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Criteria for the Spatial Differentiation of the EU Territory: Economic Strength

Study Programme on European Spatial Planning

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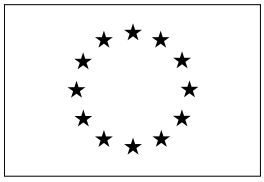

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Preface

Since the informal meeting of Spatial Planning Ministers in Liège in 1993, the EU Member States and the European Commission have been jointly elaborating the European Spatial Development Perspective (ESDP). In the preceding years, through the signing of the Maastricht Treaty, the EU had acquired considerably extended competencies in various policy fields, such as regional policies, trans-European networks and environmental issues. These have a potentially great impact on the spatial development in the Member States and the planning parameters of their regions and cities. This growing influence on spatial development on the one hand is contrasted by a lack of formal competence and political organisation of spatial planning at the administrative and legislative EU level on the other hand. In opening the political debate on the perspectives of European spatial development the 15 Member States and the European Commission initiated an intensive communication process concerning space and territory in the context of European policies. By adopting the ESDP in May 1999, they expressed their agreement on common objectives and concepts for the future development of the territory of the EU.

The ESDP is based on certain assumptions concerning current trends and problems of spatial development in Europe and an assessment thereof. Economic and social cohesion, conservation of natural resources and cultural heritage and a more balanced competitiveness of the European heritage are the underlying objectives of the ESDP. The political guidelines for their realisation as defined in the document are (1) a balanced and polycentric urban system and a new urban-rural relationship, (2) parity of access to infrastructure and knowledge and (3) sustainable development, prudent management and protection of nature and of cultural heritage.

However, in the process leading up to the adoption of the ESDP it became obvious that, despite all the efforts, large gaps in terms of comparable, spatially relevant data and a sound knowledge of spatial processes in Europe still remain. Acknowledging this, the ESDP develops strategies to overcome these deficits. The most important of these strategies is the institutionalisation of a "European Spatial Planning Observatory Network" (ESPON). In the ESPON, spatial research institutes of the Member States – as so called *national focal points* – are to prepare and exchange information, thus constituting an observatory in the form of a research network. For Germany, the Federal Office for Building and Regional Planning (BBR) assumed the function of a national focal point. From 1998 to 2000, the ESPON was tested in the framework of a study programme in accordance with Article 10 of the European Regional Development Fund.

During the ESDP process seven criteria were identified for which reliable indicators are needed to monitor the progress in realising the main objectives of the ESDP, i.e. the support of a balanced and sustainable development of the EU territory and its cities and regions:

- Geographical Position
- Economic Strength
- Social Integration
- Spatial Integration
- Land Use Pressure
- Natural Assets
- Cultural Assets

A substantial part of the Study Programme dealt with the elaboration of conceptual approaches and indicators for these seven criteria.[1] It was asked whether and how these criteria can be conceptualised and put into operation as indicators for spatial development, and to what extent it is possible to illustrate these indicators with existing, accessible empirical data. In accordance with the seven criteria, seven international working groups were formed. Their results formed the basis for the final report of the Study Programme compiled by the co-ordinators.[2] Germany played an active part in three of the seven working groups: Geographical Position, Economic Strength and Cultural Assets. The work carried out on these three topics as well as the final report as such is now published in the BBR research report series ("Forschungen"). In the present volume, the findings concerning concepts and indicators of "Economic Strength" are documented.

The investigation of economic strength in the EU regions follows a multi-directional approach and draws a comprehensive picture of what economic strength is and what it

(1)
The Study Programme considered three main topics. The other two were strategic studies on rural-urban partnership and innovative cartography of spatial planning in a European context.

(2)
The final report is also available as cd rom and can be ordered at www.nordregio.se.

means. In a second stage the results are to be integrated into the overriding approach of the Study Programme so that they can be observed in connection with the other criteria.

Previous work has proven that an approach which is too narrow often is incapable of uncovering the multiple causes which lie at the heart of regional economic strength. For this reason the present Study takes up the proposals of the 6th Periodic Report on the Social and Economic Situation and Development of Regions of the EU (1999) presented by the European Commission. As well as describing individual economic indicators, the subject is addressed from different perspectives such as potential inputs and outputs of economic strength, capacity for innovation, diversification, and factors of regional competitiveness. The importance of the territorial rootedness of production and services is acknowledged too. In methodological terms, the investigation is founded on multivariate data analysis.

The results of these analyses show that a direct line from what generally are perceived as good preconditions for economic development to successful development in practice (as represented by statistical data) does not exist. However, this macro view needs to be complemented by a closer look at the specific situation in every single region. Locational variables such as proximity, productivity, innovation and diversification are important factors. In a regional perspective, however, these variables become less significant in comparison with national economic cycles and general national institutional conditions, which might have very specific influences (as is clear, amongst other things, in the case of Ireland).

The study on economic strength was elaborated by the national focal points of Ireland and Luxembourg. The BBR contributed to the “competitiveness” aspect by providing data and methodology. The authors would like to thank all the focal points for their oral and written contributions. We would also like to thank the European Commission and the national Ministers responsible for Spatial Development who co-financed their focal points for the elaboration of the Study Programme.

In the course of the Study Programme, around 200 experts from the 15 EU Member States co-operated in a multi-layered international network: the network of national focal points, the national networks of spatial planning experts and 13 international working groups. As a test phase for a future spatial planning observatory network it proved to be a challenging and enriching experience. We firmly believe that the network approach of the Study Programme has shown its advantages and potential for the observation of spatial development in the European Union, and we hope that this approach will be continued in the near future.

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1 Introduction

(Luxembourg/Ireland)

The aim of this theme is to analyse European spatial development on a statistical basis using economic strength indicators. In doing so, the study examines the interrelationship between the causal factors and the effects of the various concepts at a regional level. The analysis takes into account the broader policy aims of the European Commission set out in Article 2 of the Maastricht Treaty, namely to promote harmonious and balanced economic development, sustainable growth and economic and social cohesion. These goals are further refined in the ESDP document (1999) which outlines the need for new concepts in urban-rural relations, that are increasingly operating at a regional rather than a settlement level. The document promotes the polycentric development model as a means of ensuring a more evenly distributed spatial balance in Europe.[1] These interlinked goals are taken into account in this theme by the introduction of spatial classifications complementing the statistical analysis of the regions.

The term "economic strength" was used in the Noordwijk draft of the ESDP (1997) to describe one of the seven most important dimensions of spatial phenomena with which to conduct spatially relevant analysis. The document identified three areas of further work as follows:

"In order to establish a more solid comparative evaluation of territorial strengths, weaknesses, opportunities and threats, agreement needs to be reached on specific spatially relevant ***criteria and their indicators****. These criteria, both individually but particularly in combination, are also necessary to develop different* ***typologies of areas*** *and to assess spatial impacts of* ***long-term European scenarios****. On the basis of such a set of criteria, it can be established on a comparative basis whether different cities, towns or areas of Europe enjoy with to respect to the three fundamental goals of the ESDP, a relatively stronger or weaker outlook for spatial development" (ESDP 1997: 42).*

The Noordwijk draft sets out a framework for the criteria, requiring one or more quantitative and/or qualitative indicators for each criterion and methods for their combined assessment. Criteria for economic strength are described in the document as follows:

"Economic strength in a spatial context expresses the relative (international, national and regional) economic position of a city, town or area, the ability to sustain or improve its position and the intensity of spin-off effects. There is no simple indicator available for economic strength in this respect. A sustainable high level of economic strength would involve at least a more than average economic output and/ or a more than average per capita income, a than average rate of unemployment, a favourable, modern and diversified sectoral structure and (a potential for) intensive trade relations with other (world) regions"
(ESDP 1997: 49).

This reference gives guidance for further elaboration of the current study. Studies in the broad field of economic strength already exist but they do not cover the entire range of aspects suggested in the ESDP framework. The aim of this study is to find an approach on economic strength that considers the demands outlined above by making use of existing theories and studies. Restrictions in the time frame and data do not allow the empirical application of all useful approaches but it is feasible to put in place a framework, with early research results, which can be applied to a more in-depth analysis in future studies. As a final part of this study, policy conclusions will be drawn and an assessment of further research provided to satisfy the demands of the Noordwijk approach.

The report is structured in the following way: Section 2 develops the approach for the study and selects areas of in-depth research in specific fields and dimensions of economic strength; Section 3 elaborates the selected approach; and section 4 draws some policy conclusions on the overall approach.

(1) For further discussion and definitions on urban-rural relations and polycentricity within this Study Programme see Theme Study 2.1 *Main Trends Shaping the European Territory*.

2 Economic strength – the approach

(Luxembourg)

2.1 Describing economic strength by indicators

2.1.1 Previous approaches

The introduction outlined the general thinking of the Noordwijk report on the criteria for economic strength. Reviewing the approaches (not only the theoretical but also the empirical studies which go beyond case studies that have been used in the European context), it is clear that they concentrate on the question of economic strength in the wake of the Single European Market. Prominent research includes the "blue banana" study by a team of French researchers (Brunet et al. 1989) which was based on a questionnaire aimed at enterprises (Nam et al. 1990). This was further developed towards "European grapes" and other developments such as the opening of the East (Kunzmann 1996). Most of these studies concentrated on competitiveness issues rather than developing the comprehensive approach required by this study. Further approaches, also concentrating on the competitiveness of regions, have been developed by some German groups of researchers (Irmen/Sinz 1989, Schmidt/Sinz 1993). Other studies concentrated on the impact of the Single Market. While addressing the problem of economic strength they do not clearly define conditions and indicators in the sense defined above (see for example European Commission 1997). A further research-based source concerned with economic strength is provided by the European Commission who published the "Cohesion Report" (European Commission 1996b). The Sixth Periodic Report (European Commission 1999) uses a more comprehensive approach to describe the situation of areas in various contexts.

In this report we seek to build on this by developing a more comprehensive framework based on the reviews of previous approaches which addresses all of the regions. In contrast, the Cohesion Report concentrates more on the cohesion countries and, therefore, provides a more restricted view in terms of the aims of this study. The conclusion of this very brief overview suggests using the studies cited as the basis for the comprehensive study required by the Noordwijk approach on economic strength.

2.1.2 Spatial indicators

Different concepts for economic strength cover a wide range of indicators. For instance, a wide variety of indicators are available to describe the economic strength of regions and areas in a broader context according to single indicators only. Core indicators usually comprise output and labour force statistics, but also include economic potential based on infrastructure and innovation capacity. In recent years, the EU has been preoccupied with competitiveness, adaptation (firms and labour) and modernisation. The European approach to economic development emphasises the role of the institutions, including the EU itself, in supporting and guiding economic development. The following list is not intended to be comprehensive but should cover the most important indicators that begin to describe the variety of areas in the European territory.

Employing the broad concept of the economic potential of regions creates some overlapping with other criteria investigated in this Study Programme. Therefore, it is important to define the criteria in order to avoid the multiple use of single indicators within differing spatial criteria. This applies in particular to the indicators of infrastructure, which reflect accessibility and are, therefore, strongly connected to the criterion "geographical position". Infrastructural indicators might also reflect the "spatial integration" criteria of regions in terms of infrastructure networks. Overlapping also exists with the criterion "land use pressure" in terms of the availability of industrial sites, and with "social integration" in terms of the quality of the workforce. Agglomeration indicators could also be used as a sub-criterion of "economic strength" in relation to "land use pressures". The criterion "economic strength" should, therefore, avoid using these indicators, particularly when combinations with other criteria are envisaged. If care is not taken the indicator will count twice and distort the results. In terms of future economic strengths, it seems to be advisable to agree on a limited number of combined key indicators such

as competitiveness, modernisation, etc. which concentrate on the core indicators of economic strength.

