy.

On the other hand, it is necessary to find adequate measures to contribute to improved living conditions in the concentration areas or at least to prevent them becoming worse.

The reason for granting aids to the economically less favoured areas is to prevent the regional concentration of population and industry. The first target in introducing aid measures is, however, to hasten economic development in favoured peripheral areas. The effect for the concentration areas (avoiding further unwanted immigration) only takes the form of a positive side effect. So far, the impact of aid measures has been insufficient to reduce the unwanted concentration trends to the desired degree.

Measures must now be devised aimed at checking the trend to further unwanted regional concentration and contributing to deconcentration. However, there can be no doubt that a policy for deconcentration cannot be applied without concern for measures to aid the less favoured areas. This will become increasingly clear from the following propositions. However, investigation of the congested areas is of primary concern in this study.

4.1 Indicative versus mandatory control measures

In considering measures to avoid further concentration trends and to reduce existing regional concentration there are two different forms of mechanism; indicative measures and mandatory measures. Indicative measures are interest rates, taxes and grants. Mandatory mechanisms are national prohibitions (refusal of permits) and obligations. The following propositions on indicative and mandatory mechanisms are examples of the way investment between regions may be directed. However, they are also generally applicable to other measures aimed at preventing undesirable regional concentration.

The State seeks to influence investment motives by introducing indicative mechanisms in the form of regional incentives or disincentives. Thereby, it indicates to the investor the regions in which investments are desired or undesired, e.g. by a regional investment tax. Indicative mechanisms do not affect the freedom of action of entrepreneurs.

(1) See A. Bergan, Preliminary Paper on Restrictive Regional Policy Measures, to Members of the Working Party N° 6 of the Industry Committee, OECD, 11.11.1975, p. 3 ff

For instance, the entrepreneur is free to invest in areas with an investment tax but he must take that tax into account. Indicative mechanisms for the direction of regional investment are in conformity with market conditions since the State imposes no direct obligations with regard to the regional distribution of investment.

Conversely, the introduction of mandatory mechanisms is a direct imposition on the freedom of decision of the entrepreneur. Prohibitions on regional investment - only these are of interest in connection with avoiding undesirable concentration - which are currently applied in the form of refusals to sanction investments in different countries of the European Communities limit freedom of choice for the investment location. While direct influence on the size of regional investments can be obtained by national procedures for sanctioning investments, it is necessary, firstly, in the case of indicative mechanisms, to study their anticipated effect on investments, that is to say, an analysis of the effectiveness and anticipated effectiveness of the mechanisms must be carried out before deciding on the level required to achieve a precise target.

This applies equally to the problem of imputing additional social costs. This concerns a charge of which the volume is calculated on the basis of anticipated losses. Whether and to what extent potential investors in concentration areas are sensitive to these obligations can only be appreciated by knowing the parameters reflecting the effectiveness of the charges in question.

The last comment should not give the impression that mandatory mechanisms - unlike indicative mechanisms - can be introduced without problems. Here, the problem derives much more from the fact that investments may be restrained by prohibition from a particular area but this provides no guarantee that they will then go to the area where they are wanted. It is much more likely that they will either be dropped altogether or that they will go abroad.

A further problem is that not all investments should be hindered from entering the concentration areas but only those which the authority with power of decision deems undesirable. The effect required can only be sought by sectoral differentiation of disincentives. There has to be discrimination against branches where investment is unwanted because it runs counter to aims. In the case of approval procedures, a decision is also needed as to which investments are generally desirable in the concentration areas.

The decisive advantage of indicative mechanisms is that precise guidance by way of the market mechanism remains unchanged.

4.2 Consideration and assessment of the efficiency of already existing or potential measures for influencing choice of locality and residence

In the following paragraph, the most important measures for influencing regional distribution will be outlined. This presentation makes no claim to deal with all measures in full.

4.2.1 Measures inhibiting new investment in Community countries

A possibility exists of restraining unwanted investment in the concentration areas by introducing the obligation to obtain necessary authorisation for the establishment and extension of industrial and service activities. This measure is already applied in varying forms in some countries of the European Communities.

4.2.1.1 France

The prevailing feature of French regional policy of the last two decades has been the attempt to limit the expansion of Paris (later of Lyon, also) aimed at achieving a better distribution of economic activities in the provinces. The essential measure adopted for this purpose has been the introduction of an authorisation procedure for investments.

In France, construction or extension of industrial building or service activity premises in the Paris and Lyon regions has required the authorisation of the Ministère de l'Équipement (1). The Minister's decision is adopted on the basis of an opinion of a committee formed by D.A.T.A.R. (Délégation à l'aménagement du Territoire et à l'Action Régionale).

The Committee assesses the usefulness of the establishment abovementioned in the concentration regions of Paris and Lyon. Authorisation is required for investments in industry and service activities, which exceed a given threshold value in the surface area required and/or in the number of persons employed.

The aim of this investment control is to prevent the establishment and development of enterprises in Paris which can work as efficiently in the provinces. Decision criteria for the granting or refusal of authorisation are, together with the surface area required and/or the number of persons employed, "the nature of the firm's products, the links between company and suppliers, the likelihood of success in an alternative location and its competitive position in international markets" (2).

Concerns, who receive authorisation, have to pay special taxes.

These measures have been successful with regard to industry but expansion in the services sector has scarcely been curbed (3). However, it should be noted here that measures have only applied to service activity since 1972.

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- (1) For authorisation procedure in France see: Commission of the European Communities, A Regional Policy for the Community, 1969, p. 96
Idem, Report on regional problems in the enlarged Community, p. 232
W. Brücher, Aims and results of industrial decentralisation in France in: Regional Research and Regional Planning 29(1971) p.268; U. Thumm, Regional policy as an instrument of French economic policy, An enquiry into regional planning, Essays on Regional and Transport Problems in Industrial and Development Länder, publishers J.H. Müller and Th. Dams, Vol.3, Berlin 1968 p. 156, A. Bergan, Restrictive Regional Policy Measures, p. 12 ff
- (2) A. Bergan, Restrictive Regional Policy Measures, p. 12
- (3) Idem, Restrictive Regional Policy Measures, p.14, Re-Appraisal of Regional Policies in OECD Countries, Organisation for Economic Co-Operation and Development, Paris 1974, p. 106

4.2.1.2 Great Britain

In Great Britain (1) control of locality selection for industrial concerns has existed since 1945 within the framework of British Regional Policy (Industrial Development Certificates). However, the rules have been amended several times. Since 1972, outside the Development Areas and Special Development Areas, an Industrial Development Certificate (IDC) has been necessary for the construction of an industrial establishment and for the extension of an existing industrial premises of more than 1,000 m² (10,000 sq.ft.) in the South-East and about 1,400 m² (15,000 sq.ft.) in districts outside the Development Areas (2). Prior to a decision, the application is checked by the responsible Government Department and the Regional Planning Authority. The local Planning Authority has the right to disallow government authorisation.

Authorisation will be refused if a concern is free to settle in the Development Areas or if settlement or extension will increase shortages of resources; in particular of labour.

Authorisation will only be granted where the concern can show that its competitive ability and long term profitability will be prejudiced by settlement in the Development Areas (3).

An empirical evaluation shows that authorisation refusals have prevented the creation of 120,000 industrial jobs between 1966-1970 in the more prosperous regions. This figure has been reduced by further expansion of employment in existing undertakings as a consequence of investment prohibition (4).

The hypothesis that the essential restrictive effect of investment control does not result from a formal rejection of an application but by way of discouragement at the stage of informal enquiry (5), that is to say, by withdrawal of the application, has not been confirmed in practice.

In view of the recognition that excess demand for ground and labour is caused essentially by expansion of the tertiary sector, control was extended to office building by the Control of Office and Industrial Development Act 1965.

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- (1) For details of authorisation procedure in Great Britain see: Commission of the European Communities, Report on regional problems in the enlarged Community, p. 278; G.C. Cameron, Regional Economic Policy in the United Kingdom in: Regional Policy and Planning for Europe, published by M. Sant University of East Anglia, 1974, p. 20 f; V.I. Küpper, Resources and Results of Regional Development Policy in Great Britain in: Regional Research and Planning, 29(1971), p. 252; J.B. Callingworth, Town and Country Planning in Britain, Edinburgh 1972, p. 62 ff; A. Bergan, Restrictive Regional Policy Measures, p. 7 ff
 - (2) See G.C. Cameron, Regional Economic Policy in the United Kingdom, p. 20; B. Moore and J. Rhodes, Evaluating the Effects of British Regional Economic Policy in: Economic Journal, 83(1973), p. 108
 - (3) See A. Bergan, Restrictive Policy Measures, p. 8; G.C. Cameron, Regional Economic Policy in the United Kingdom, p. 20
 - (4) See B. Moore and J. Rhodes, Evaluating the Effects of British Regional Economic Policy, p. 108; see also A.J. Brown, The Framework of Regional Economics in the United Kingdom, p. 103
 - (5) A.J. Brown, The Framework of Regional Economics in the United Kingdom, p. 303

Since then authorisation (Office Development Certificate) has also been needed in the concentration areas for constructing and extending office buildings which extend over more than 10,000 square feet. This authorisation is only granted if the investment is in the public interest and the location cannot be elsewhere.

This measure is supported by the Location of Offices Bureau which informs concerns of the disadvantages of concentration areas and the advantages of other localities (1). The only means available to this institution are information and persuasion. It is estimated that, on the strength of these two measures, concerns employing some 200,000 people have left London. However, many have remained on the outskirts of London.

In considering the activities of the Location of Offices Bureau, it is not possible to discover how far they contribute to the avoidance of investment or to the displacement of capital already invested. Still it must also be taken into account along with direct measures aimed at the transfer of undertakings.

In contrast with French rules governing authorisation, where the numbers employed are also taken into account, the British system uses surface area as the only criterion. The need to obtain authorisation may be bypassed by settling new undertakings in buildings already existing and by expanding concerns already located but below the legal threshold value.

4.2.1.3 Italy

The main objective of regional policy in Italy is to develop the south of the country. Investment control was introduced in 1971 (3).

Since then the construction of new industrial concerns and the extension of existing concerns, with investment of more than Lit. 7,000 million, are governed by authorisation procedures. An inter-ministerial Committee grants authorisation. If investment takes place without authorisation, a penalty of 25 % of the total investment is payable to the State.

The principal reason for introducing this measure, however, was rather to promote growth in the Mezzogiorno as a counterweight to pressure on resources in the concentration areas (4).

(1) See A. Bergan, Restrictive Regional Policy Measures

(2) See idem

(3) See Commission of the European Communities, Report on regional problems in the enlarged Community, p. 257; A. Bergan, Restrictive Regional Policy Measures, p. 15

(4) See A. Bergan, Restrictive Regional Policy Measures, p. 15

4.2.1.4 Netherlands

A system of administrative controls and disincentives aimed at avoiding undesirable investments was defined by a law promulgated on 1. October 1975 (1).