The list in table 2.1.2.1 sets out a set of single indicators that describe the main issues of economic strengths and potentials without overlapping with other spatial criteria. The list considers input and output variables, taking into account that strength covers not only the ability of regions to be competitive but also the ability to provide wealth to the population in the territory. Many intervening variables are also addressed. The problem with this list of indicators is that not all of them can be operationalised, which means that although some single indicators cannot be addressed, their concepts must be recognised. Problems arise with the availability of data at European level, particularly with indicators such as institutional capacity or institutional support frameworks in terms of their quantitative and qualitative dimensions and disposable income. The fiscal systems of Member States differ in such a way that comparable data at the spatially disaggregated level is hard to achieve. As a first step in describing the economic strength of areas in the European context a number of single indicators were selected. This was considered a particularly useful way of linking the economic approach with other spatial indicators. The selection of single (classic) indicators needs to consider core economic strengths if it is to avoid overlapping with other criteria. However, more conceptual indicators or indices need to be employed to describe sophisticated issues on the question of economic strength.

2.1.3 Concepts of indicators

Table 2.1.2.1 shows the emergence of concepts for more complex indicators or indicator systems that are needed to achieve a more refined analysis. Some topics, such as the capacity for innovation, require a more refined approach. Indicator systems that are relevant to such an analysis are based on theories of regional (economic) development. A systematic approach to select the most important concepts suggests a need to review all of the scientific literature on economic development. This approach would allow the identification of all relevant concepts but would also distort the picture in one of the following two ways: a) the importance of certain concepts changes over time as the framework for economic development changes, and b) there is a changing pattern

Table 2.1.2.1 Overview of selected spatial indicators of economic strength by dimension

Dimension	Indicators
• **Output**	GDP per capita, GDP by sector, productivity, export rates, share of agriculture
• **Income**	Disposable income, distribution, poverty lines
• **Labour force**	Unemployment rates (by age groups, by term), participation rates (by education, skills and occupation levels, age groups, gender), employment by sector, number of persons dependent on social security, levels of investment in education, in training and re-training per persons of labour force, role of active labour market policies, including community-based partnership initiatives
• **Capacity in innovation**	R&D investments (by industry, public/private status), R&D employment. Could be opened up to process as well as product innovation and emphasise innovation in services as well as in industry
• **Infrastructure**	Roads/railways/harbours/airports of regional, national and international importance, technology (transfer and access, such as ISDN), number of persons accessible in a certain time, utilities, industrial sites, education and training facilities, health care, leisure facilities. Could focus more strongly and explicitly on the criteria relevant to “post-industrial” economies including measures of information intensity such as contact potentials, headquarter functions, higher education facilities, concentration of R&D activities
• **Fiscal indicators**	Dependency on fiscal transfers, orientation on public investment programmes
• **Regional trade**	Balances, including measures of regional export performance
• **Institutional support frameworks**	Role of social capital, extent of public-private partnerships, balance between hard and soft supports for enterprise, level of investment in networking, co-ordination and integration
• **Enterprise characteristics**	Possibly to be expanded to company size, ownership of enterprises, sectoral composition and orientation of companies, regions or localities, technology standards in companies, expert performanceof regions
• **Agglomeration**	Population density, degree of urbanisation and settlement structure

of political awareness about the importance of certain concepts. Since one aim of this Study Programme is to bridge the purely scientific view with the European policy viewpoint, a combined, pragmatic approach is needed. Therefore, in a discussion process at the second meeting of the ESPON network in Stockholm in February 1999, the Focal Points of the Study Programme selected a range of concepts as a kind of work hypothesis which are in principle considered to be important concepts for the description of economic strength[2] (see table 2.1.3.1).

From a scientific viewpoint this approach does not detract from the task of proving the significance of the proposed indicator concepts. The approach proposed in this study considers input and output variables, taking into consideration that strength covers not only the ability of regions to be competitive, but also to provide wealth to the population of the territory. Many intervening variables are also addressed. Not only are single indicators addressed, but concepts of single indicators must also be recognised.

Classic single indicators – These were used in more complex analyses in combination with other spatial criteria. They are representative of the broad range of factors behind economic strength. Taking account of dynamic development in regions such as south-west Germany, north-central Italy, Ireland etc., regional development theory has acknowledged that no one single factor can be attributed to the success of a region. Instead, regional development has to be examined in terms of a wide range of variables, including resource endowment, market forces, location, social cohesion, vertical integration, and the division of labour, innovation and general industrial relations.

Globalisation/territorial rootedness of production – Integrating markets lead to an increasing harmonisation of production conditions. The term "footloose industry" indicates that there are industries that do not rely much on specific local or regional conditions for production. A hypothesis suggests that spatial units, which provide conditions for a specific kind of production, can bind industries to their territory and thereby create the basis for a strong and sustainable economy.

Modernisation/diversification – Modernisation examines the innovative capacity and future orientation of spatial units. Modernisation and competitiveness can to some extent be seen as sequential in that the basis for competitiveness is laid down in the modernisation indicators.

Competitiveness – This explores the ability of spatial units to maintain their position in an increasingly integrated and competitive market. It represents the most comprehensive approach followed by the study and provides the basis for the integration of all approaches.

The typologies identify different types of economic regions based on a number of variables related to the concepts of territorialisation, modernisation and competitiveness. In seeking to add value to the study, both the inputs and outputs for the factors of modernisation and competitiveness were defined.

(2) Deduction and description of these concepts follows in section 3.

Table 2.1.3.1 Selected concepts to describe spatial economic strength

Concept	Description
• **Single classic indicators**	Single classic indicators can be used in complex analyses and in particular in combination with other spatial criteria. The indicators should include „representatives" for input, output, sectoral structure, future orientation, labour market and fiscal strength.
• **Globalisation and territorial rootedness of production**	Integrating markets lead to an increasing equalisation of conditions for production. The term "footloose industry" indicates that there are industries that do not rely much on specific local or regional conditions of production. It can be assumed that spatial units, by providing conditions for specific kinds of production and therefore binding the respective industries to their territory obtain the basis for sustainable economic strength.
• **Modernisation and diversification**	Modernisation aims at the innovative capacity and future orientation of spatial units, conceived as the key factor for long-term sustainable economic development and strongly connected with a balanced enterprise structure. Central aspects are size, sectoral structure and the functional division of labour between spatial units and types of regions.
• **Competitiveness**	The ability of spatial units to maintain their position in increasingly integrating and therefore also increasingly competitive markets. The indicators most relevant for depicting competitiveness need to be identified to specify the most comprehensive concept for economic strength.

Due to tight constraints in time and resources within this project, not all of the suggested concepts can be elaborated fully. This applies in particular to the concept of globalisation and territorial rootedness where data is not widely available. The aim is to at least describe the concept and outline links with other defined concepts while leaving the realisation of the empirical research to a later project of following studies for the ESDP.

2.2 Some technical remarks

2.2.1 About the methodology

It is clear that the compiled comprehensive list of indicators needs further definition bearing in mind that the whole exercise is aimed at the development of different typologies for areas of European territory. A distinction between simple and complex indicators is most apparent. Simple indicators such as choosing a single or several indicators are easy to understand but may not cover the whole issue envisaged. Complex indicators or indices may allow for the inclusion of more information but they may lack the conciseness and clarity preferred for ease of interpretation at a political level.

In terms of **simplicity** the most common methodology is to choose a set of indicators such as GDP per capita, rate of unemployment or employment in the agricultural sector. An example is given by the European Commission's proposal for Structural Funds (EUROPEAN COMMISSION 1998). In order to select areas eligible for Structural Funds, the reform proposal suggests the following single indicators for regions covered by Objective 1 status: GDP, measured in power purchasing parity, of less than 75 % of the Community average (NUTS 2).

Under Objective 2 status, a set of indicators is applied in relation to the eligible industrial areas at NUTS 3 level. These are, firstly, an average rate of unemployment over the last three years that is above the Community average. Secondly, a percentage share of industrial employment in total employment equal to or greater than the Community average in any reference year from 1985 onwards. Thirdly, a discernible drop in industrial employment compared with the reference year chosen in accordance with the second indicator. Rural areas under Objective 2 (NUTS 3) status are eligible when they satisfy the following criteria: either a population density of less than 100 people per square kilometre, or a percentage share of agricultural employment in total employment which is equal to, or higher than, twice the Community average in any reference year from 1985. Secondly, either an average unemployment rate over the last three years that is above the Community average, or a decline in population since 1985 (European Commission 1998: 46 ff).

The typology of areas requires **classes** to be constructed on the basis of indicators. The best way to do this is to identify clusters of areas for each indicator. These classes can be **cross-tabled** in order to define types of areas in terms of their economic strength, e.g. high unemployment and relatively high GDP may indicate an old industrialised area (for typologies see below).

The compilation and computation of a range of indicators can build a complex index. Indices allow the combination of different indicators which augment the existing information but can also lead to a reduction of information through a reliance on statistical calculations defining the importance of given indicators. As a first consideration, combining indicators in an index allows for the **substitution** of values of single indicators. The question arises as to whether minimum standards should be defined for the indicators in an effort to prevent the loss of information in the case of extreme values. In addition, the **calculation** of the index emphasises extreme deviant values, e. g. given standardised indicators, multiplication would give extreme (i. e. high or low) values a stronger effect than when the indicators are added up. Furthermore, indices provide the opportunity to **weight** indicators, e. g. to include a doubled value of GDP and a single value of unemployment. Classes can be built that identify clusters in the same way as the simple approach.

Finally, methods for the compilation of indicators and indices must be addressed. The broad range of concepts for this study and their overlapping makes it necessary to employ more **complex methods of**

compilation. These will facilitate the examination of the correlation of indicators and indices, and also of the usage of multivariate analyses (such as factor and cluster analyses) to identify the most suitable indicator for the spatial criteria of economic strength, and to minimise redundancy.

Correlation analysis of these indicators of cause and effect aided the interpretation of development factors within a region. Further factor analysis and cluster analysis was used to build typologies and produce maps based on spatial classifications.

2.2.2 About the data

The application of different methodologies requires that data is available at various spatial levels. The main source of regional indicators is provided by the Eurostat "Regions – Statistical Yearbook" and the "REGIO" database.

The **Regions – Statistical Yearbook** is updated every year and provides harmonised and comparable statistical data on the main economic characteristics of the EU regions – population, employment, unemployment, economic data, research and development, agriculture, transport, and energy. Data is mainly given at NUTS 2 level, although some is only available for NUTS 1 regions or even Member State level (NUTS 0).

The **REGIO database** is specifically dedicated to statistics on economic life in the Member States and regions of the European Union. It represents the most comprehensive source of regional data available from Eurostat. The database contains around 100 tables, divided into the following subjects: demography, economic accounts, unemployment, labour force sample survey, energy statistics, agriculture, transport, and research and development. Data is given for different NUTS levels, and is generally more detailed than that from the "Regions – Statistical Yearbook". The database is only available from the Eurostat Data Shops network.

Another source is the databases used for the preparation of the Cohesion Report (European Commission 1996b) and the Sixth Periodic Report (European Commission 1999). The Commission prepared the main part of the analysed data for these documents. For example, the employment data originates from the national accounts of Member States.

From the outset, the choice of indicators was limited to some degree by the availability of data at regional level. This had two main effects: a) where a particular indicator was identified as representative of a concept measurement was not always possible, and b) where indicators were generally available but did not cover all the regions or were only available using different base years.

3 Concepts and indicators

3.1 "Classic" indicators (Ireland)

3.1.1 Concept and indicators

There is no complex theory or concept behind the proposed structure for the classic indicators, or any resulting indicators, and as a result the methodology and data are straightforward. The classic indicators should be easy to understand and draw on readily accessible data. They examine not only the current level or state of the indicators but also the dynamics of each indicator. Some form of standardisation of these indicators is advisable for comparability and transparency, using the EU average or a percentage share.

In terms of a widely accepted **input** indicator, the total **investment in relation to GDP** is suggested. Capital intensive production is still an important indicator for the economic strength of a spatial unit. However, data is not readily available for this indicator at EU level. An alternative indicator is **GDP per employee**, which can be used to measure the productivity of a region. This provides a measure of economic growth that has been achieved by raising the output of each person employed. In general, without opening a discussion about the quality of the GDP as a suitable indicator, one has to keep in mind that GDP consists of many expenditures of a defensive nature and does not include any inherent environmental costs. There has been a great deal of discussion about this problem and measures such as additional (environmental) accounting indicators are currently being developed mainly at national level.

There could also be an argument for using GDP per employee as an **output** indicator for regional productivity, bearing in mind the difficulties with the concept of GDP. However, difficulties arise because this measure of output does not consider how much of the GDP is used to benefit the total number of people within a given spatial unit. Consequently, **wealth** is better measured by GDP per capita. This measure is the outcome of a number of factors including GDP per employee, employment growth, participation rates and level of dependency. The greatest problem with this indicator is that it does not reveal anything about disposable income and its distribution, which would be a better indicator for reflecting the wealth of a region. In view of the accessibility of the data we suggest using **GDP per capita**. While this identifies the wealth of a region, it should be noted that other concepts such as the distribution of income using quintiles would provide a more appropriate picture of the social situation in practice.[3]

Another very basic indicator used to depict the progress of an economy is the **sectoral structure** of a territorial unit. The sectoral structure usually comprises agriculture, industry and the service sector. One might compile the share of these sectors on the basis of the employment of GDP data. Particularly in remote regions, the output in terms of value added in the agricultural sector is very low because of low productivity. Although (or perhaps because) a high proportion of employment is found in this sector, it is advisable to use employment shares rather than output shares. Low proportions of employment in the agricultural sector indicate an advanced economic structure. In contrast, a high proportion of employment in the service sector is usually considered indicative of an advanced economic structure. This is not true in every case. There are many service sector jobs that do not necessarily point to an advanced economic structure. On the other hand, a highly productive industrial sector does not necessarily indicate a weak economic structure. In addition to these conceptual problems, there are also problems with interpreting the data as companies categorised as industrial may incorporate a high share of service occupations. Taking account of these considerations we recommend using the **share of employment in the agricultural sector** as an indicator, bearing in mind that it portrays the degree of remoteness rather than the degree of advancement of a territorial unit. The **future orientation** of industries is another key indicator of economic strength. Future orientation is used as a guide to the innovative capacity of firms. The indicators most commonly used are those such as R&D investment per employee (or as a share of all investments) or the output and the **share of R&D employment from the total employment**. Data availability recommends the employment indicator, which also has fewer problems of definition.

(3) See also: concepts of the World Bank and the OECD

The most comprehensive indicator for the **labour market** is the **unemployment rate**. Using only the unemployment rate means losing information about the quality of unemployment, in particular the unemployment of young people and long-term unemployment. Other indicators such as labour market participation rates are also very interesting in qualifying the information on labour markets but nevertheless, the unemployment rate can be used to identify differing participation levels in Member States and also certain types of regions.

Finally, a **fiscal and/or institutional indicator** would be beneficial for identifying the capacity and ability of spatial units to influence economic development. It is important to address two dimensions, both of which are difficult to measure. The fiscal dimension would consider the financial means available for economic development, which should include, apart from the financial resources available regionally, the financial flow from national level to each spatial unit for the purposes of economic development policy. The other dimension examines the response of institutional capacities to the demands of active regional policies. Both indicators are hard to operationalise as institutional and financial arrangements differ considerably across Member States. One possible indicator to use in this respect could be "fiscal sources" for value added taxes which are known at regional level from Eurostat files.[4] A list of classic indicators is given in table 3 1.1.1.

(4) The values have been published by Decroly and Vandermotten in 1990.

Table 3.1.1.1 Overview of classic indicators

Classic Indicator		Description	NUTS level	Source	Other concepts
1	Input	Investment by GDP		n.a. in Eurostat	
2	Output/Productivity	GDP per employee	1, 2, 3	Eurostat - REGIO	Competitiveness
	2a	Gross value added by sector	2	Eurostat - REGIONS	Modernisation/Diversification
3	Wealth	GDP per capita	2	Eurostat - REGIONS	Competitiveness/Modernisation
			2, 3	Eurostat - REGIO	
	3a	Employment	2	Eurostat - REGIONS	
			2, 3	Eurostat - REGIO	
4	Sectoral structure	Share of employment in agricultural sector	1, 2	Eurostat - REGIONS	Competitiveness/Modernisation
			2	Eurostat - REGIO	
	4a	Income by sector	2	Eurostat - REGIONS	
			3	Eurostat - REGIO	
	4b	Employment by sector	2	Eurostat - REGIONS[1]	Modernisation/Diversification
			2	Eurostat - REGIO[2]	
			3	Eurostat - REGIO[3]	
5	Future orientation	Share of R&D employment of total employment	1, 2	Eurostat - REGIONS	Competitiveness/Modernisation
			2	Eurostat - REGIO	
	5a	R&D investments (by industry)	1	Eurostat - REGIONS	Competitiveness/Modernisation
				Eurostat - REGIO	
	5b	R&D employment	1, 2	Eurostat - REGIONS	Modernisation/Diversification
			1, 2	Eurostat - REGIO	
6	Labour market	Unemployment rate	2	Eurostat - REGIONS	Competitiveness
			2, 3	Eurostat - REGIO	
	6a	Participation rate by age	2	Eurostat - REGIONS	
				Eurostat - REGIO	
	6b	Participation rate by sex	2	Eurostat - REGIONS	Modernisation/Diversification
			3	Eurostat - REGIO	
	6c	Long-term unemployment	2	Eurostat - REGIONS	Modernisation/Diversification
			2, 3	Eurostat - REGIO	
	6d	Unemployment by sex	2	Eurostat - REGIONS	
			2, 3	Eurostat - REGIO	
	6e	Unemployment by age	2	Eurostat - REGIONS	
			2, 3	Eurostat - REGIO	
7	Fiscal/institutional indicator	Fiscal source for VAT		n.a. in Eurostat	
	7a	Transport lines in km (streets, railways, waterways)	1, 2	Eurostat - REGIONS	Modernisation/Diversification
8	Regional trade	Goods transport (streets, railways, waterways)	2	Eurostat - REGIONS	
			1, 2	Eurostat - REGIO	

[1] Six categories: agriculture and forestry, energy and water, industry, building and construction industry, market services, non-market services.

[2] 21 categories: agriculture, forestry and fishery, industry, market services, energy, ores and metals, minerals, chemical products, metal products, machines and electro-technical products, means of transport, food, beverages and tabac-products, textiles, clothing, leather and shoes, paper and printing products, different industrial products, building and construction, recycling and repair, trade, catering, accommodation, transport and telecommunication services, market services, banking and insurance services, other market services, non-market services.

[3] Three sectors: agriculture, industry and services.

3.1.2 Regional profiles of classic indicators

Five variables have been chosen to represent the classic indicators of economic strength in a region. These five are taken from the list of indicators in table 3.1.1.1. They were chosen for two reasons, taking into account that a reduced number of indicators was preferred for this study. The first is that they were considered to be the most important and most representative indicators based on what we were seeking to describe e.g. wealth, sectoral structure etc. The second reason they were chosen was their ready availability at EU level. This last requirement meant that while an indicator for fiscal and institutional concepts would have enhanced the study it was not practical given the availability of data. The concept behind the indicators used was outlined in section 3.1.1. Three of the indicators are considered as inputs: GDP per employee (productivity), share of employment in the agricultural sector (sectoral structure) and share of R&D employment out of total employment (future orientation). The other two indicators – GDP per capita (wealth) and the unemployment rate (labour market) – are considered as outputs of economic development.

For the most part these indicators have been well researched in existing literature. As a result, this section will not repeat analyses that are already available in existing studies[5]. In particular, the Sixth Periodic Report on the Social and Economic Situation of the Regions of the European Union published by the European Commission in 1999 provides recent analysis of most of the indicators outlined above. An exception is the indicator on "R&D employment out of total employment": data for this was analysed using the Eurostat REGIO database.

The following paragraphs outline the situation with regard to the indicators in the European Union regions and Member States. The indicators are assessed over a ten-year period: 1986–1996 was the baseline for output and GDP data at regional level. For employment and unemployment the baseline period was 1987–1997 as data for 1997 is available.

GDP per employee (input)

The indicator GDP per employee has been used to measure the output or productivity of a region. GDP per capita can be viewed as a combination of GDP per employee (productivity) and employment growth as well as other factors such as the employment/unemployment rate, participation rates and dependency rates. In the EU growth has mainly been achieved by raising the output of each person employed rather than by increasing the number of people in work. As a result, even in regions that have comparable GDP per capita, there are significant variations in the relative contribution of GDP per employee and growth in the numbers employed (see map 3.1.2.1, page 10).

Portugal has a low GDP per capita and around 60 % of the EU average in productivity but it also displays a low level of unemployment. The south of Italy has an output of around 90 % of the EU average, with the exception of Calabria, which is just over 80 %. However, the number in employment is very low, about 40 % of the working age population. As in Spain, low GDP per capita is mainly attributable to low levels of employment.