The law governs the authorisation of all building in industry and service activity which is to be carried out in the Rijnmond, where the total investment exceeds Fl 1 million. Authorisation depends on the results which may be anticipated from the investment with regard to concentration of the population and their activities and, therefore, on economic structure and the labour market. This measure corresponds to the investment controls abovementioned in England and in France.

A further measure is the requirement to advertise building plans in a wide area in the west of the Netherlands.

Furthermore, a selective investment tax has been introduced on building investments of more than Fl 250,000 in the Rijnmond region. This tax is designed to make building investment more costly in this concentration area and, thereby, to make entrepreneurs reduce investments in this area and to carry them out in other areas (where possible in aided areas). The tax is 10 % (of the total investment). Public buildings, transport infrastructure, and building for hotels and guesthouses are exempt from the tax.

Klaasen, in discussing the advantages and disadvantages of the selective investment tax, while comparing authorisation procedures, comes to the following conclusions (2).

In Rotterdam, when enterprises seek building permits, details are required on labour and ground requirements, influence on the environment, consequences for traffic circulation, etc. If it is anticipated, on the basis of this information, that an undertaking will not depreciate residential conditions in the town and will even possibly contribute to improving the situation, it is unreasonable to make this concern, having received a building permit, pay an investment tax.

An undertaking, which does not comply with these requirements, can settle in the areas in question simply by paying the tax provided it has sufficient capital. Klaasen makes it clear by one example that the effective cost of the investment tax is relatively small so that little growth restraint can be expected here. It would be more effective, in a positive sense, to spend the resources deriving from the investment tax on combating the negative consequences of settlement on the quality of the environment, transport communications, etc.

Nor does Klaasen accept the frequently quoted argument that an investment tax is administratively simpler to handle than rules governing a system of

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- (1) See Commission of the European Communities, Report on regional problems in the enlarged Community, p. 257; A. Bergan, Restrictive Regional Policy Measures, p. 16 ff
 - (2) See L.H. Klaasen, Comment on the pros and even more on the cons of investment taxes. Lecture to the Institute for Settlement and Housing; University of Münster, Münster 26 May, 1975

authorisation. The Netherlands law sees a distinction in this sense that "the level of the tax should depend on the anticipated impact on the labour market, the environment, etc. Thus, the possibility of arbitrary decisions exists here as in case of obligatory authorisation" (1).

Generally, one may say that an analysis of the direct and indirect effects of an investment on the labour market, ground use, the environment, quality of infrastructure etc. is as necessary for reasonable rules governing authorisation as for selective investment taxes. From the optic of a prior assessment of the immediate impact on the concentration regions, a system of authorisation is preferable to the imposition of investment taxes since it permits the volume of investment to be limited with certainty. From the optic of practicability, priority should also be given to authorisation procedures, which are easier to handle administratively. However, all these elements are only relevant to the problems of congested areas. It is in no way certain whether the less favoured (depopulated) areas will benefit from either of the two measures.

4.2.2 Measures for relocating private capital already invested

In Section 4.2.1 disincentives for new and extension investments were discussed; consideration must now be given to these measures which can be specially introduced to encourage relocation of concerns or part concerns. The readiness of concerns to decentralise is certainly influenced by disincentives but it can also be stimulated by incentives.

Examples are available in France (2). For instance industrial concerns, transferring their location from the Paris region to the provinces (outside the Paris basin), are paid an indemnity if at least 500 m² of industrially usable ground becomes free thereby. The decentralisation grant aimed at reducing transfer costs may be up to 60 % but has an absolute upper limit. Furthermore, decentralisation premiums between 10 - 20 % of total investment and tax benefits are granted to private and public service concerns, if they transfer from Paris to the provincial growth poles. Decentralisation of concerns from the Paris region can also be supported by exceptional loans from a special Development Fund and aided by various forms of tax benefits (even in cases of settlement outside specifically aided areas) (3).

It is difficult to assess how far these incentives are effective; principally because they are always linked with other measures. However, it may be supposed that these financial incentives encourage readiness to decentralise as do national information offices by informing concerns of possible locations outside the concentration areas.

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- (1) See L.H. Klaasen, Comment on the pros and still more on the cons of investment taxes, p. 15
 - (2) See Commission of the European Communities, Report on regional problems in the enlarged Community, p. 232; U. Thumm, p. 155; W. Bücher, p. 232 f. Comparable aids to transfer are also granted in Denmark and the United Kingdom
 - (3) See U. Thumm, Regional policy as an instrument of French economic policy, p. 153; W. Bücher, Aims and results of industrial decentralisation in France, p. 268.

4.2.3 Decentralisation of public capital

Having power of decision on the location of national institutions and offices, the State has a mechanism available for making a direct contribution to reducing further concentration and even deconcentration. For this reason account must be taken of regional policy objectives when deciding the location of national institutions and offices.

Both in France and also in Great Britain efforts have been made for years to transfer national institutions and offices, as far as possible, out of the concentration areas of Paris and London to less developed areas in order to relieve pressure on the concentration areas and at the same time to stimulate growth in aided areas (1). Comparable measures can be found in the Federal Republic of Germany. The 1974 report of the Federal Government on regional planning takes account of this aspect by evaluating, on the basis of regional policy interests, the grounds for proposed transfers and new establishment of Federal services (2). The same trends exist in the Netherlands (3).

It has been confirmed for England that this measure has resulted in the transfer of the increase in the numbers employed in public administration to the provinces (4). A larger part of decentralised administration has been located in the development areas so that the measure has contributed both to relieving pressure on the concentration areas and to developing the aided areas. The settlement of administrative jobs in the aided areas has increased the attraction of the local labour market so that pressure on the concentration areas has been reduced by the linked decline in migration.

The decentralisation of public capital has the advantage that the State has direct power of decision on the degree of decentralisation. However, it should be stated that account must be taken of the negative effects on the concentration areas (principally on the labour market) of proposed decentralisation of public institutions.

4.2.4 Measures to control inward migration

If, after examination of the three criteria mentioned in 3.2 - 3.4, the conclusion is reached that further congestion in given regions should be prevented, measures for checking investment and transferring capital must be supported by further measures to limit the influx of persons from the home country and from abroad into the concentration areas. A major problem for concentration areas is the strong influx of labour from abroad with a consequential impact on the housing market, transport and the social structure.

(1) See Commission of the European Communities, A Regional Policy for the Community, p. 96; G.C. Cameron, p. 22 f

(2) See 1974 report of the Federal Government on regional planning, Federal Publication VII/3582, Tables C.6.8, p. 73 ff

(3) See L.H. Klaasen, Comment on the pros and even more the cons of investment taxes, p. 12

(4) See A. Bergan, Restrictive Regional Policy Measures, p. 12

According to our information, no Member State of the European Community at present applies measures to prevent the movement of its own nationals into the concentration areas, i.e. there are no prohibitive aspects in relation to this influx.

The immigration of persons from third countries concerns firstly population distribution between the European Community and the rest of the world. Settlement of these persons in given regions is, however, a problem of regional policy. Contrary to the group of people formed by "E.C. residents", an administrative directional mechanism for settlement is available in the case of third country migrants.

A conceivable measure for reducing immigration would, for instance, be a tax on concerns employing workers from abroad. The income from this tax should then be spent in meeting infrastructure costs rendered necessary by the influx of foreign workers. Certainly, there may be doubt about the effectiveness of this measure if demand for foreign workers is substantial.

Also, within this field, fall naturally all measures which raise the attraction of the aided areas for the population; that is to say, investments in infrastructure for regional purposes, aids to investment, etc.

We surmise that an effective reduction in the influx of home and foreign workers into the concentration areas can only be achieved by raising the attraction of other areas. It should be noted here, as a principal factor, that freedom of movement of labour within the countries of the European Community is a declared Community aim.

4.2.5 Measures to aid outward migration of persons already settled

The readiness of people to migrate from the concentration areas will be influenced by the attraction of potential destinations. On the other hand, the transfer of undertakings and the prevention of investments in the concentration areas will lead to migration of labour. This process may possibly be strengthened by resettlement aids and similar measures. Measures of this kind have not hitherto been introduced with a view to aiding migration from concentration areas. Moreover, it is difficult to pinpoint how effective they would be. However, it may be assumed that, as a rule, workers' removal costs to another location are paid, at least partially, by the employer. From this optic the granting of removal assistance should rather be understood as a further aid to the concern prepared to decentralise. To this must be added the fact that ideas concerning the attractiveness of a possible destination, which are decisive when the choice is being made, are hardly likely to be influenced by a once-for-all payment of removal costs. A system of removal aids must, therefore, be supplemented by public information on the advantages of potential destinations in the provinces.

5. Targets and Instruments of a possible Community policy to check further concentration trends and to reduce existing concentration

5.1 Necessity for a Community policy to check concentration trends

The progressive economic integration of Member States within the framework of the European Communities facilitates the exchange of goods, labour, capital and information. This result, desirable in itself, can lead to further regional concentration in the congested areas combined with an increasing depopulation of the peripheral areas of the European Community unless countered in two ways: by measures to check further exodus from the depopulated areas and by measures to check influx into the concentration areas.

A satisfactory solution will only be possible if joint measures are taken by Community countries not only in the depopulated areas but also in the congested areas. In particular, clear cut criteria and threshold values are needed to define the highest acceptable level of concentration. The maintenance of these threshold values would not only enlarge national amounts available for investment in the depopulated areas but would also check inevitable competition for internationally mobile firms between concentration areas of the different Member States.

It should be emphasised that the obligation of the European Community to sustain a counter-concentration policy does not depend on fluctuations in concentration trends. So long as targets exist, which are hindered or prejudiced by the concentration process, the Commission has the duty to conduct an anti-concentration policy.

This applies both to Community income and employment targets already laid down and to targets to be fixed for infrastructure and the environment. It implies, in consequence, a transfer of resources, especially of capital, out of the congested areas of the European Community into the less industrialised regions.

The Foreign Minister of the Federal Republic of Germany has recently put the matter in the following way:

The European Community Treaty has set the Community a target to achieve equality of living conditions. He who does not say "Yes" to this target must, therefore, say "No" to Europe. European solidarity cannot assume the form whereby one part of Europe enjoys well-being and another part supplies the workers to help in producing this well-being. There exist in Europe substantial disparities in well-being between various regions. People do not have the same opportunities for livelihood everywhere; they do not have the same possibilities to use their freedom to initiate projects. Formal freedoms are of small assistance to people obliged to live in most bitter want.

Unless we construct something positive in an integrated Europe, their situation could become permanent. Serious social conflict would arise, inner disturbance would destroy this Europe to the marrow.

The creation of equal living standards in Europe demands a real transfer of resources from the highly developed areas of the Community to the less favoured areas. This shows that a policy for Europe is a policy for

reform. This also implies, however, that each country transferring resources must keep public opinion informed at home on the consequences of the distribution of its own social product (1).

The regional policy of the European Communities is predestined to implement this transfer of resources by channeling them through its own measures.

Regional policy can, thus, be distinguished from specialised policies in individual departments where the transfer of resources is only a secondary effect.