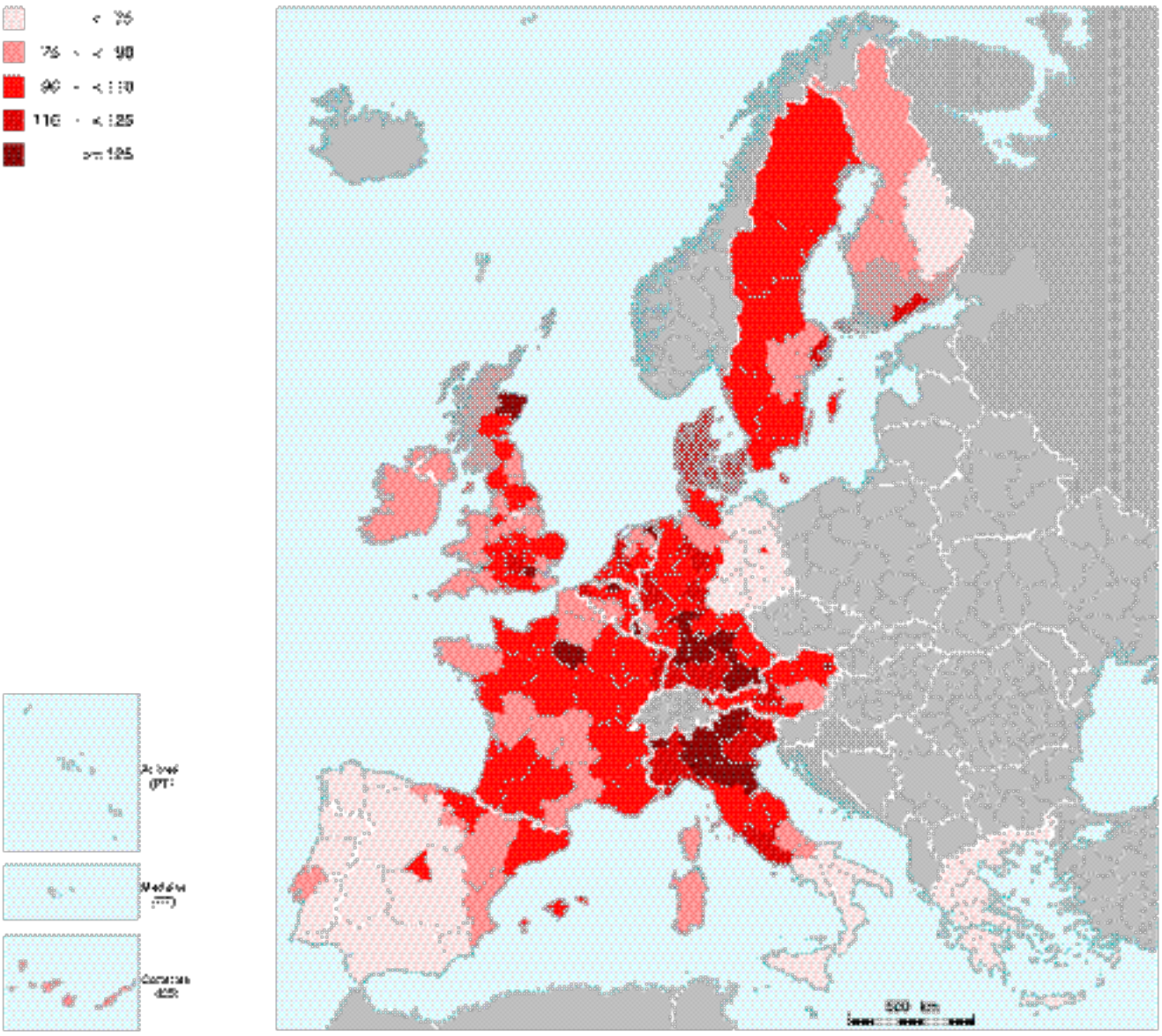
In the new German Länder the opposite is the case. They have employment rates just above the EU average but the output per person employed is generally 60 % or less of the EU average.

Ireland is unusual in that over the baseline period it performed strongly both in output and employment growth. GDP per person employed increased to above the EU average and in 1997 employment was 58 % of working age population, up from 51 % in 1988 and just under the EU average of 61 %. Significantly, over the same period the participation rates were also up and the dependency ratio decreased. The combination of these factors has ensured that the growth rate was maximised within this period. The only other regions that experienced a significant rise both in output and employment were Northern Ireland and Centro in Portugal. Flevoland also recorded high growth in both GDP per employee and employment but because a large proportion of its population works outside the region this is not a true reflection of the productivity of the region.

Greece shows one of the poorest performances with low productivity and employment levels. In the interior regions

(5)
European Commission (1999): Sixth Periodic Report on the Social and Economic Situation and Development of the Regions of the European Union, Luxembourg
Dunford, Michael (1996): Disparities in Employment, Productivity and Output in the EU: The Roles of Labour Market Governance and Welfare Regimes, *Regional Studies* 30 (4), 339–358
Cambridge Econometrics (1998): A report on Regional Competitiveness indicators submitted to DG XVI of the European Commission

Map 3.1.2.1
Productivity in the EU 1995–1997: GDP per employee in %



Data source: EUROSTAT

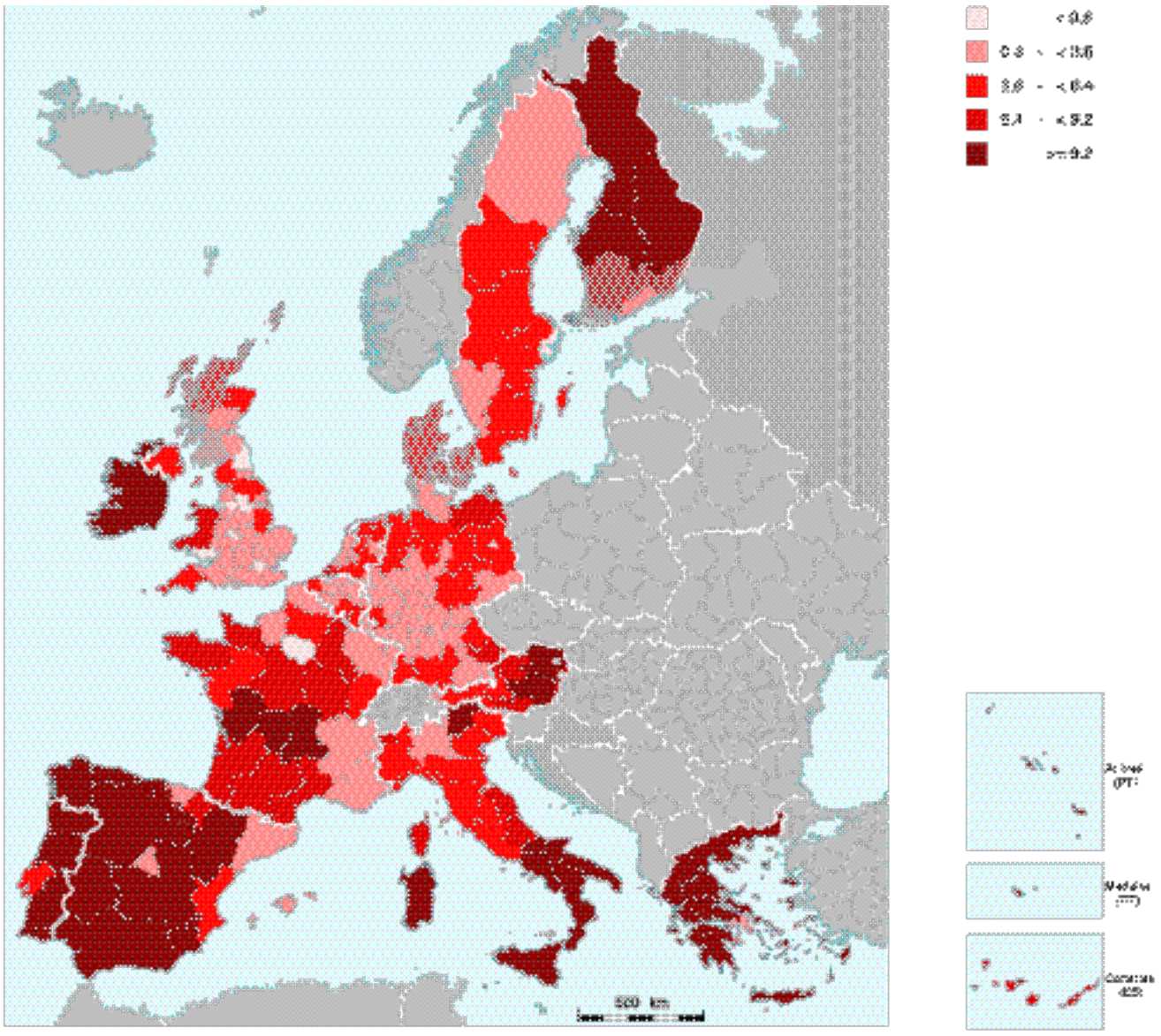
productivity is typically about 60 % of the EU average, and while this is similar to many of the regions of Portugal, it does not display the low unemployment rates of the Portuguese regions nor does it have the high productivity growth. Although employment growth was just above the EU average a high proportion of jobs remained in the weaker agricultural sectors.

Both Finland and Sweden were badly hit by the recession in the early 1990s. The Itä-Suomi region in Finland went from traditionally high employment rates to around just 55 % of the working age population in employment. On the other hand, the slump left productivity growth largely unaffected, and in some cases even higher, as industry restructured.

While there are many regions in which productivity has increased by more than the EU average since 1988, there are no regions where the employment rate has risen significantly without a correspondingly high growth in productivity. Therefore, while productivity growth is a precondition for sustained growth of employment, it is not sufficient in itself. In some cases, for instance Basilicata in Italy and Sterea Ellada in Greece, productivity increased from below the EU average to above it but the employment rate went down and unemployment rose in 1997.

In any given region a combination of factors must occur over a given period if GDP per capita is to grow. Ireland is an example of where productivity growth has been

Map 3.1.2.2
Sectoral structure: share of employment in the agricultural sector 1997 in %



Data source: EUROSTAT

higher in the past but did not result in an equivalent rate of growth in GDP per capita, because it was not accompanied by a rise in participation rates and employment and a fall in the dependency rate.

Share of employment in the agricultural sector (input)

In Objective 1 regions a major discrepancy in the structure of employment is the persistence of high employment in agriculture where it accounts for about one in ten jobs, twice as many as in other parts of the Union. Objective 1 regions have been less successful in creating jobs and reducing unemployment than they have been in raising productivity and increasing GDP per capita.

Between 1987 and 1997, employment declined in agriculture and manufacturing but increased in services. Of all sectors, agriculture has experienced the greatest decline in employment with just under four million jobs which represented a drop of 39 %. The regions with the highest concentration of agricultural employment had an unemployment rate of four percentage points above the EU average at 14.7 % in 1997. Areas that maintain a high reliance on agriculture are particularly at risk of falling behind economically. Greece is an example where unemployment remains below average but employment in agriculture is as high as 30–40 %. There is already evidence of the difficulties caused by economic restructuring in Greece. The

change in employment rates between 1987 and 1997 reveals that unemployment rates have risen in all of its regions. Long-term unemployment, an indicator of structural disadvantage, is also high in 1997.

Those regions with the highest employment in agriculture are to be found to the north and west of Spain (Galicia, Castilla y León, Estremadura), Portugal (Centro and Alentejo), Greece, southern Italy (Molise, Basilicata, Calabria), Sardinia and in the Finnish regions of Väli-Suomi and Ahvenanmaa/Åland (see map 3.1.2.2, page 11). When compared with GDP per capita in 1996 the majority of these regions had GDP per capita of less than 75 % of the EU average. Only one region, Castilla y León, had a GDP per capita of 75–90 % of the EU average.

There are regions such as Emilia-Romagna and East Anglia where agriculture is concentrated in high value sectors, and in these cases GDP per capita is above average. In rural areas as a whole, unemployment is below the EU average and in some cases very low. These rural regions tend to be more diversified and do not rely solely on agriculture. To a large extent, a high proportion of employment in the agricultural sector is a measure of a region's remoteness.

Another element to take into account when examining employment in the agricultural sector is the level of underemployment. Increasingly agriculture is carried out in conjunction with another job or on a part-time basis. Unlike urban areas where part-time work is a choice, in rural areas 42 % of part time workers would prefer a full-time job.

Share of R&D employment (input)

The highest share of R&D employment (in percent of total employment) is to be found in major urban areas in the core regions (see map 3.1.2.3). These include regions such as Stuttgart (1.13 %), Bremen and Oberbayern (2.35 %) in Germany, Ile-de-France (1.63 %), Piemonte (0.84 %), East Anglia (1.47 %) and the south of England. All of these regions also display a higher than average per capita GDP. The Nordic countries show an unusually high proportion of R&D employment in relation to total employment, in particular Finland, where Uusimaa has a share of 3.64 %, the highest in the EU. It is also high in Etelä- Suomi (2.51). Stockholm has the highest share of any Swedish region at 1.75 %. Stockholm also has a higher than average EU percentage of employment in services at 83 % but this is seldom the case with the other regions.

There are also regions within the core areas which have a very low share of R&D employment. These include regions such as Niederbayern (0.21 %) which is within the same NUTS 1 region as Oberbayern. The number of patent applications for Oberbayern per one million inhabitants is almost three times greater. The GDP per capita of Niederbayern is 96.8 % of the EU average compared to Oberbayern, which has a GDP per capita of 158 %.

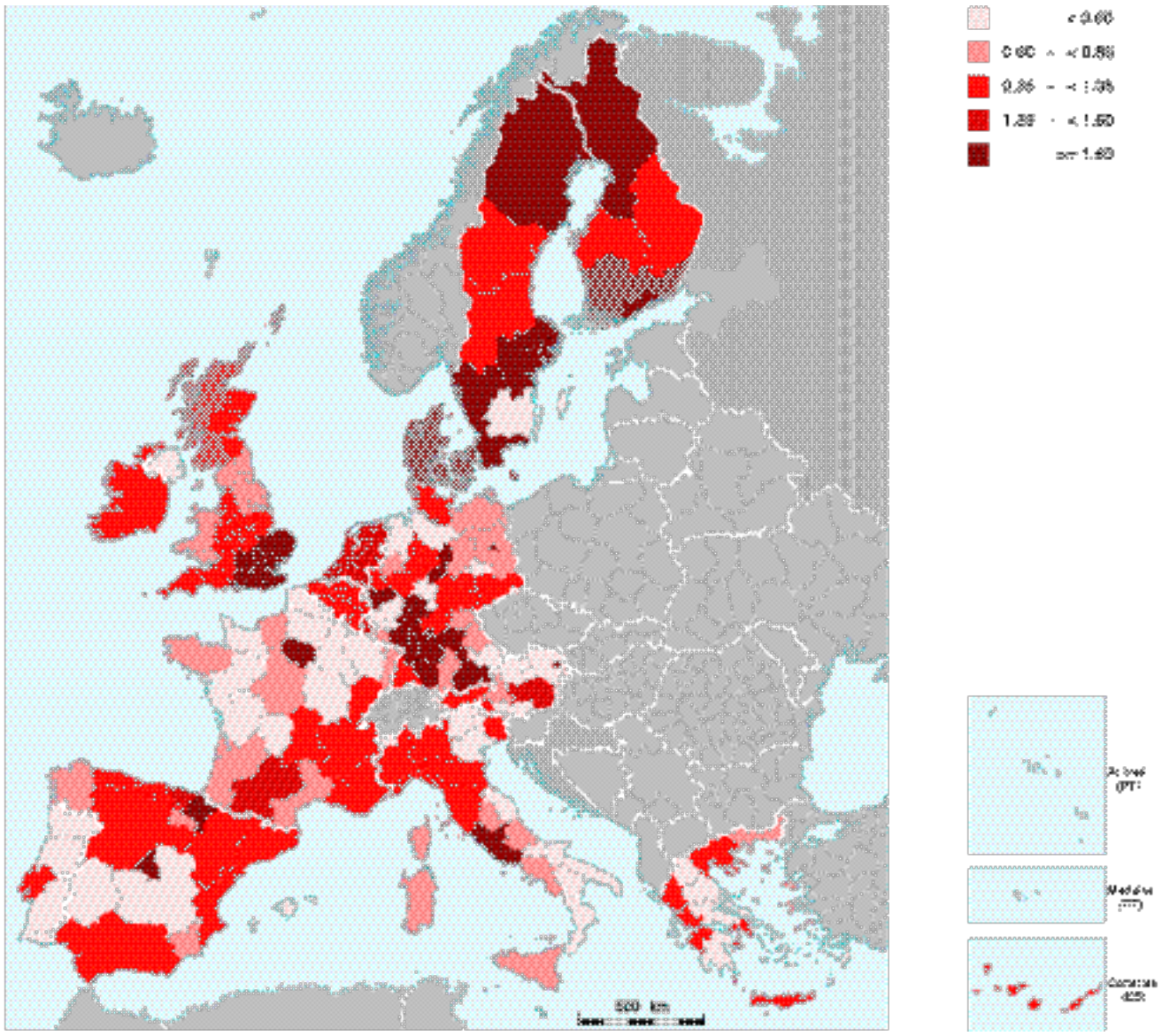
The new German Länder have a low proportion of R&D employment. These regions tend to have a higher share of their total employment in agriculture. In France this same pattern can be seen in the regions of Languedoc, Ouest and Limousin. In the UK, Wales and Northern Ireland have the lowest proportion of R&D employment at 0.19 and 0.20 % respectively. These regions have a lower GDP per capita and higher employment in agriculture than other regions in the UK. R&D employment as a share of the total was also low in Yorkshire, the north of England and Scotland.

There is no data available for Greece, Luxembourg or Austria. The Netherlands only has data available at national level and in this respect is similar at 0.59 % to Belgium at 0.64 %.

There is a marked divergence between those Member States with the lowest R&D share of employment and those with the highest. Objective 1 regions, in particular, record very low levels. In Spain the highest proportion of R&D employment is in Madrid and Pais Vasco but when compared to other regions it is still low at 0.49 % and 0.56 % respectively. In all there are nine NUTS 2 regions in Spain with less than 0.10% employment share in R&D. Portugal records even lower levels. Lisbon has the greatest proportion of the regions with 0.09 %.

The southern and central areas of Italy in particular have low R&D employment levels. The regions of Calabria and Molise have almost no share of employment in R&D at all. Regions such as Emilia-Romagna also show low levels at 0.3 %.

Map 3.1.2.3
Share of R&D employment 1995 in %



Data source: EUROSTAT

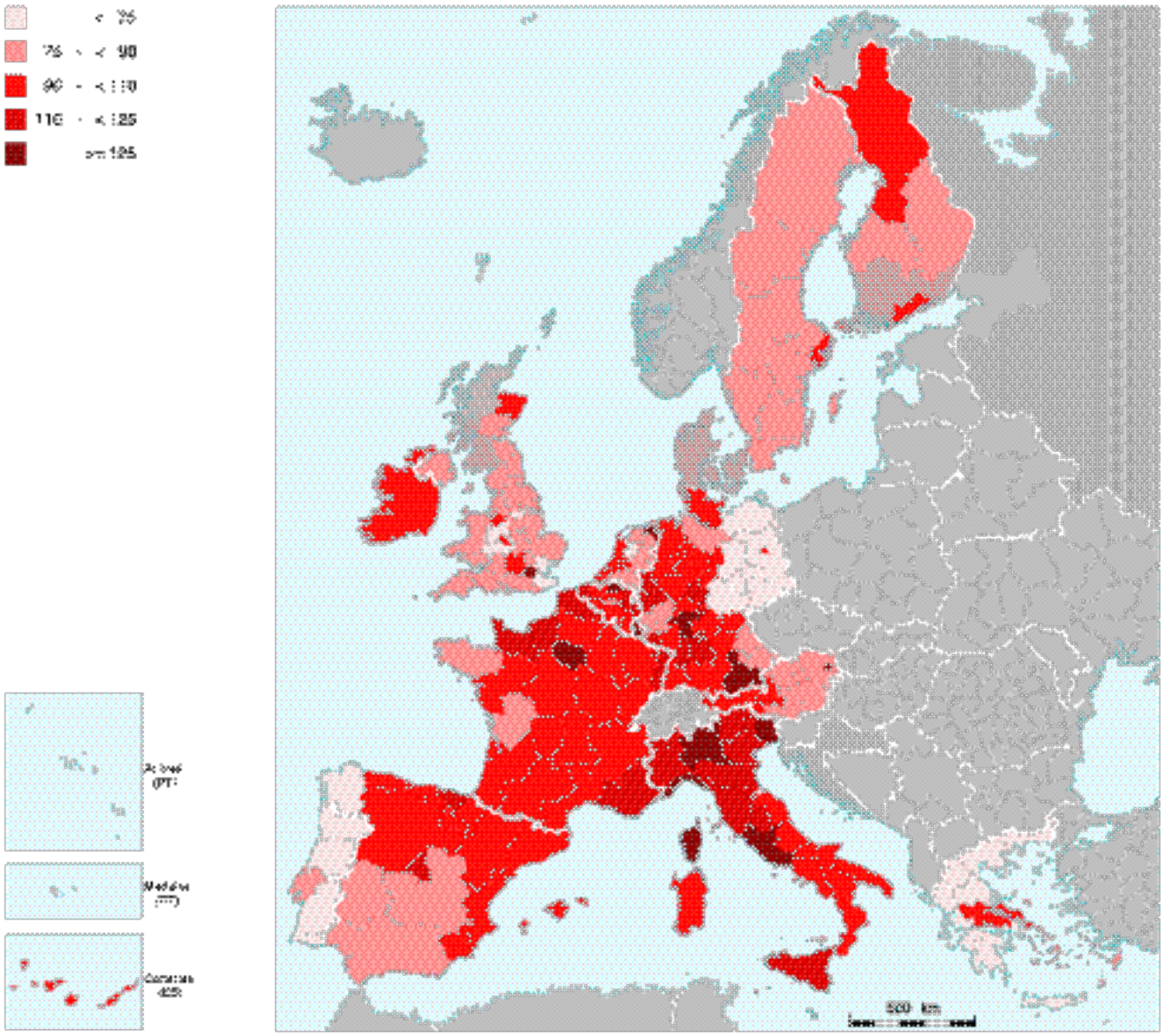
Ireland, with data for one NUTS 1 level region only, records R&D employment shares of 0.5 %. There is a high probability that this is concentrated mostly in the east of the country and that there would be a high regional disparity.

As an indicator of future orientation, the share of employment in R&D as a percentage of total employment would suggest that the concentration will continue in the core regions and that Objective 1 regions in particular have a long way to go in restructuring their economic base.

GDP per capita (output)

Taking GDP per capita (masured in power purchasing standards, PPS) – as an indicator of economic strength, regional disparities are apparent (see map 3.1.2.4, page 14) The GDP per capita in the ten poorest regions taken as a whole increased from 41 % of the EU average in 1986 to 50 % in 1996. Relative GDP per capita in the ten wealthiest regions has declined over the same period from 3.7 times the level in the ten poorest regions to 3.1 times the level. Eight of the ten poorest regions remained unchanged from 1986 to 1996 and included the French overseas dominions, some Greek regions (Voreio Aigaio and Ipeiros) and the Portuguese regions of Centro and Alentejo. Similarly, the ten wealthiest regions changed very little and included Brussels, Ile-de-France, Wien, London and four regions in Germany – Hamburg, Bremen, Oberbayern and Darmstadt.