For this reason European regional policy must assuredly be developed and strengthened. A procedure consisting of five stages seems desirable for the scientific monitoring and underpinning of this strengthening process; in fact, some of these stages can be implemented simultaneously:

1. Specifying the targets of European regional policy by way of a system of social indicators.
2. Specifying, by means of a model, the conflicting and consistent relationships between the targets and determining the trade-offs between the targets.
3. Specifying the links between targets and measures.
4. Selecting appropriate instruments.
5. Level of application of instruments in conformity with the targets.

These stages will be considered in paragraphs 5.2 - 5.6 following.

5.2 Specifying targets

As emphasized on many occasions, economic policy measures on deconcentration must be based on known targets. Social indicators can be used to specify these targets precisely. On the basis of an analysis of existing concentration over the whole territory of the European Communities and an assessment of its future development, an attempt must be made to formulate targets to be pursued within the framework of a European regional policy aimed at damping down regional concentration.

The assumption must be that targets sought by the European Community must not differ in the main from those of Member States.

Beyond improving regional income possibilities, the Community must also direct its regional policy measures to improving the quality of the environment and to raising the level of regional infrastructure equipment. Targets must, therefore, take into account the level of income growth, a fair regional

(1) H.D. Genscher, Speech on 27.10.1975 in Mainz, stencilled manuscript, p. 8

distribution of income, stability of interregional income movements and also be concerned with pressure on the environment and the quality of infrastructure (1).

5.2.1 Substitutive versus complementary targets (threshold values)

Since it is a fact that European regional policy is only in an initial phase, it now seems premature to seek to formulate a substitutive target function. Individual target variables must, therefore, be weighted with reference to their relative benefits. However, it appears that national preferences differ to such an extent that it would not be possible to achieve agreement on target weighting. In that case, agreement must be reached by the relevant Community authorities on, for example, the relationship between the parameters g_j , within a target function of target variables for the environment, infrastructure and the economy as illustrated by:

$$W = \sum_j g_j Z_j$$

as occurs in the regional economic policy of the Federal Republic.

On the European level, this attempt, at the present time, seems doomed to failure in view of differing national priorities. It even seems doubtful whether the possibility of substitution should be allowed so long as a minimum degree of realisation of individual targets has not been reached. All experience shows that it is easier to reach agreement on minimum standards to be achieved for individual targets.

The use of complementary targets is therefore recommended for the European Community both on expert and on political grounds.

5.2.2 The importance of threshold values in controlling concentration

Threshold values of target variables are designed to show, for each individual sub-region of the countries of the European Communities, the particular framework within which the development process may occur. The level of target values should guide the regional distribution of economic activities and population. In effect, the introduction of upper limits in the congested areas should lead to the diversion of development towards other areas whereas the introduction of lower limits in the depopulated areas should reduce the volume of movements towards the already congested areas. In the Federal Republic, debate on such a policy, concerned with problems of concentration areas and depopulated areas, takes place under the label "balanced functional

(1) See R. Thoss, M. Strumann, H.M. Bölting, On adopting the level of income as a target indicator of regional economic policy; Contributions to settlement and housing conditions and to regional planning, Vol. 115, Münster 1974, p. 13 ff

spaces" (1). Taking account of particular national features, this concept would seem also applicable to other Community States.

The concept of balanced functional spaces links considerations of central place theory with the concept of growth poles or centres. This leads to the proposition that different sub-regions of a national territory are variously gifted for performing certain tasks. To check the growth of existing concentration areas in favour of sub-regions at present in less favourable circumstances, it is necessary to define as priority regions for industrial, commercial and urban development those less developed areas with embryonic economic potential and infrastructure. By way of a corresponding concentration of means it appears possible to apply the principle of relative decentralisation (from the old concentration areas) through regional concentration (functions of production) in hitherto less developed sub-regions. To this should be added the concept of a regional division of labour based on potential and skills; for, together with income targets, attention must be given both to the productive functions of agriculture and forestry and also to water supply etc. (2).

Elements of this concept are the realisation of certain lower limits for population and job concentration. For this the structure of balanced functional spaces is of essential importance. It is achieved by creating:

- good urban living conditions
- good working conditions and prospects
- promising recreational facilities near by,

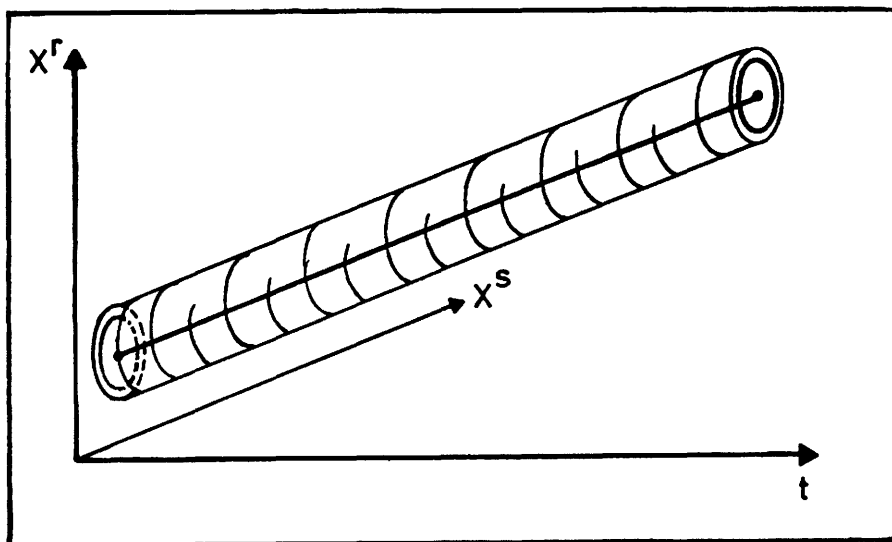
which will increase the competitive capacity of less developed areas vis-à-vis the concentration areas both for the population and for enterprises (3).

By fixing upper and lower limits for target variables (constraints), which are to be taken into account when introducing regional policy mechanisms, the field of manoeuvre will be positively and technically restricted. This point is clarified by Graph 9 which illustrates a regional system with two sub-regions r and s , in which the optimal allocation of production x^r and x^s has to be decided for both sub-regions over a period of time with account being taken of development potential and political aims (4).

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- (1) See "Balanced functional spaces; principles for an intermediate regional policy", research reports of the working party "Balanced functional spaces as a concept of regional policy" of the Academy for Regional Research and Land Planning: Publications of the Academy for Regional Research and Land Planning, Research and meetings reports, Vol. 94, Hanover 1975
 - (2) D. Marx, On the concept of balanced functional spaces as a basis for a middle-of-the-road regional policy in: Balanced functional spaces, p. 8
 - (3) Idem, p. 9 ff
 - (4) See R. Thoss, Consideration of Quantitative Ecological Targets in the Planning of Regional Development, Papers prepared for the 22nd North-American Meeting of the Regional Science Association, Nov. 1975, in Cambridge, Mass., p. 2 ff.

Graph 9:

Limitations of growth in an economy with two regions
by way of lower and upper limits of target variables

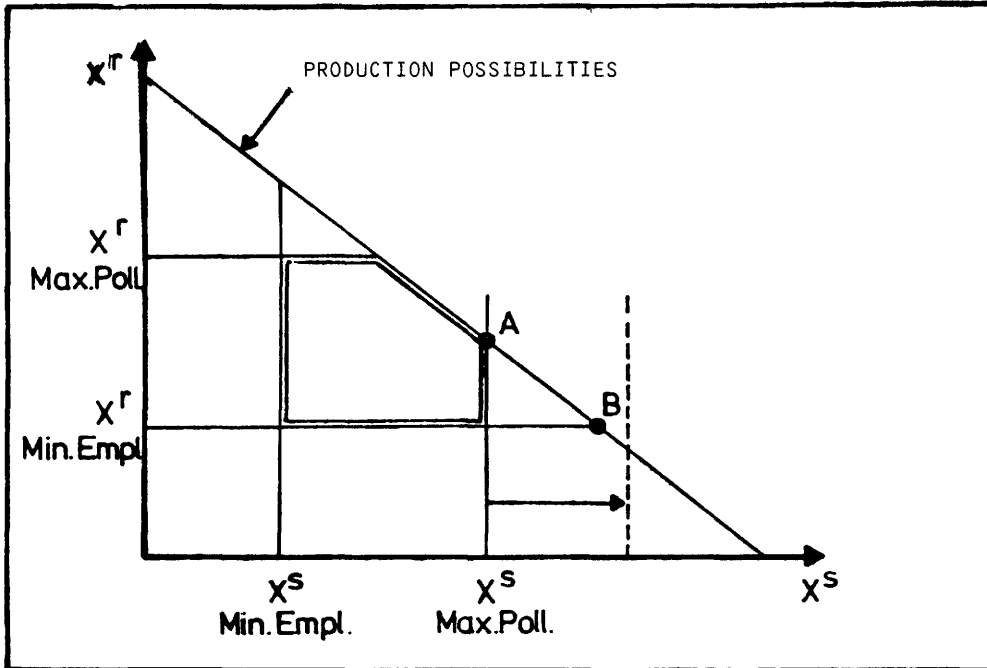


The upper and lower limits may either be set as a function of natural resource shortages or on the basis of standard ideological considerations. In the second case, they will undergo more substantial changes due to permanent alteration in the weighting of social aims. The problem is, therefore, not only one of finding the best growth path with account being taken of the upper and lower limits, it also must accept that these limits are not stable. The lower and upper limits change because they rest on value judgements, which change with social preferences and must therefore be constantly assessed and reviewed.

This is shown clearly in Graph 10, which presents a cross section from Graph 9 at a given point in time.

Graph 10:

Cross section of the lower and upper limits of target variables



The upper and lower limits will be fixed by the production possibilities curve which is dependent on the availability of production factors, on usual minimal employment standards for each sub-region and on usual maximal degrees of environmental pollution for each sub-region.

Assume that the indifference curves (not shown in the graph) are such that to maximise total output of both sub-regions a development programme, described by the coordinates of A, is required. If production is at a high level and full employment assured, the inhabitants of Region S might (possibly) be ready to abandon part of present income in favour of higher quality of the environment. This means that the upper production limit will move to the left in the direction of point of origin. Conversely, B shows the level of production in Region S, which might be possible if environmental restraints were loosened. The "price" for raising the quality of the environment will be fixed by the opportunity costs, i.e. by the numerical reduction of the target function. This is the shadow price for the maintenance of the quality of the environment in sub-region S.

Conversely, a change in economic circumstances (or extraneous factors) can limit the environmental conscience of local inhabitants. They may be disposed to move maximal environmental pollution to the right in order to raise their

income. This would limit employment possibilities in sub-region S as indicated in the existing (transformation) curve, possibly to the level at B. By considering shadow prices and sensitivity analyses of the lower and upper limits, the beneficial effects for the overall system can be determined (1).

Growth of the factor contents may cause the environmental limits and the production possibilities curve to move further from the origin if, for instance, more efficient techniques for environmental protection are developed and introduced. This means that production limits can be loosened without further environmental pollution.