Map 3.1.2.4
GDP per capita 1995–1997 in %



Data source: EUROSTAT

Disparities are increasingly apparent within Member States rather than between them. In the four cohesion countries in particular, relatively wealthy urban centres contrast strikingly with poorer rural regions. An important factor in disparities in GDP stems from the effect of economic restructuring. Some regions, for instance in the northern Member States which are dependent on declining industries, show lower GDP per capita. An example is Hainault in Belgium which was 81 % of the EU average in contrast to the northern regions in Belgium which were as high as 137 % (Antwerp) of the average in 1996. Similar low GDP per capita levels exist in Merseyside in England and in Burgenland in Austria which are also suffering from the effects of restructuring and associated urban and social problems. In contrast, regions which specialise in growth sectors show above average GDP per capita.

In Portugal growth has been concentrated in the urbanised regions of Lisboa (88 % of EU average) and Norte. While the poorer regions and the interior are catching up, significant differences remain: for example, Alentejo, which is in the same NUTS 1 region as Lisboa, has only 60 % of the EU average.

In Spain growth has been high in Madrid and Cataluña where it is equal to the EU average. Growth is also strong in the poorer southern regions so that Extremadura has risen from 44 % in 1986 to 55 % in 1996 and

Castilla-la-Mancha has risen from 54.5% to 66% in 1996. However these regions are still heavily dependent on agriculture and remain in an economically fragile position. In general, growth in the northern Spanish regions remains sluggish.

In Greece, the poorest Member State in the region, there has traditionally been little regional disparity. This is changing as Athens concentrates growth in the service and manufacturing sector and as the rest of the country is in the process of restructuring. Athens is also favoured because of its better access to the rest of the EU. While most Greek regions experienced growth over the 1986–1996 period, three regions actually had a decline in GDP per capita. These were Ipeiros (47.4% to 43.8%), Poloponnisos (60.7% to 58.3%) and Sterea Ellada which started from the relatively high base of 73.5% of the EU average in 1986 and declined to 65.5% in 1996.

Ireland has recorded the highest growth in the EU over the nineties, rising from 60.8% of the EU average in 1986 to 96.5% in 1996, and it has now exceeded the EU average. The main problem encountered in Ireland is that the growth is concentrated in the East of the country and large regional disparities remain. There are also some fears that the extent of linkages in the local economy created by one of the main sources of growth, namely inward investment and multinationals, may not be enough to sustain growth. On the other hand there has been a corresponding decrease in unemployment and a rise in participation rates. Allied with the rapid development of the service sector there still appears to be potential for future growth.

The inclusion of the new German Länder had the effect of lowering the average GDP per capita in the Union, which in turn increased the relative level for other countries. In 1991 the Länder GDP per capita was about one third of the EU average. By 1994 it had increased to about two thirds but since then there has been a slow down in its rate of catching up. The initial increase was probably largely due to specific policies adopted by the unified Germany to aid the new Länder.

In general, urban areas and areas with high concentrations of service and manufacturing activity display a high GDP per capita. In contrast, rural areas which are heavily dependent on agriculture have a lower GDP per capita. Even in poorer regions which are catching up with the EU average there is a danger that if supply side improvements and diversification do not take place, growth will not be sustainable.

Unemployment (output)

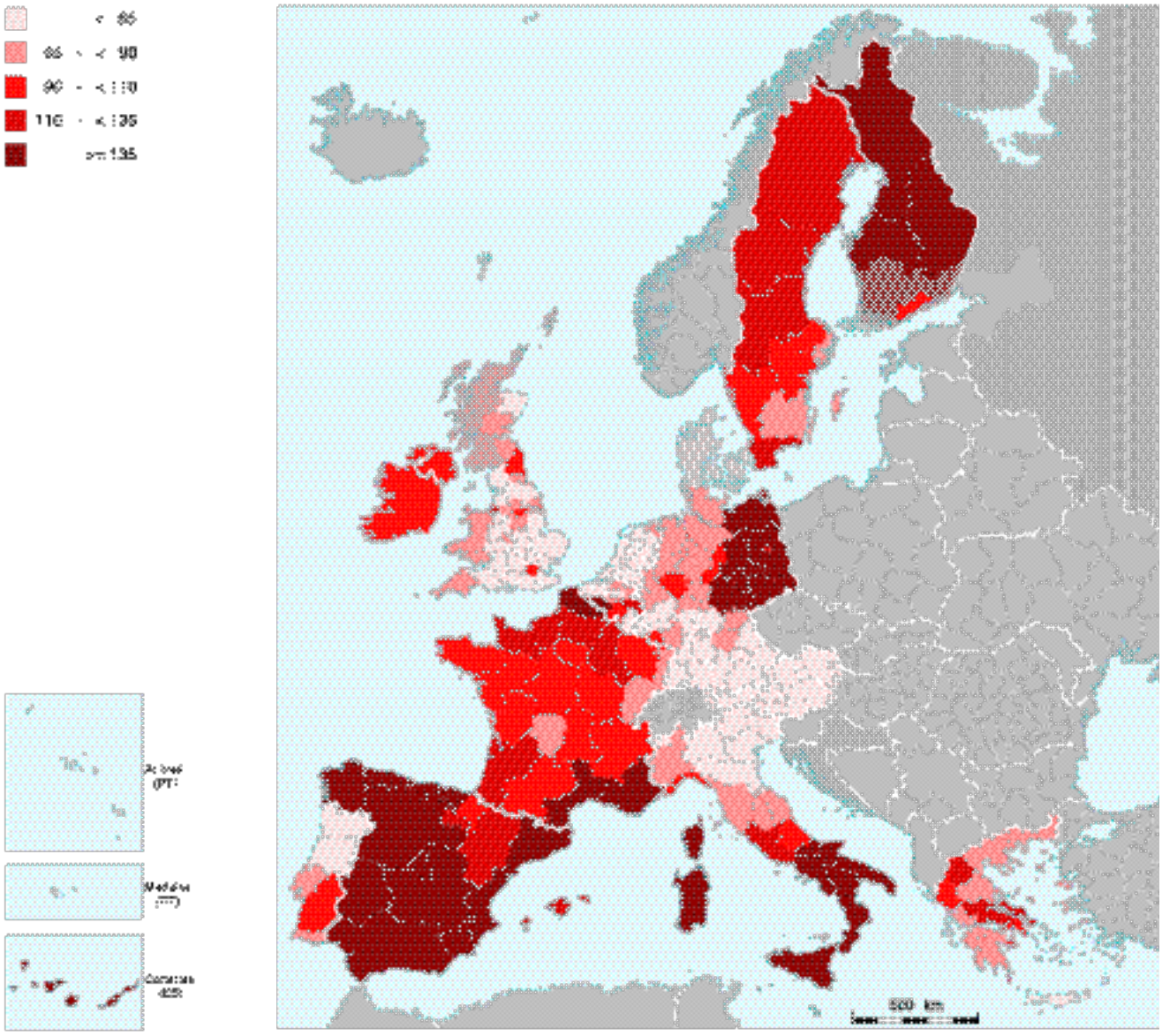
High unemployment remains a problem in the European Union. In 1998 unemployment was almost 10%, representing 16.5 million people. High levels of long-term unemployment are associated with high levels of unemployment and have the additional negative social affects of marginalisation and social exclusion. By 1997 just over 49% of unemployed people in the EU had been out of work for more than one year (5.2% of the workforce).

Unemployment rates are greatest in Spain and extend to the French Mediterranean regions (see map 3.1.2.5, page 16). South Italy and the islands of Sardinia and Corsica are amongst the unemployment black spots in the Mediterranean. In Northern Europe the worst unemployment is to be found in parts of Finland, eastern Germany and the declining industrial regions. Between 1987 and 1997 the overall unemployment rate in the Union remained similar (around 10%) but varied widely between the regions. Ireland, the UK and the Netherlands reduced their unemployment by as much as 4.5 percentage points whereas Sweden, Finland and south Italy increased theirs. In the case of Sweden unemployment rates escalated from 2.5% in 1987 to 10.4% in 1997, largely due to the recession in the early nineties.

Long-term unemployment is worst in the northern regions of Spain, South and Central Italy, Greece, Northern Ireland and some regions undergoing restructuring in Belgium, the Netherlands and parts of Germany and France. As long-term unemployment is about 50% of all unemployment in the EU, this would suggest that structural unemployment is a major cause of concern, particularly in view of the fact that it is more persistent than short-term unemployment and involves more than just increased output or investment to solve.

Regions with high rates of GDP per capita do not necessarily have similarly high rates of employment. In particular, urban areas often have higher than average unemployment. Urban areas are classified as having more than 500 inhabitants per square kilometre,

Map 3.1.2.5
Unemployment rate 1997



Data source: EUROSTAT

according to which definition 49 % of the EU population is included. Rural areas are classified as having less than 100 inhabitants per square kilometre and include 24 % of the EU population. Between these two are intermediate areas with 500–100 inhabitants per square kilometre and these areas incorporate just over one quarter of the population. Unemployment in rural areas averages 11.3 %, which is almost as high as urban areas (11.7 %). In intermediate areas unemployment is lower than in either of the other two areas at 9.1 %. Unemployment of women is worst in rural areas at 13.8 %, and is particularly serious in the Mediterranean regions. Long-term unemployment is highest in urban regions e. g. Merseyside, but can also be seen in agricultural regions that are restructuring e. g. Greece.

Portugal, which has less than 75 % of the EU average GDP per capita for the majority of its regions recorded relatively low unemployment rates. In Alentejo, the worst affected region, unemployment remained below the EU average for rural regions at 10 % in 1997. In contrast, some regions in northern France (Nord-Pas-de-Calais) and SE England which had high GDP per capita also displayed high unemployment rates. Greater London had 140 % of the EU average GDP per capita in 1996 but while its unemployment rate was below the EU average (9.7 % in 1997), the level of long-

term unemployment was very high at 44.5 %. Youth unemployment was also high at 16.6 %. In this situation there is a strong potential for social exclusion and marginalisation.

Unemployment among women is higher than among men in most of the EU (12.5 % as against 9.5 % in 1997). Women constitute over 40 % of the EU labour force but they account for almost half of the unemployed and over half of the long-term unemployed. Women are also likely to work part time and to be concentrated in the service sector. There are marked regional differences in female unemployment. In the Nordic countries female unemployment rates are similar to those of men, as they are in the UK. On the other hand, in Spain, Italy and Greece less than half of women participate in the labour market. When women do participate there is high unemployment and little opportunity for part time work.

Regional disparities remain a problem particularly where they are accompanied by, and are in part the cause of, social exclusion. Whereas unemployment in the 25 worst affected regions averaged 28 %, the least affected regions had unemployment rates of less than 5 %. Structural problems are a major factor in long-term unemployment. A result of this is high unemployment scattered throughout some of the core regions. This is particularly evident in old industrial regions in Northern Europe such as Hainault in Belgium. However, poorer rural regions are also affected especially where there is a continuing high reliance on agriculture and a lack of diversification. In these cases unemployment itself is not always high but the percentage of long-term unemployed and youth and female unemployment is high. While the level of unemployment in Greece is still relatively low there has been an increase in the growth rate of unemployment as it is in the early stages of restructuring its economy. On the other hand Ireland, which has also experienced a decline in agricultural employment, has not experienced unemployment. Growth in other sectors, specifically manufacturing and services, has ensured that unemployment has decreased from 18 % in 1987 to 10 % in 1997.

The unemployment situation in each region and Member State is different and while it is possible to create broad typologies, the unemployment rate in any given region will depend on the combination of factors in play at a particular time.

Typology

Using a matrix taken from the classification of urban, intermediate and rural regions it is possible to create a preliminary typology of regions based on their economic strengths using the five classic indicators outlined above. Densely populated areas are defined as groups of contiguous municipalities, each with a population density of more than 500 inhabitants per square kilometre and a total population for the area of more than 50,000.

Intermediate areas are defined as groups of municipalities, each with a population density of more than 100 inhabitants per square kilometre, but not belonging to a densely populated area. The area's total population must be at least 50,000 or the area must be adjacent to a densely populated one. (A municipality or a contiguous group of municipalities with an area of less than 100 square kilometres, not reaching the required density but fully contained within a dense or intermediate area, is considered to be part of that area. If contained by a mixture of dense and intermediate areas, it is considered intermediate.

All other areas are classified as sparsely populated.

Densely populated areas are referred to as urban, and sparsely populated ones are referred to as rural.

Taking a small number of samples for each type of region, figure 3.1.2.1 shows a broad typology.

In the highly developed urban regions those areas in the core come out most strongly. These regions have high GDP per employee, a relatively small share of employment in

Figure 3.1.2.1
Preliminary typology of economic strength based on classic indicators

	High	Medium	Low
Urban	Wien, Hamburg, Ile-de-France, London	Limburg, Merseyside	Madrid, Attiki
Intermediate	Groningen, Uusimaa Stockholm, Lombardia, Piemonte	Hainault, Abruzzo	Dessau, Campania, Braunschweig
Rural	Ahvenanmaa/Åland, Salzburg, Småland Med Orna	Umbria, Aquitaine	Alentejo, Dytiki Makedonia, Mecklenburg-Vorpommern, Extremadura, Molise Galicia

the agricultural sector and a high share of R&D employment as a percentage of total employment. On the output side they have a much higher than average GDP per capita and low-to-average unemployment levels. Analysis at NUTS 2 level can conceal enclaves of social deprivation in these regions where unemployment is very high and where long-term unemployment in particular is persistent.

At the other end of the scale there are poorly developed rural regions. These regions tend to be located in the south of Europe and in other peripheral regions. They have very low GDP per capita and low productivity levels. In general the unemployment levels are high and the rate of unemployment seldom shows signs of declining and in some cases is increasing. These regions retain a high reliance on agriculture and have a very low percentage of the population working in R&D. The new German Länder tend to have low productivity but an above average rate of employment, with the largest share of employment in agriculture.

Regions such as Hainault in Belgium lie between these two extremes. In many cases they are old industrial regions which are undergoing restructuring. GDP per capita and output typically approach the EU average and may even be just above it but unemployment rates are above average and levels of long-term unemployment and youth unemployment are persistently high. Typically, the share of employment in R&D is also lower than in highly developed economic regions.

3.1.3 Conclusion

Within any region there are complex combinations of factors in action that will determine its overall economic strength. In particular it is possible that certain negative aspects of "strong" regions will be lost in a typology and similarly, positive aspects of "weaker" regions will also be overlooked. This is especially the case in the indicator for unemployment. Weaker economic regions will often display low unemployment rates, a situation aspired to by all regions, but this may not be combined with high productivity or wealth. On the other hand, wealthy regions may also have relatively low (or occasionally high) unemployment rates but long-term unemployment can be a persistent problem. As an example, Madrid had increased its GDP per capita by 1996 to just above the EU average but its unemployment rate had increased over the ten-year period 1987–1997 from 16.3 % to 18.4 %. Furthermore, the long-term unemployment rate was 57.5 % and youth unemployment was also high.

In general, the classic indicators show that a divergence remains between the lagging regions and the strong regions. Nonetheless, there has been some convergence since the single market came about. In Objective 1 regions GDP per capita has increased towards the Union average in almost all cases. At the same time, unemployment rates in these countries have tended to rise. This may be a short-term effect of structural readjustment, particularly as policy is focused on increasing GDP rather than on specific employment aims. It seems that the most immediate problems for the lagging regions are the unfavourable structure of their economies and their lack of innovation.

3.2 From globalisation to territorial rootedness (Luxembourg)

3.2.1 Supporting concept/theory

The following overview aims to identify some of the processes associated with economic liberalisation. These processes give rise to various indicators of economic strength and the resulting trends that contribute to growth and innovation in some areas and to peripheralisation in others.

One of the most significant trends of modern economics is that of *globalisation*. Malecki (1998: 191) defines globalisation as the widening and deepening of the operations of firms to produce and sell goods and services in more markets. Brainard (1993) expands on this theme by suggesting that globalisation signifies functional integration

of internationally dispersed activities. The nationality of a product becomes difficult to ascertain because it is the result of a complex set of connections in a production chain across several countries.

Globalisation, therefore, has a significant impact on the economies of space. Knox and Agnew (1998: 18) have pointed out that the shift in production and markets to a worldwide scenario has led, globally, to NICS (South Korea, Hong Kong, Taiwan, Mexico, Brazil) but also to the polarisation of income and wealth. The United Nations Development Programme found that the differential between the wealthiest 20 % of the world's countries and the poorest 20 % increased from a factor of 30 in 1960 to a factor of 60 in 1990 (UNDP 1993). High technology has been the enabling factor allowing firms to locate and function on a global scale. Sachar and Oberg (1990) have identified three distinct spatial impacts of enabling technologies. The first is in core countries where high technology creates new jobs, particularly in business and financial services, but reduces the need for employment in manufacturing. It also creates new products, facilitates new production and distribution processes and brings about new forms of corporate organisation. They identify the second spatial impact in semi-peripheral countries, where high technology brings an increase in manufacturing employment, increases in productivity and an overall improvement in competitiveness. The third spatial impact identified is in peripheral countries. Here there has been a relative decline in productivity and international competitiveness. New technologies are often too expensive to acquire and even when deployed their main effect is to displace jobs in labour-intensive sectors. This leads to an increase in the informal urban economy and a resultant pressure on the public sector to increase government- sponsored jobs. In Ireland, Foley and Griffith (1992) found that branch plants of TNCs exhibit "good" manufacturing features, such as exports, high-technology sectors and high levels of worker skills, in contrast to local firms, which tend to be small, with low technology and minimal export levels.

The trend towards globalisation has ensured the consolidation of the core of the world system revolving around the triad of North America, East Asia and Western Europe. Malecki (1998: 273) has identified the "international rules of the game" to encompass not only product trade, but also trade in services, the creation and diffusion of technology, foreign direct investment (FDI) and strategic corporate alliances, all of which are becoming key determinants of international competitiveness. Contemporary companies seek good quality markets, skills and infrastructure. They need to be flexible in their methods of production, in their methods of work and in their inter-company relationships. In general, flexible plants are likely to be affiliated with headquarters and R&D functions. Where this is the case, closures and unemployment are less likely. The availability of skilled technical workers is a key determinant in the location of FDI.

Depending on the type of FDI, regional development may be enhanced or suppressed. Sweeney (1985: 97) suggests that areas dominated by large companies tend to have low entrepreneurial activity because these firms have internalised their information resources and networks. Branch plants tend to have networks with the geographically distant parent company. Miller and Cote (1987) believe that the development of local linkages is the fundamental distinction between regions where development can be seen to have taken place and where it has not. Rural and non-metropolitan regions can compete provided that they encompass inter-company interaction, specialisation and availability of finance and labour. The rate of new company foundation is considered by Malecki to be an important indicator of a thriving economy. Others such as Storey (1993: 78) argue that new company foundation is not the most appropriate policy goal, rather the ability for businesses to grow and prosper may be more important. Storey argues that the more significant long-term challenge to government is to generate competitiveness and increasing globalisation among small manufacturing enterprises.

Globalisation is also strongly connected with the openness of markets. This question has been discussed in the context of developing countries (Falvey/Gemmell 1999, Dollar 1992). Measures for openness are usually related to differences in price levels and impediments to trade. Some models employed also estimate the optimal

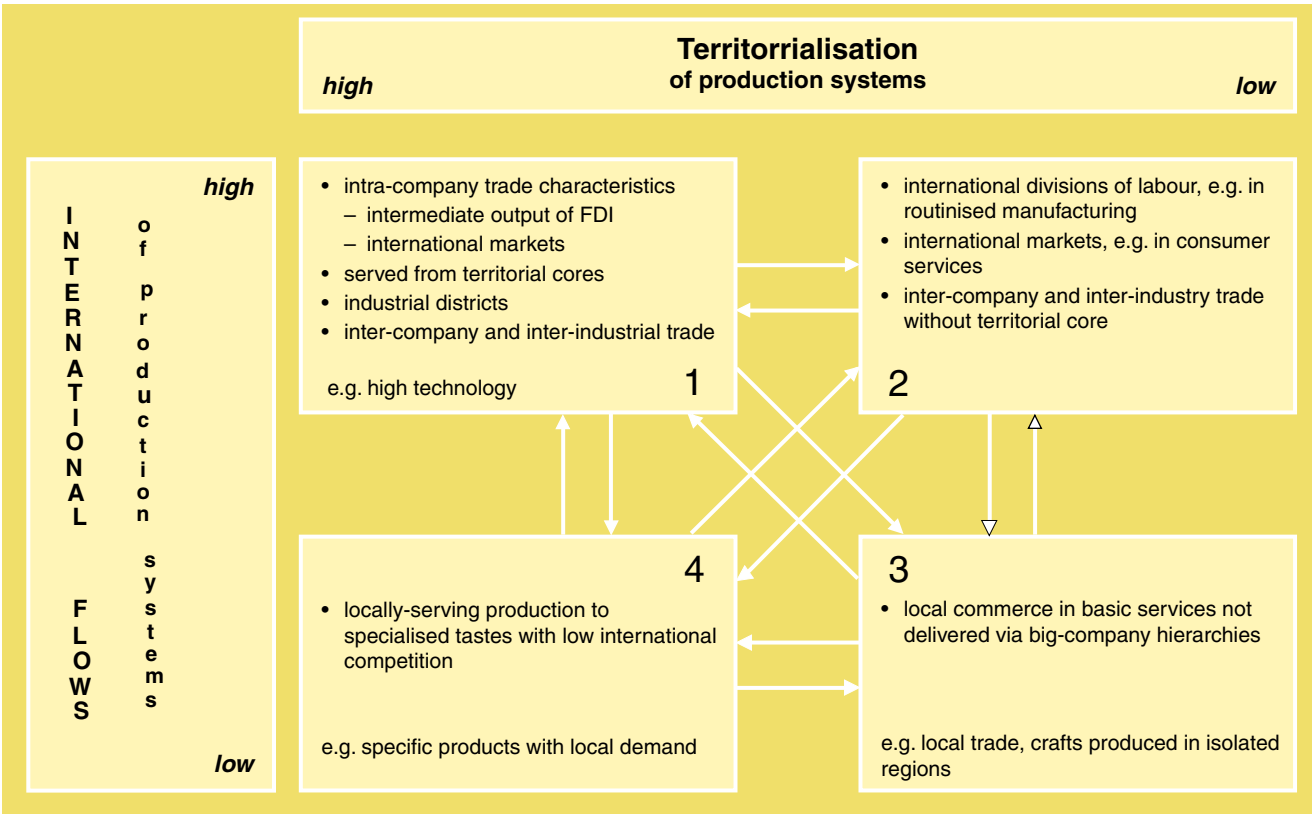
trade for a country and calculate deviations from that value. The wide range of measures can be attributed to the observation that openness ranking is not strongly correlated (Falvey/Gemmell 1999: 103). These approaches cannot be employed for regional analysis as exchange rates are fixed and trade impediments occur only on a very limited level. So the question arises as to how development can be measured at a regional level.