Since, on the one hand, targets are permanently subject to change and, on the other hand, target relationships still require analysing the threshold target values in such a model will have to be continually revised to achieve a coherent system which ensures consistency between the target values and social preferences. By changing the upper and lower limits of the target variables the number of regions concerned will also be changed. Very low target values for the level of the economy lead to a limitation of aid measures to relatively few areas.

According to the selected level of demand regional policy measures must be concentrated on a few regions or extended to many regions.

It would seem reasonable for the European Community to begin by imposing few drastic demands upon regional policy and only to improve target values progressively to the extent that international agreement can be reached and, principally, when financial possibilities permit the realisation of targets. The physical restrictions imposed upon target fulfillment by the transformation curve form an essential framework condition for European regional policy.

This situation can only be taken into account by setting modest targets in the first instance. This, in any event, seems more reasonable in the interests of future development of regional policy than to start by simply ignoring particular targets. According to general experience, the introduction of new targets is incomparably more difficult than progressive raising of standards at later intervals. This leads to the recommendation that initial targets should be the least restrictive possible but that, at later times, they should be raised progressively within a process of continual target revision if the appropriate consensus and financial framework allow.

(1) See W. Isard, Introduction to Regional Science, Englewood Cliffs 1975, p. 403; R. Thoss, Resolving Goal Conflicts in Regional Policy by Recursive Linear Programming; in: Papers of the Regional Science Association, 33(1974), p. 59 ff

5.2.3 Target values recommended for a European Community regional policy aimed at combating concentration

As already stated, the guidance of regional policy towards "a middle-of-the-road strategy" (1), within the meaning of D. Marx, demands a precise definition of target values in the form of "ex ante" values of social indicators. This demand must also be made in the context of regional policy at supranational level.

"In summary, the different elements contained in the criteria for demarcating aided regions, in the requirements of regional development programmes, etc. form generally a competent framework within which to build" (2). In the first instance, however, these elements only apply to the domain of economic structure. For a policy to restrain concentration a more comprehensive list of targets would have to be drawn up.

A corresponding proposal is made in Table 8, but it must be stressed that this list can only be a basis for initial discussions. A recommendation on targets can only be understood as an incentive to produce the required political will power. In view of the standard character of fixed targets, a list of targets must necessarily consist of propositions, which may differ according to the general attitude to and subjective assessment of each one of them. Targets must therefore be discussed and altered at length until a list commanding majority approval has been established and on which those responsible for taking decisions may agree.

The list provided here can only be understood as a first step in such a direction. It reflects measures currently adopted for regions of the Federal Republic of Germany to clarify targets of regional development policy (3). The target values proposed here for the European Community are certainly very much lower than those recommended at national level; this is to facilitate agreement and to take account of the limited financial framework. Moreover, the bulk of the proposed list concerns economic structures although it may also contain indicators for which the European Community has no responsibility at the present time.

In order not to set the targets sought at too high a level the average values (\emptyset) used as a basic reference have been interpreted as national averages. Later, when national averages have become sufficiently close together they could be converted to Community average values.

(1) See D. Marx, abovementioned, p. 1 ff

(2) P. Wäldchen, On the problem of developing a concept of regional policy for the European Communities: see Balanced functional spaces - abovementioned, p. 177

(3) See: Social indicators for regional planning; Recommendation of the Committee for regional planning, 16.6.1976

Table 8: Proposed Targets for a European Regional Policy

Broad Division	Sub-Division	Regional classification (1)	Targets			
			Value	Dimension (2)	Measurement units (2)	
10 Nature Potential	10000 Open space (least demand)	R 10	> 0.10	ha/inh.	Inh.	
	001 Open space	R 10	> 0.99	ha/ha	ha (actual)	
	100 Forest land (lower level)	R 10	> 0.07	ha/ha	ha (total area)	
	101 Forest land (upper level)	R 10	> 0.70	ha/ha	ha (total area)	
	102 Forest land (upper level)	R 30	> 0.60	ha/ha	ha (total area)	
	200 Water area	R 10	> 1.00	ha/ha	ha (actual)	
	300 Uneconomic land (lower level)	R 10	> 0.01	ha/ha	ha (total area)	
	301 Uneconomic land (upper level)	R 10	> 0.10	ha/ha	ha (total area)	
	310 Protected areas	R 10	> 1.00	ha/ha	ha (actual)	
	320 Moorland, heather, mountain pasture	R 10	> 1.00	ha/ha	ha (actual)	
	400 Farm land in use	R 10	> 0.90	ha/ha	ha (open area)	
	11 Recreation Potential	11000 Neighbourhood recreation space (total)	R 10	> 0.10	ha/inh.	Inh.
		100 Neighbourhood recreation space (occ.)	R 10	> 0.01	ha/inh.	Inh.
	12 Built-up and loaded areas	12000 Built-up area (total)	R 10	< 0.25	ha/ha	ha (total area)
001 Built-up area (total)		R 10	< 1.10	ha/ha	ha (actual)	
100 Transport surface area		R 10	< 0.08	ha/ha	ha (total area)	
13 Noise	13000 Noise affected areas (L > 60 dB(A))	R 10	< 0.10	ha/ha	ha (total area)	
	100 Residents in noise affected areas (L > 60 dB(A))	R 10	< 0.01	Inh./inh.	Inh.	
14 Air quality	14000 Sulphur dioxide	R 10	< 0.06	mg/m ³	m ³ air	
	100 Dust concentration (K < 10 μ m)	R 10	< 0.10	mg/m ³	m ³ air	
	200 Dust concentration (total)	R 10	< 0.20	mg/m ³	m ³ air	
15 Surface area: water	15000 Heating range	R 10	< 3.00	Deg. C	-	
	100 Maximum temperature	R 10	< 28.00	Deg. C	-	
	200 Biological state	R 10	> β-mesosaprob	-	-	
	201 Biological state	R 10	> 1.00	-	Actual situation	
	300 Pollution level	R 10	< 1.00	ECW	Actual situation	

(1) R 30 = Region of approximately 30,000 sq. km., R 10 = Region of approximately 10,000 sq. km. (Emission measurement points: worst points)

(2) Population and hectares in 1000s, ECW = Einwohnergleichwerte (Population equivalents).

Table 8 (continued)

Broad Division	Sub-Division	Regional classification (1)	Targets			
			Value	Dimension (2)	Measurement units (2)	
20 Income level	20000 Wages and salaries/employee	R 30	0.80	-	Ø Mio u.a./emp	
	001 Wages and salaries/employee	R 10	0.60	-	Ø Mio u.a./emp	
	100 GDP/"economic" population (3)	R 30	0.80	-	Ø Mio u.a./per	
	101 GDP/"economic" population	R 10	0.60	-	Ø Mio u.a./per	
21 Economic work potential	21000 GDP/labour force (L)	R 30	0.80	-	Ø Mio u.a./L	
	001 GDP/labour force (L)	R 10	0.60	-	Ø Mio u.a./L	
	100 GDP/inh.	R 30	0.80	-	Ø Mio u.a./inh.	
	101 GDP/inh.	R 10	0.60	-	Ø Mio u.a./inh.	
22 Stability	22000 Job deficiencies - long term	R 10	1.50	L/L	L/L	
23 Branch structure of job places	Proportion of jobs in:					
	23000 Farming and forestry	R 10	0.50	L/L	L/L	
	100 Energy, water, mining	R 10	0.50	L/L	L/L	
	200 Processing industry	R 10	0.50	L/L	L/L	
	300 Building industry	R 10	0.50	L/L	L/L	
	400 Trade	R 10	0.50	L/L	L/L	
	500 Transport and communications	R 10	0.50	L/L	L/L	
	600 Banking and insurance	R 10	0.50	L/L	L/L	
	700 Private sector service activities	R 10	0.50	L/L	L/L	
	800 Org. or profitable activities	R 10	0.50	L/L	L/L	
	900 Public sector	R 10	0.50	L/L	L/L	
	24000 Skilled jobs	R 10	0.50	L/L	L/L	
	30 Migration balance	30000 Migration balance	R 30	0.01	Inh./inh.	Inh.
		001 Migration balance	R 10	0.05	Inh./inh.	Inh.
	31 Concentration level	31000 Population density (lower level)	R 30	0.25	Inh./ha	Inh.
		001 Population density (lower level)	R 10	0.20	Inh./ha	Inh.
002 Population density (upper level)		R 30	30.00	Inh./ha	Inh.	
40 Supply and disposal	003 Population density (upper level)	R 10	70.00	Inh./ha	Inh.	
	40320 Local drainage	R 10	0.80	EGW/EGW	EGW	
	330 Waste disposal	R 10	0.80	Inh./inh.	Inh.	
	430 Main water supply	R 10	0.80	Inh./inh.	Inh.	
41 Transport and communications	41210 Motorway (links)	R 10	0.04	Links/ha	ha	
	211 Motorway (length)	R 10	0.10	km/inh.ha	Inh.ha	
	220 Roads 1 order (several lanes)	R 10	0.10	km/inh.ha	Inh.ha	
	221 Roads 1 order (two lanes)	R 10	0.40	km/inh.ha	Inh.ha	
	230 Roads 2 order	R 10	1.00	km/inh.ha	Inh.ha	

(1) R 30 = Region of approximately 30,000 sq. km., R 10 = Region of approximately 10,000 sq. km. (Emission measurement points: worst points)

(2) Population, labour force and hectares in 1000s, EGW = Einwohnerequivalent (Population equivalent)

(3) "economic" = total population + commuter balance

5.3 Specifying links between targets and determining "trade-offs"

5.3.1 The structure of a regional policy decision-making model for determining "trade-offs"

The second stage in the further development of European regional policy - which might well be started parallel with the fixing of target values to be achieved - should consist of devising a mathematical model which would allow consistent and conflicting relationships between targets to be specified in detail. In this way it would be possible to simulate the consequences of alternative target levels for the realisation of other targets. The opportunity costs of alternative targets could then be determined.

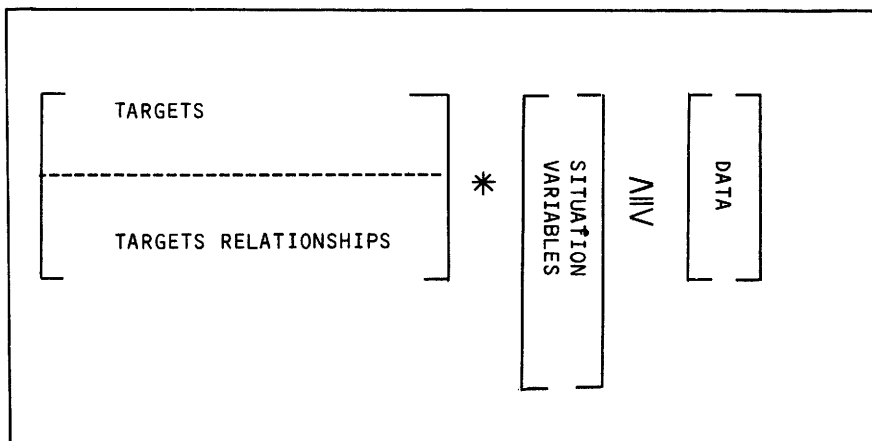
For this purpose, it is necessary to specify the interrelationships between the different target indicators. This can be achieved by means of a system of equations and inequalities in a decision-making model for regional policy as sketched for a typical region in Diagram 11. This diagram is based on Graphs 9 and 10 in so far as it describes the mathematical structure of a system which takes account of the links referred to in 9 and 10.

The model consists of

- the column vector of the situation variables for which levels have to be determined
- an Impact Matrix, describing the interrelationships between the variables
- a vector of available data, which must be taken into account when making a decision.

Diagram 11:

Plan of a decision-making model without instruments



The targets give the levels of the situation-variables to be achieved in a given region;

the target-relationships indicate conflict or consistency between individual targets.

A decision-making model, as described here, does no more than represent a synthesis and quantification of the theoretical considerations formulated with the help of Graphs in Section 3.

5.3.2 An example of a decision-making model for the Federal Republic of Germany

As an example of a model for establishing "a middle-of-the-road strategy", a model for 38 regions and 6 sectors will be outlined which was prepared in the context of the first Federal planning programme of the Federal Republic of Germany (1). A comparable model must be established to determine the trade-offs of Community regional policy. In view of the very large number of relationships, which cannot all be perceived and which exist between respective regions and technical fields, the use of an aid to decision-making of this kind in elaborating an agreed policy for deconcentration appears unavoidable. Only by this means can prior assessment be made of the anticipated effects of a decision. (2). Individual parts of this model will now be described.

(1) See R. Thoss, A Dynamic Model for Regional and Sectoral Planning in the Federal Republic of Germany in: Optimization and simulation of macro-decisions, Collection Economie Mathématique et Econométrie, N° 3, Namur/Gebmloux (Duculot) 1970, p. 111,ff; idem, A Dynamic Model for Regional and Sectoral Planning in the Federal Republic of Germany, in: Economics of Planning, 10(1970), p. 89 ff; idem, Resolving Goal Conflicts in Regional Policy by Recursive Linear Programming, p. 59 ff; also, Basic Questions for comprehensive presentation of regionally important planning and measures, Information of the Institute for Regional Planning, H. 76, Bonn 1972

(2) The equations and inequalities in the model described here and a description of the symbols used will be found at the end of section 5.3.2

5.3.2.1 Promoting and maintaining regional economic potential

It is feasible to assemble a group of equalities and inequalities within the model related to the objective of promoting and maintaining regional economic potential. These are linked to the objective of approximating standards of living but the link is often only indirect.

In the first place, definitions have to be stated aimed at guaranteeing the avoidance of structural bottlenecks and marketing difficulties in the regions. These are equations (2*), (3*), and (4*) in which conditions of demand for individual sectors are described in the form of an Input-Output-Model. A definition will be made for each sector to show how far goods and services produced can be used.

Attention to demand variations is extremely important for planning building-intensive infrastructure installations since it should ensure that each sector will, for each given period, produce just so much to ensure that structural bottlenecks will not appear in other sectors and that the sector itself will not be faced with marketing difficulties. It is thereby desirable to ensure that the variable ΔV_i^* is zero in all sectors. If not, entrepreneurs will adapt their production plans for the following period to smaller marketing possibilities and also limit input factors and the peak capacity levels of their existing premises. If structural deficiencies of this kind were permitted in planning regional policy, the appearance of a cumulative contraction process would not be excluded, nor would maintenance of economic potential in the regions be assured.

The maintenance of a balanced branch structure is the object of conditions (5) and (6), also (15) to (17) which deal with factor supply for the various sectors.

Production functions (2) and (3) and definitions (10*) and (11*) are also part of this group which describes factor productivity and the extent of technical advance.

Equation (9) describes the regional expenditure which is required to assist the formation of private capital with a view to creating and maintaining a sufficient number of jobs and for the provision of services in the field of infrastructure. The required level γ_{ni} gives, as a percentage, for each sector and region, the amount of aid necessary per unit of private investment.

To avoid disparities in the regional distribution of gross domestic product, which would either lead to massive emigration or to social injustices, inequality (1), linked to (13*) and (24*), determines that gross domestic product per head should not fall by more than 20 % below the average.

5.3.2.2 Maintaining a well balanced social structure

One of the main aims of regional policy must be to check social erosion caused by excessive migration from problem areas. Sharp falls in population levels are, therefore, incompatible with set targets. Migration from problem areas will only be acceptable up to a certain level. If the migration movement should tend to exceed this threshold, it must be corrected by measures to assist the economy and infrastructure.

Also linked to the objective of maintaining a well balanced social structure is the problem of integrating the guest population from third countries with as little friction as possible. Priority should go to ensuring as even a distribution of immigrants as possible within regions as indicated by inequalities (21) and (22). Only in this way can a substantial integration of foreigners be implemented and ghetto formation prevented.

5.3.2.3 Economic stability

In deciding infrastructure formation, in compliance with targets, care must be taken in all circumstances to avoid conflict between this target and the target for stability. This requirement demands that expenditure on essential infrastructure projects should not exceed the financial powers of public bodies and should be linked to production capacities. The available public funds set an upper limit to measures undertaken for regional purposes and this fact ensures their sparing use. These relationships are illustrated by the equations and inequalities (4*), (19*) to (22*).

Since the proportion of gross domestic product available to private budgets for consumer purposes can hardly be lowered below a certain minimum (6*) the claims of private investment, foreign trade surpluses and expenditure on infrastructure must be confined to the remainder of the social product. Assuming a balanced budget, it is therefore necessary to meet infrastructure requirements as far as possible by limiting to a minimum the foreign trade surpluses (eq.(9*)): since the demands of foreign economies lead to a shortage of goods and services needed for this objective. After the allocations to consumption, foreign trade and the State, the remainder (of GDP) is devoted to replacement investments and to increased productive capacity and, therefore, to the establishment and extension of enterprises. The remaining targets determine in part the regions and sectors where this rise in capacity may take place. As an example, a consequence of the objectives of removing regional disparities and strengthening regional economic potential is that at least part of the private capital formed in each planning period should be directed into the problem areas. Fortunately, the marginal productivity of capital is generally highest in these areas so that complete conformity exists between the consequences arising from these targets and the growth target.

5.3.2.4 Growth in full employment

To achieve the targets abovementioned, the capacity of resources available in the regions, especially the labour factor, will have to be utilised as effectively as possible (23*).

In so far as other targets abovementioned are not adversely affected thereby, regional policy should make a contribution to the realisation of these standard values by helping to exploit regional growth reserves. This also helps to attract the factors of production to the places where they can be most efficiently employed. As v.Böventer in his "theory of regional balance" has shown, the total economic product is greatest, from a real economic standpoint, if the marginal factor returns are the same in all regions (1).

(1) See E.V. Böventer, Theory of regional balance, Tübingen 1962, p. 116, p. 158

The pursuit of the growth target in regional policy means nothing more than the consequential application of this theory.

So far as the labour factor is concerned there is a conflict between targets since the marginal productivity of labour is largest in those regions where capital accumulation in proportion to labour is largest, i.e. in the existing concentration areas.

Certainly, direct labour productivity is not the only element to be considered when examining the regional distribution of the working population which is most favourable to growth. In this instance opportunity costs of material and personal infrastructure play a larger part. According to inequality (18) every additional inhabitant of a region has a right to a given supply of services from the sectors 4, 5 and 6. However, all the working population and their families should now share in material infrastructure at an adequate level (12) - (14). As abovementioned this is a charge on private capital formation (eq. (2) and (3)).

The allocation criterion for the labour factor cannot therefore only be the marginal productivity of this factor, but from this asset the opportunity costs must be deducted to meet the infrastructure requirements. If, for instance, there is available capacity in infrastructure in some regions, according to selected standard requirements, there will be no opportunity costs because population growth will not require additional public investment. The marginal productivity of labour may then, solely by itself, be lower than in other regions; however, from the growth optic it is only the balance which counts.

If, after taking account of the varying opportunity costs, the contributions of additional labour to the GDP is still greater in the concentration areas than in other regions, the pursuit of the growth target alone will conflict with other targets abovementioned. For instance, there will be greater damage to the environment in the regions where immigration occurs and regions affected by emigration will be threatened with the consequences of social erosion.

The growth target can only be pursued, through the allocation of the labour factor, in so far as it is possible to respect the other targets, i.e. principally by taking inequality (20) into account. Otherwise stated: maintenance of the principle of "active reconstruction" of the problem areas must be paid for by renouncing a rise in the social product which would otherwise be possible.

The situation differs with regard to the capital factor. Here productivity changes take place in the opposite direction to that experienced for the labour factor. If, for individual sectors, a list is prepared according to the level of marginal productivity of capital, regions with small capital intensity appear at the top. Contrary to the labour factor an additional unit of capital makes the highest growth contribution precisely in the problem areas.

The growth target is therefore fully consistent with the target for equalising living conditions since an investment in structurally weak areas aids both targets alike. If the intention is to improve income conditions in these regions, this will only occur through a concentrated input of capital; if it

is to achieve maximum growth of the total economy, that also requires input of capital since its marginal productivity will be greatest in these areas.

Industrialisation of economically weak areas could conflict with environmental protection, if substantial pollution of natural assets were to occur in these regions. However, as a rule, this does not happen. Only wild uncontrolled development must naturally be prohibited, also in country areas; this is guaranteed by limitations on land development - see restrictions (23) - (27).

Instead, with regard to the distribution of private capital in the rural areas it is precisely a distribution allowing maximum growth and, thus, aimed at marginal productivity which provides protection for natural assets in the concentration areas since it follows that growth pressure will be less for ensuing planning periods. Restraint of capital accumulation in the already highly industrialised regions puts a relative brake on the marginal productivity of labour since capital intensity then declines in these areas by comparison with other regions. Without doubt this will have a tendency to restrain the abovementioned influx into the concentration centres.

The growth target can therefore be pursued, following the decision on the allocation of the capital factor, without compromising the other targets; indeed, the pursuit of growth in itself actually aids their achievement.

The pursuit of the growth target is guaranteed - apart from (12) - by the maximisation demand (1*). Furthermore, among the possible regional distributions of the variables, all those which run counter to one or more of the conditions abovementioned will be discarded. Among the solutions remaining, which in all circumstances guarantee the fulfillment of other targets, that one will be chosen which ensures the highest possible gross domestic product. In this instance, however, only those portions of production destined for practical use in the country should be taken into account; i.e. involuntary investments in stocks and that part of production which is lost as a trade surplus should not be included.

5.3.2.5 Quality of infrastructure

The provision of material infrastructure installations and of corresponding personal infrastructure is without doubt the most important prior condition for equality of standards of living between regions. A wide range must therefore be granted to material and personal infrastructure. Inequalities (7), (8) and (10) - (14) are concerned with material infrastructure.

Every increase in public investment is, *ceteris paribus*, a burden on the private sectors (eq. (2*) and (3*)), i.e. it leads, via the production functions (2) and (3), to a decline in the value of the target function (1*) corresponding to the marginal product of capital in the best alternative utilisation. In this model, public investments are, therefore, evaluated and distributed according to the importance of the opportunity costs and also conforming to the results of a cost-benefit analysis.

The minimum private equipment, comparable to infrastructure installations and relevant to the tertiary sector, is defined in inequalities (7) and (8). The necessary provision of personal infrastructure is governed by inequalities of type (18). These inequalities determine, in conformity with economic base

theory, the number of employment places in the service sectors 4, 5 and 6 as a proportion of the total population.

Care should also be taken with personal - as with material - infrastructure to take into account the level of opportunity costs in distribution. Due to the labour balance (15), a better supply of services leads, *ceteris paribus*, to a reduction in the utilisation of labour in other sectors and, thereby, to a renouncement of an otherwise possible extension of production linked to the level of anticipated marginal product of labour in those sectors - see (2) and (3). This effect will certainly be compensated by the fact that the working population entering the service sectors will make a direct contribution to GDP by their productive effort.

5.3.2.6 Quality of the environment

Among the problems of environmental protection, one important aspect cannot be treated in this model: changes in production techniques. This would require a far more precise branch division and the explicit handling of deleterious material within the model.

Two other aspects of environmental disturbance are, however, handled in the model: measures for disposal of waste (sewage) and the protection of reclaimed conservation areas from uncontrolled economic use. The maintenance of open spaces is very important in this connection because all harmful material can be rendered innocuous if reclaimed conservation spaces for air and water are available in large measure.

The target for protecting the inhabitants of the region from harm due to waste is included in the model to ensure that particular care is taken to provide the regions with sufficient public means of waste disposal. The number of households per region, who are serviced by main drainage, is used as an indicator for the level of drainage infrastructure. Inequality (12) proposes that, by 1985, 90 % of all dwellings should have main drainage.

Alongside the provision of investment in infrastructure for drainage and waste disposal, possibilities for changes in the use of surface areas in individual regions are limited. This applies to the reduction in land use by agriculture in order to keep the observed increase in unused land within bounds. According to the model, any increase in built-up areas in the regions should be subject to limitation to prevent growing destruction of countryside suitable for recreational purposes. The model further guarantees the region that a substantial number of recreational sites will be prepared for the anticipated new inhabitants. Additionally, in each period considered, one third of suppressed demand for recreational sites will be satisfied. These targets for environmental protection will be found in the equations (23) - (27).

In the case of environmental targets, the decision on settlement sites will be based on cost-benefit analysis, i.e. by comparison of opportunity costs. The factor "ground" makes a two-fold contribution to GDP:

- directly,
if it is a factor of production in sector 1 (2),
- indirectly,
if it serves for building land or, as additional reclaimed land, for the settlement of working population, (24) and (25).

Table 9 List of equations and inequalities of a linear programming model for regional planning and regional economic policy in the Federal Republic of Germany

Definition of abbreviations :

V = behavioural equations, N = target, T = definition

Variables :

X_i	Variables Gross product value in Sector i (DM million)
C_{pr}	Private consumption (DM million)
C_{st}	Public consumption (DM million)
E	Exports (DM million)
ΔK_i	Private gross investment in Sector i (DM million)
ΔQ_k	Public investment of type k (physical units)
QI_k	Index of public capital supply of type k (physical units)
\bar{Y}	GDP per head pop. (DM m./1000)
Y	GDP (DM m.)
Z	Capital transfers (DM m.)
A_i	N° employed in Sector i (1000)
F1	Agricultural land in use (10,000 ha.)
F2	Recreational space (10,000 ha.)
F3	Built up surface area (10,000 ha.)
F4	Unused surface area (10,000 ha.)
B	N° of inhabitants (1000)
W	Internal migration balance (1000)
AG	Immigration balance (1000)
P(70)	N° employed 1970 (1000)
P(85)	N° employed 1985 (1000)
ΔV	Stock changes (DM m.)
M	Balance of payments (DM m.)
F	Total surface area (1000 ha.)

Index interpretation

r	Regions (r = 1,...38)	
*	Summation over r	
i,j=1	Farming and forestry	k=1 Public investment Sector 1
i,j=2	Productive industry	k=2 Public investment Sector 2
i,j=3	Trade and transport	k=3 Public investment Sector 3
i,j=4	Other services	k=4 Public investment Sector 4 and 5
i,j=5	Housing	k=5 General administration
i,j=6	Public sector	k=6 Education
t=0	1970	k=7 Social affairs
t=1	1975	k=8 Public health
t=2	1980	k=9 Transport
t=3	1985	k=10 Housing
		k=11 Local installations

I. Regional targets, behavioural equations and definitions (r = 1, ..., 38)

A. Sector contributions to gross domestic product.

- (1) N $\sum_i Y_i^r \geq 0,8 \bar{Y}^r \times B^r$
- (2) V $Y_i^r \leq a_i e^{\lambda_i t} (A_i^r)^{\alpha_i} (K_i^r)^{\delta_i} (F1^r)^{\gamma_i} \quad i = 1$
- (3) V $Y_i^r \leq a_i e^{\lambda_i t} (A_i^r)^{\alpha_i} (K_i^r)^{\delta_i} \quad i = 2, 3$
- (4) N $Y_i^r \geq \beta_i \sum_{i=1}^3 Y_i^r \quad i = 4, 5, 6,$

B. Private capital formation

- (5) N $\Delta K_1^r \geq 0,05 K_1^r(t-1)$
- (6) N $\Delta K_i^r \leq K_{r,i}^r K_i^r(t-1) \quad i = 1, 2, 3,$
- (7) N $\Delta K_4^r \geq K_4^n \Delta K_5^r$
- (8) N $\Delta K_5^r \geq K_5^n \Delta Q1_{10}^r$
- (9) N $Z^r = \sum_{i=1}^5 Z_i^n \Delta K_i^r$

C. Public capital formation (material infrastructure)

- (10) N $\Delta QI_1^r \geq Q_1^n A_1^r$
- (11) N $\sum_{k=2}^4 \Delta QI_k^r \geq \sum_{k=2}^4 Q_k^n \sum_{i=2}^5 A_i^r$
- (12) N $\Delta QI_k^r \geq Q_k^n \Delta B^r + 1/3 [Q_k^n B^r(t-1) - QI_k^r(t-1)] + \omega_k QI_k^r(t-1) \quad k = 5, \dots, 11$
- (13) N $\Delta QI_9^r \geq 4\Delta B^r + 1/3 [2B^r(t-1) + 50F^r - QI_9^r(t-1)] + \omega_9 QI_9^r(t-1)$
- (14) N $12,5\Delta K_5^r + \Delta QI_{10}^r \geq 430\Delta B^r + 1/3 [430B^r(t-1) - QI_{10}^r(t-1)] + \omega_{10} QI_{10}^r(t-1)$

D. Labour input and population growth

$$(15) \quad V \quad \sum_i \Delta A_i^r \leq 0,444\Delta B^r + 0,156\Delta G^r + 0,004B^r(t-1)$$

$$(16) \quad N \quad -0,25A_1^r(t-1) \leq \Delta A_1^r \leq 0$$

$$(17) \quad N \quad \Delta A_i^r \leq A_i^r A_i(t-1) \quad i = 2, 3,$$

$$(18) \quad N \quad \Delta A_i^r \geq \psi_i \Delta B^r \quad i = 4, 5, 6,$$

$$(19) \quad T \quad \Delta B^r = 0,005B^r(t-1) + W^r + \Delta G^r$$

$$(20) \quad N \quad \Delta B^r \geq 0$$

$$(21) \quad N \quad \Delta G^r \leq 0,025B^r(t-1)$$

$$(22) \quad N \quad \Delta G^r \geq 0,01W^r$$

E. Development of surface use

$$(23) \quad N \quad \Delta F2^r + n^r \Delta F1^r = 0,01\Delta B^r + 1/3 [0,01B^r(t-1) - F2^r(t-1) - n^r F1^r(t-1)]$$

$$(24) \quad N \quad \Delta F3^r = 0,005\Delta B^r$$

$$(25) \quad T \quad \Delta F1^r + \Delta F2^r + \Delta F3^r + \Delta F4^r = 0$$

$$(26) \quad N \quad -0,15F1^r(t-1) \leq \Delta F1^r < 0$$

$$(27) \quad N \quad 0,075F3^r(t-1) \geq \Delta F3^r > 0$$

II. National targets, behavioural equations and definitions

A. GDP and expenditure on productive goods and services

- (1^x) N $\sum_r \sum_i X_i^r - M^x - \sum_r \Delta_i^x \rightarrow \text{Max}$
- (2^x) T $X_i^x = \sum_j a_{ij} X_j^x + d_i C_{pr}^x + e_i E^x + \sum_j b_{ij} \Delta K_j^x + \sum_k g_{ik} \Delta Q_k^x + \Delta V_i^x \quad i=1, 2, 3,$
- (3^x) T $X_i^x = \sum_j a_{ij} X_j^x + d_i C_{pr}^x + e_i E^x + \sum_j b_{ij} \Delta K_j^x + \sum_k g_{ik} \Delta Q_k^x \quad i=4, 5$
- (4^x) T $X_i = \sum_j a_{ij} X_j^x + C_{st}^x \quad i=6$
- (5^x) V $C_{pr}^x = 0,56Y^x$
- (6^x) N $C_{st}^x = 0,893X_b^x$
- (7^x) N $E^x = \sum_i m_i X_i^x - M^x$
- (8^x) T $Y^x = \sum_i w_i X_i^x$
- (9^x) T $w_i X_i^x = \sum_r Y_i^r \quad i=1, \dots, 6$
- (10^x) N $Y^x \geq 1,26Y^x(t-1)$
- (11^x) T $\bar{Y}^x = Y^x/B^x$

B. Private capital formation

- (12^x) N $\sum_i K_i^x = \sigma Y^x + Z^x$
- (13^x) T $\Delta K_i^x = \sum_r \Delta K_i^r \quad i=1, \dots, 5$

C. Public finances

- (14^x) N $\tau Y^x = X_b^x + \sum_k \sigma Q_k^x + Z^x$
- (15^x) T $Z^x = \sum_r Z^r$

$$(16^x) \quad T \quad \Delta Q_k^x = \sum_r \pi_k Q_k^r$$

$$(17^x) \quad N \quad \Delta Q_k^x \geq \Delta Q_k^x(t-1) \quad k=1, \dots, 11$$

D. Labour input and population growth

$$(18^x) \quad N \quad \sum_{ri} \Sigma A_i^r = 1/3 [P^x(85) - P^x(70)]$$

$$(19^x) \quad T \quad \Delta B^x = \sum_r \Delta B^r$$

$$(20^x) \quad T \quad \sum_r W^r = 0$$

If only suppressed demand for reclaimed ground is satisfied in a region without leading to the settlement of new inhabitants ($\Delta B^r=0$ in eq. (23)), then the opportunity costs will rise to the level of potential returns on the alternative use of ground i.e. agricultural or industrial use. Conversely, care will be taken in the regional distribution of the population that, ceteris paribus, ground will be utilised in the first instance in those regions where the agricultural returns are smallest.

5.4 Specifying the target-means relationships of various measures aimed at reducing the concentration trend

5.4.1 Harmonisation of measures of individual States

A successful regional policy requires essentially that national and Community regional policy should be effectively co-ordinated. To this end the first requirement is a general harmonisation of Community regional policy targets and the regional policy targets of individual Member States. However, this cannot prevent individual Member States from setting themselves more exacting targets for their regional policy and seeking to achieve them by corresponding measures. "Harmonisation of measures" can therefore only mean the adoption of those measures which are necessary to achieve the "ex ante" values (see Table 8) in individual sub-regions of the EEC. In all areas of the European Community where targets are not fully reached, the implementation of measures with comparable effects is required. Only in this way can the distribution of investments and population be made to comply with the targets. The desired effect - namely the direction of investment and population into the less developed regions thereby relieving pressure on the concentration areas - cannot be achieved without sufficient harmonisation of measures. For this reason, a co-ordination of regional policy by means of a decision-making model is indispensable.

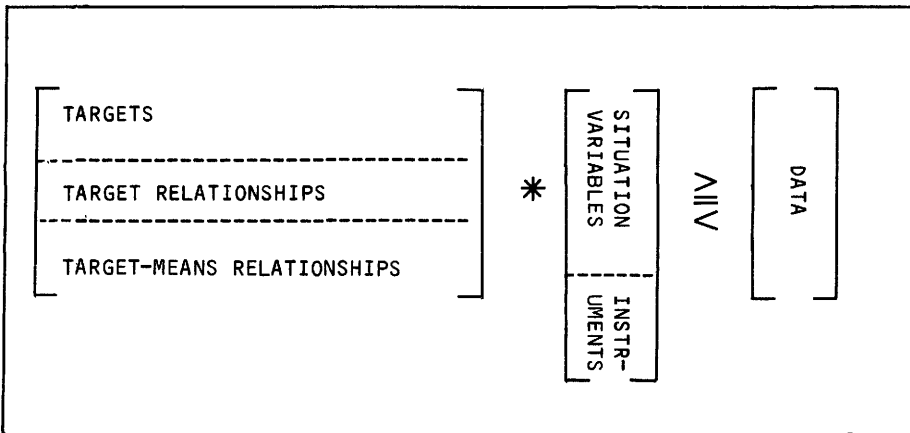
5.4.2 The structure of a decision-making model for regional policy used to determine the instrument "mix".

Targets for the various regions must firstly be used to establish trade-offs and then to determine the instrument "mix" needed to meet the targets. The instrument variables (capital grants, labour subsidies, etc.) must therefore be linked to the target variables.

This implies an extension of the decision-making model already shown in Diagram 11. An extended model of this sort is sketched in Diagram 12. It consists of:

- a column vector of the variables for which the levels have to be determined (now including the instrument variables),
- a coefficient matrix, describing the relationships between the variables (now including the target-means relationships)
- a vector of the available data, which have to be taken into account in making a decision.

Diagram 12: Outline of a decision-making model with instrument variables



As in the more simple case of the model for fixing trade-offs (Diagram 11), the targets define the levels of the situation variables which should be achieved; while the target relationships indicate conflict or consistency between individual targets.

Additionally, however, the model includes functions which describe the effect of instruments on target variables (target-means relationships). These functions must first be estimated as in the case of the investment functions abovementioned (see section 3.3.1). The increased capacity of a model of this kind enables not only the indirect target-means relationships, which previously were not apparent, to be obtained, but also - after introducing the additional equations - allows the adequate level of aid to be calculated. This information is, moreover, obtained in addition to the determination of trade-offs.

Independently from their inclusion in the decision-making model the target-means relationships constitute an important mechanism for preparing decisions since they enable the effectiveness of instruments to be analysed. The target-means relationships are also irreplaceable for inspection and control of measures. This is therefore a very important and long ignored research topic with particular interest for the scientific planning of economic policy.

5.4.3 An example of a decision-making model for regional policy used to determine the instrument variable "mix"

In order to harmonise the instrument "mix" with the regional policy targets, the target-means relationships must be used "in inverse form", so to speak. The targets indicate the values that must be reached by the instruments in the regions if they are to fulfill their task of restraining concentration. (For approvals no special instrument variables need be introduced since prohibitions or obligations directly influence factor inputs or production).

In this example, we want to describe the extensions which would be feasible for a model of the type described in 5.3 in order to use it to determine the instrument "mix". To maintain the connection, the basic features of the model will first be restated:

Like every growth model, this model considers both the demand for and the supply of goods and services. Also, in this case, demand is described by way of a conventional multiplier analysis indicating the effect of investment on income. To understand this effect it is necessary to define regional gross domestic product (Y):

$$(1) Y = C_{pr} + C_{st} + \Delta K + \Delta Q + E-M$$

and a consumption function

$$(2) C_{pr} = cY$$

in which C_{pr} and C_{st} represent private and public consumption, ΔK and ΔQ private and public investments and $E-M$ the regional external contribution. The parameter c is the marginal propensity to consume.

By substituting (2) into (1) the general multiplier equation is obtained

$$(3) Y = \frac{1}{1-c} (C_{st} + \Delta K + \Delta Q + E-M)$$

which describes demand for goods and services. The multiplier gives the effects of instruments C_{st} and ΔQ on demand.

If the input from national instruments is not to lead to imbalances, supply must always be the same as demand. Supply is given by the production function

$$(4) Y = u\Delta A + v\Delta K + (1+\lambda)Y(t-1)$$

in which u and v are the marginal productivities of labour (A) and capital (K) and λ is technical progress. These quantities can be ascertained quite simply through a Cobb-Douglas production function provided their coefficients can be calculated.

Up to this point, the model considered here only represents a much simplified form of the detailed example in 5.3. There also it is an essential condition that supply and demand be in balance.

Diagram 13 outlines the relationships which have to be introduced into the model in order to determine the effects of the instruments.

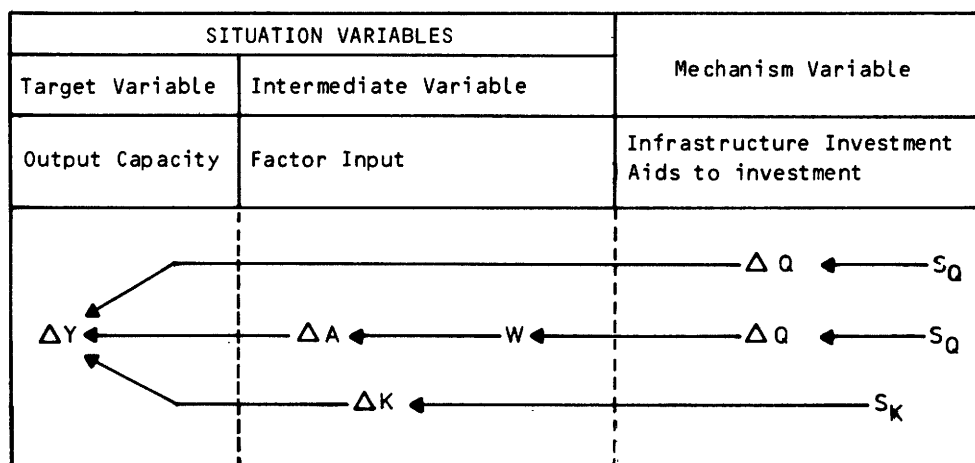
In our example we are concerned with the effects of the instrument variables

Infrastructure and
Subsidies

on the production capacity of a region (1).

Diagram 13:

Possible effects of infrastructure and investment on production capacity



The diagram shows how an efficiency analysis may reveal the network of relationships impacting on the target variables. The selected example shows that influences of several kinds may act on regional production capacity (and consequential income):

- a) The existing infrastructure directly hinders the raising of production.
- b) By its influence on the net migration balance and the resultant changes in the regional labour input, the presence of infrastructure leads to changes in regional production capacity.

(1) See: R. Thoss, M. Strumann, H.M. Böltling, The capacity effects of infrastructure investment and investment aids and their importance for regional policy; see "Regional effects of public expenditure" published by the Academy for Regional Research and Land Planning, Research Reports, Vol.98, Hanover 1975, p. 65.

c) Investment aids influence the volume of regional investment and thereby, indirectly, production capacity.

The top arrow in Diagram 13 shows the direct effect of infrastructure on production. This so-called "threshold hypothesis" (1) of infrastructure may be described by the following inequality (5):

$$(5) \alpha Y \leq Q + \Delta Q$$

The coefficient α indicates the input of infrastructure needed per unit of production. An inequality is used because, while lack of infrastructure certainly throttles production, an expansion of infrastructure does not necessarily stimulate private entrepreneurs to produce. Other motivations are much more important in this context.

Two equations indicate the links between the "investment aid" instruments (S_K) and grants for improving infrastructure (S_Q):

$$(6) \Delta K = a_0 + a_1 K(t-1) + a_2 Y(t-1) + a_3 S_K$$

and

$$(7) \Delta Q = b S_Q$$

Equation (6) corresponds to the lower arrow and equation (7) to the outside right arrows in Diagram 13. The first term of (6) shows the influence of capital supply, the second shows the effect of the volume of production on investment. Equation (6) thus describes how the different variables affect the level of private investment.

As an example, the coefficient a_3 shows the effect of investment grants S_K . Correspondingly, b describes the effect on communities of grants for infrastructure.

Finally the influence of infrastructure on migration and labour input is indicated by the middle arrow in Diagram 13:

$$(8) \Delta A = \epsilon \Delta B$$

$$(9) \Delta B = nB(t-1) + W$$

$$(10) W = f(Q + \Delta Q)$$

Symbols B and W represent the number of inhabitants and the migration balance, ϵ and n the activity rate and natural population growth rate.

(1) See A.O. Hirschmann, The Strategy of Economic Development, New Haven 1958, p. 84; R. Thoss, Resolving Goal conflicts in Regional Policy by Recursive Linear Programming abovementioned, p. 59 ff; R. Thoss and H. Bölting, Mechanisms for creating and maintaining balanced functional spaces, abovementioned.

The model (3) - (10) may, on the one hand, be used to forecast the development of target variable Y over a period of time if the levels of the instrument variables are known. However, more interesting from the point of view of making decisions on regional policy is the possibility of determining the optimal levels of the instrument variables (for given targets). The level of income sought (or, within a larger model, the values in Table 8) must therefore be included in the model, which will then provide details of the instruments required to achieve the targets in question. In this way, the right instrument "mix" can be simulated which will ensure that the region forms "a balanced functional space".

5.5 Choice of appropriate instruments

As already stated, concentration may be countered by braking the development of peak regions and also by hastening the development of less favoured regions. Theoretically, therefore, it is possible to begin by influencing the location selection of enterprises or of private households. A choice must then be made from a list of possible instrument variables for which the target-means relationships must then be calculated.

5.5.1 Reduction of the concentration trend by
measures within the congested areas

5.5.1.1 Instruments for influencing the choice of residence by enterprises

The simplest measure for preventing undesirable investments in the concentration areas is a system of investment controls by way of obligatory authorisation. To aim at the best overall economic effect from the application of this measure, the decision to grant or refuse investment authorisation should take into account the localities where the input of an additional unit of capital has the greatest impact on the different target variables. The impact must therefore not only be assessed in the context of a single variable but from all the aspects involved. Above all, the effect on an individual region (i.e. on a concentration region) must not be the only factor to be considered, it is also necessary to compare advantages and disadvantages interregionally as happens in multi-regional decision-making models, by a comparison of opportunity costs. Authorisation must, therefore, depend on an analysis of the effects of the planned investment on the income situation, on the environment and on infrastructure conditions in all regions. To this end, attention will not only be paid in the model (by way of the Interdependence-Matrix) to primary effects but also to effects on other activities (consequential effects).

In particular, it is important to examine whether a refusal to authorize investment means that growth in capital input will be kept at a low level. Indeed, one of the main objectives of preventing investment in the concentration areas is to ensure, thereby, that more capital will be available for the depopulated areas. If this condition is not fulfilled, the cost-benefit assessment must consider the consequences. A system of investment authorisation must, therefore, be conceived in such a way that it will take account of the interests of the concentration areas and also of the less favoured areas.

An alternative to controlling investments by way of authorisation is to consider imposing a graded investment tax - an investment premium in reverse. The success of a selective investment tax depends on the reaction of the enterprises in question. Investments in the concentration areas with high profit forecasts will probably not be prevented by this method; it will principally be investments promising only modest returns which are diverted to the peripheral regions.

An investment tax may, therefore, have the effect of obliging enterprises with small growth opportunities and modest capital to invest outside the concentration areas. Enterprises which are strong in growth potential and in capital may, in certain circumstances, despite higher costs, find it possible to implement their investments in the concentration areas. In this case, the adverse consequences for the concentration areas cannot be prevented. Moreover investments directed, because of the investment tax, into the depopulated areas are the results of a negative selection so that the settlement of these activities in the less favoured areas cannot be expected over the long term to raise the economic potential in those areas to the level in the concentration areas.

Clearly, due to the long life of capital goods, the starting point should be to seek and influence the location choice of new investments. This refers to both net investments and changes of location when replacement takes place. (reinvestment). In some measure, however, a real transfer of capital goods is also possible. Therefore, the introduction of restrictive measures in the concentration areas should be supplemented by financial incentives favouring enterprises prepared to transfer from the concentration areas. In this context, one might consider partial repayment of transfer costs, special tax benefits and depreciation facilities, payment of removal costs to workers concerned, etc.

5.5.1.2 Instruments for influencing choice of residence by private households

In theory, the same possibilities exist for influencing choice of residence by private households as for enterprises, but, for exceptional reasons, there is an important limitation. Access authorisation and financial charges are theoretically conceivable. At various times they have also been used in practice (e.g. after 1945). However, they are impossible today on constitutional grounds. Moreover, the efficacy of residential permits is prejudiced because effective control of residence is impossible in practice. Financial charges - maybe in the form of a reversal of the preference now accorded to Berlin or of a roundabout method of raising property tax in the concentration areas, which is then passed on in the form of increased rent - lead to social tension and are to that extent problematical. The same applies to any attempt to restrain concentration by curtailing infrastructure or housing. Success is likely to be minimal because residents are partially satisfied with smaller homes. The only result will be worse living standards in the towns and increased dissatisfaction among residents.

5.5.2 Reducing the concentration trend by way of measures in the less favoured areas

A deconcentration policy based on restrictive measures can only be successful if supported by more intensive aid for the less favoured areas. A rise in the attraction of aided areas for residents and enterprises reduces pressure in the concentration areas. This implies the strengthening of private investment capacity in the aided areas and an adequate provision of infrastructure catering for the needs of enterprises. Here too account has naturally always to be taken of all direct and indirect effects in order to find the best distribution of resources between regions. The only possibility of achieving this is by way of a model of the kind proposed here.

5.5.2.1 Instruments for influencing the choice of location by enterprises

5.5.2.1.1 Grants for capital installations

Within the framework of European regional policy, a system of financial incentives for private investments, applied in the aided areas, has already been created in order to influence their regional distribution in favour of those areas. Within the framework of the European Regional Development Fund

the European Communities are assisting private capital investments by participating in national aid measures (1). Details will not be discussed here. The declared purpose of this Fund is, however, to increase the volume of aid. Furthermore, by way of grants to projects aimed at improving infrastructure which is directly linked to investments in industrial and service activities, the infrastructure threshold in the aided areas will be raised so that more private investment can be carried out (provided other circumstances are also favourable). The activity of the European Regional Development Fund is therefore directed towards providing the labour potential in the aided areas with more capital. A rise in capital intensity leads to a relative reduction in the labour factor.

5.5.2.1.2 Grants for labour input

A direct labour subsidy by granting employment premiums on the English model (Regional Employment Premium) is conceivable in theory. It offers new enterprises an incentive to settle in the aided areas by reducing the cost of labour and encourages firms already present to employ more workers than they would otherwise have done. In this way unemployment in the aided areas can certainly be decreased. However, the measure is problematical because the granting of employment premiums leads without doubt to delays in implementing technical progress. There is, therefore, a negative side effect of which account must be taken in a decision. If there is no alternative, it must be accepted that there will be reduced growth in future incomes caused by restraining technical progress in favour of a rise in current incomes. Investment aids should therefore have priority among measures aimed at influencing regional distribution. Employment premiums should only be used in cases of extreme need.

5.5.2.2 Instruments for influencing the choice of residence by private households

Without comprehensive infrastructure measures no policy for reducing or changing a concentration trend can be successful. Certainly a system of financial premiums can be conceived to check migration from the depopulated areas. For instance, this is already the policy in Berlin. However, such measures will certainly cost very much more than raising the level of infrastructure in the poorest regions.

The special importance of infrastructure for the choice of location and residence has been stressed. In the long run, therefore, despite financial reasons for not extending the programme, an extension of European regional policy to include the infrastructure needs of households is quite unavoidable if the concentration trend is really to be brought to an end. This policy

(1) See K. Wegerhoff, The European Regional Development Fund (ERDF): financing - statutory distribution - application; lecture to the 8th scientific conference of the Association and Institute for Regional Policy and Transport of the University of Freiburg, 29.9. to 3.10.1975 in Freiburg, see European Communities, the European regions, N° 3/1975 of 21 March 1975, p.2.

implies a transfer of resources from the richer to the poorer regions (and countries) of the European Community which falls entirely within the framework of the commitment to European solidarity undertaken by the Foreign Minister of the Federal Republic of Germany (1).

5.6 The right instrument "mix" for reducing the concentration trend in agreement with the targets set

The last stage in the process of developing a fully operational European regional policy would be to use the model sketched in section 5.4 to prepare decisions concerning the level of instruments referred to in section 5.5. Clearly, this can only be considered as a long term development objective since the relevant scientific principles have first to be established and the corresponding statistical basis is not yet complete. All scientific efforts aimed at improving European regional policy should, however, be directed to making progressive contributions to the realisations of these targets.

For the Community the value of instruments created to this end lies in the fact that they allow the evaluation of possible consequences prior to the introduction of the various measures and in the course of consultations about alternatives. The prior simulation of these consequences should be as fruitful for economic policy as was the simulation of the space flight prior to the journey to the moon.

(1) see abovementioned

6. Proposed subjects for further studies

The points made in Section 5 not only describe the steps to be undertaken for improving the principles of decision-making but they are also suitable as a guideline framework for co-ordinating research activities on behalf of European regional policy. Subjects for research should in future be considered as purpose-oriented and co-ordinated efforts towards the construction of components which can be assembled by degrees into an overall mosaic of European regional development (including control possibilities).

As a conceptual basis for this progressive approach the model described in Section 5 would be suitable. The individual components should be conceived as sub-systems of the general system. This progressive purpose-oriented approach to research planning for European regional policy has the advantage of combining an overall view of the evolution of the concentration and deconcentration process and the short term results which can be used for improving the bases for decision-making.

The programme of research could consist of the following:

6.1 Preparing a systems analysis for classifying the links between the subjects researched

In the first place, priority should be accorded to drawing up a theoretical basis for determining the respective importance of the relationships which are at the root of current concentration and deconcentration processes. Regional policy must be understood, in this context, as the territorial dimension of total economic and social policy.

The most important sub-heads in such a systems analysis must be:

- the targets pursued in relation to economic well-being, infrastructure and quality of the environment in the sub-regions of the Community,
- the conflicts between these targets,
- the influence of congestion and depopulation on the realisation of those targets,
- the reasons for the current concentration and depopulation processes and the possibilities for influencing them through a Community policy and policies of Member States.

6.2 Improving statistical information

The systems analysis will indicate the statistical requirements for preparing the necessary principles of decision-making. These should be collated in three stages:

- an inventory of data already available in the desired regional structure
- a study of the possibilities for obtaining data not yet available, in particular, statistics on
 - investment and capital
 - infrastructure
 - the environment

- a possible revision of the original systems analysis should efforts to fill the data gaps prove fruitless.

The existing (and newly established) data should then be evaluated with two ends in mind: the measurement of the degree of target achievement and estimation of functional relationships.

6.3 Evaluation of the statistical information with a view to measuring the present degree of target achievement

In the first instance, the statistical information should be used to establish a permanent comparison between ex ante and ex post values of the target indicators in the various regions of the Member States under the following sub-heads:

- the degree of target achievement relating to the environment in the regions of the European Communities
- the degree of target achievement with regard to the economic and social structure in the regions of the European Communities
- the degree of target achievement relating to the settlement structure in the regions of the European Communities
- the degree of target achievement relating to infrastructure in the regions of the European Communities.

6.4 Evaluation of the statistical information with a view to estimating target relationships and target-means relationships

The second step in the statistical evaluation should involve the calculation of quantitative relationships between the component parts of the system. Only in this way can information be obtained on the likely consequences of extraneous events and applied measures and this information is indispensable for decision-making.

The evaluations required here concern two major groups of problems which should also be the subject matter for systems analysis:

- what impact do measures have on the concentration and deconcentration processes and how great is the effect of factors which cannot be influenced?
- conversely, what impact do concentration and deconcentration have on the targets, i.e. in a concrete case, what are the benefits and (opportunity) costs of a possible concentration or depopulation situation.

In this connection, the effects on the environment, infrastructure and economic well-being have to be analysed and quantified. These operations might result in an adaptation of the initial systems analysis.

6.5 Synthesis of the evaluation results to be incorporated
in a decision-making model for regional policy

If the work relating to 6.4 follows the systematic plan outlined at 6.1, the results of the evaluation can be progressively incorporated into a total picture of the regional development process within the Community and the appropriate measures deduced therefrom. Without doubt, this would be the most efficient method of fixing the regional policy instrument "mix". With the help of this model it would also be possible to handle the following subjects:

- determination of the interregional effects of regional policy measures,
- simulation of the consequences of alternative targets,
- simulation of the consequences of alternative instruments,
- proposals relating to the instrument "mix"
- target revision on the basis of the dual-values of the multiregional decision-making model.

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