The EU aimed to raise the efficiency of economic activity by introducing the common market. The same is true for the activities of the World Trade Organisation, which sought the liberalisation of trade on a global scale. Liberalisation and increasing market efficiency have the effect that regions equipped with competitive industries gain in the production sector whereas positive consumer effects occur everywhere. The economic strength of a region is likely to depend on the maintenance of a competitive position in the increasing globalisation of production and trade.

Having said that, there is a question as to whether globalisation in general is a threat to the wealth of certain regions and/or nations. Trade theory shows that trade increases wealth for both trading partners even when only comparative advantages exist. Export means to profit as a producer and import as a consumer. Locations all over the world display relative advantages for the production of goods and services. World trade is not a zero-sum game in that respect (Krugman 1994) but there are differences in countries which indicate the quality and persistence of comparative advantages. Storper (1995) set out a framework for the identification of these qualities, defined as a research agenda rather than as a result.

He distinguished two dimensions in identifying different types of globalisation in economic activities. His starting point was the idea of two extreme states of economies described by the two dimensions (see figure 3.2.1.1). The *territorialisation of production systems* describes the extent to which the production and consumption of goods and services are linked with specific regional resources and conditions that are particular to a certain region and not easy to reproduce in another region. The second dimension represents the *international flows of production*

Figure 3.2.1.1
Territorialisation and internationalisation of production systems



Source: Storper 1995, 280 with adaptations

systems in terms of trade and also the flow of production factors.

The *pure flow substitution economy* (case 2) is characterised by a very low territorial rootedness of production together with strong trade flows. The simple substitution of locations for production is possible. Locations are strongly competitive due to the high standardisation of products and technologies and locational factors. Multiple economies of scale are necessary. Strong intra-regional interdependencies and specificities describe the *pure territorial economy of interdependencies and specificities* (case 4). Substitution of factors and trade partners is more or less impossible, supply and demand are inflexible and depend on scarce resources only regionally and specifically available. In addition, case 1 represents the situation where the degree of territorialisation of economic activities is high, due to specific locational factors which are hard to interchange such as a complex social division of labour and specific local resources. Finally, case 3 considers a system of low territorialisation and low international flows not provided for by big company hierarchies because of low economies of scale and potential high transportation costs.

As long as competition in a globalised market takes place according to comparative advantages that are rooted in the specific conditions in one place (cases 1 and 4) there is little danger that the population would feel threatened by marginalisation due to strong competition. This definitely does not apply in case 2, where it starts to appear coincidental that production takes place in one location rather than another.

This approach allows for the interpretation of moves actually taking place (Storper 1995: 281 f). The most significant moves seem to take place towards case 2; from 3 to 2 by the incorporation of former locally produced goods into national production (post-war) and then into the European production system; from 4 to 2 where an internationalisation of middle class tastes brings changes in the structure of demand; from 1 to 2 in what Storper refers to as "the movement from 'internalisation' of production to its true ... 'globalisation'" (emphases also in the original) "[where] the substitution of locations increases and territorially-specific assets decrease dramatically in their importance to competitive production".[6]

Other moves are also visible in particular towards case 1, such as from case 4 where an internationalisation of territorially rooted production takes place (e. g. marketing of products all over the world) or case 3 to case 1, where standard but locally produced goods obtain territorial attributes. This can also happen to products with a high degree of standardisation and internationalisation by attaching territorially specific attributes to products (a move especially relevant to the middle class: having participated in the standardisation of world consumption, the search began for the original, the outstanding and the incomparable) and/or by using territorially rooted assets.[7]

This approach tries to address the question of globalisation by identifying company-related specificities in a region rather then looking at meso- or macroeconomic regional indicators. There the relation to the concept of competitiveness, which is described below in section 4, has to be considered. Links are also obvious with the question of modernisation in respect of equipping regions with IT infrastructure and enterprises in the IT sector. But in total the concept of territorial rootedness stands on its own by concentrating on the question of how intricately production is linked to the location where it takes place. One may also interpret this as an element of competitiveness that adds an additional dimension to the whole concept.

3.2.2 Instead of conclusions: indicators, methodology and data restrictions

The concept outlined seems broadly to address the fears of many political leaders and citizens although it does not clearly indicate economically strong regions and other regions. The kind of region that can be implemented depends largely on the type of region (for example, in a remote peripheral area local circles of production and consumption have more potential for development than the raising of export activities).

The question arises as to how to operationalise the two dimensions of "**territorialisation**" and "**international flows of production systems**" for further research. This has not

(6) Dunning 1992 cited in Storper 1995, 282

(7) Storper (1995) refines his system with regard to where and which kind of trade takes place such as intra-company trade or trade in an oligopoly (hierarchy) or voluntarily built networks within free markets which may cement imbalances.

been carried out yet. It seems easier to begin with the latter dimension:

The **international flows of production systems** comprise the following categories:

- Trade flows – sectoral composition of trade; ownership of traded commodities (foreign vs. indigenous); destinations of exports; diversification of trade destinations over time; ratio of exports to imports; exports as percentage of total output by sector.
- Role of FDI – share of total investment in manufacturing and traded services; share of total employment and total output by region. Trend measured from early 1980s to late 1990s.
- Location of company headquarters – number of regional companies in the Fortune 1000 list (or equivalent); location of headquarters of top 200 companies.
- IT indicators – ISDN lines, telephones, fax lines per 1,000 population.

The second dimension, "**territorialisation**", is much harder to frame by indicators. It appears that some of the same indicators could be applied:

- Territorialisation is apparent when mass standard products are produced which do not necessarily need to be produced in that particular region.
- The persistence (foundation and closure) of enterprises in non-IT branches (the IT branch also seems to flow constantly but should be interpreted as an innovative activity).
- The share of enterprises which located their headquarters in a particular region.
- Size of enterprises in non-IT branches.
- Productivity/value added.
- Share of investments in relation to output. Share of FDI of all investments.
- Regionally available natural resources.

The general methodology has been directed towards a kind of cross-tabling of the two dimensions, but prior to this the correlation between the indicators outlined needs to be tested. A factor analysis could be helpful in identifying the main components of the approach. A combination of both dimensions could be achieved by using a cluster analysis to "tailor" typologies in an appropriate way.

This brief overview reveals that easily accessible databases do not provide enough data to produce worthwhile results. As table 3.2.2.1 clearly indicates, the availability of data is far from adequate. Therefore, the concept should be earmarked for further research and reference can only be made to other sources that attempted to describe single indicators for the concept.

For example, the Sixth Periodic Report tried to address the question of FDI within the context of the investigation of competitiveness of the EU regions (European Commission 1999: 155) but also only at national level. In this case it was pointed out that the cohesion countries benefited considerably from FDI but on different scales. "Relative to population, apart from Belgium/Luxembourg, the largest inflows were into Ireland, followed by Spain and Portugal, while inflows to Greece were substantially lower. The UK, which also had a level of GDP below the Union average, though by much less, was also a recipient, whereas Finland, Germany and the Netherlands were the largest net exporters of capital" (European

Table 3.2.2.1
Indicators of globalisation and territorialisation

International flows of production systems		Territorialisation	
Indicator	**Source**	**Indicator**	**Source**
Trade flows	Eurostat-REGIO: flow of goods	Persistence of enterprise in non-IT branches	n.a. in Eurostat
Role of FDI	n.a. in Eurostat	Share of enterprises with headquarter in particular region	n.a. in Eurostat
Location of company headquarters	n.a. in Eurostat	Enterprise size in non-IT branches	n.a. in Eurostat
IT indicators	n.a. in Eurostat	Productivity/value added	Eurostat-REGIO
		Investment/output – FDI/investment	n.a. in Eurostat
		Regionally available natural resources	n.a. in Eurostat

Commission 1999: 119). This short citation merely points to the complexity of the problem. It is indeed the outflow of capital that marks strong regions, but attracting investment as an inflow of capital is also a strength. The result is possibly a trade-off between capital income and employment, but capital income can similarly create employment. Furthermore, the additional demands made by new employment can prompt further multiplication effects. The quality of investment into certain sectors is essential to assess the effects of investment as a whole. Therefore, one has to address the wider picture but this was not possible within the given framework.

3.3 Modernisation and diversification (Ireland)

3.3.1 Supporting concept/theory

The theory behind using indicators of modernisation and diversification is one which seeks to assess the level of structural development of a region and the degree of diversification which it exhibits based on the region's inputs and outputs. To a large degree modernisation can be seen as a precursor to a region's ability to be competitive in the global environment. The spatial dimension inherent in economic development has been examined in a number of studies. In this study, typologies and maps will be constructed from the indicators using factor analysis. It will then be possible to identify areas that range from low inputs/outputs to high inputs/outputs and regions for which a factor has no particular significance. The identification of a region's level within the modernisation process will help to determine future policy direction in the long term.

Many studies have attempted to analyse the economic performance of regions, for example Pompili (1994) constructed a taxonomy that highlighted the structural differences among EU Objective 1 regions and evaluated the performance of these regions against other Community regions. Using indicators based on employment structure at industry macro-level, human capital endowment, entrepreneurship in manufacturing, access, peripherality and network infrastructure, and localised regional diseconomies, he found that structural variables emerge as the determinants of developmental stages. Another study by Cambridge Econometrics (1998) for the EU Commission examined the factors of growth in Europe over the 1980s and pinpointed indicators of competitiveness. Some of their criteria apply equally to the concept of modernisation and diversification reflecting the inevitable overlap between the concepts.

The approach taken in this study was to identify the indicators that are best considered as inputs and outputs in the modernisation process (see table 3.3.2.1), while at the same time acknowledging the constraints posed by the availability of comparable data across the regions. Such indicators will include variables such as labour supply, infrastructure, and the level of educational attainment of the population. On the output side, the indicators used include value added by sector, GDP per capita and the number of patent applications. This approach complements Malecki's (1998) view that economic development comprises two related processes – structural change and productivity improvement. Similarly Flammang (1979: 50) described economic development as a "process of structural change, implying something different if not something more".

Structural change incorporates the large-scale sectoral shifts from agriculture to manufacturing to services and new niches. As a result the service sector, high technology and tourism are seen as potential foundations for regional economies. The service sector is a broad one, including financial services, advanced producer services (APS) and lesser skilled work such as cleaning and security. The rise in APS is linked to the twin processes of externalisation by companies and technological change. Its activities include consulting and the provision of specialised guidance and advice to businesses which may not have the resources, time or expertise to provide these services in-house. Moulaert and Tödtling (1995) compared the inter-country evolution of APS employment

in Europe. They used OECD labour force statistics (1992) which reaggregated APS with financial and insurance services.

Between 1970 and 1992 the share of APS and financial and insurance services in total employment in 10 EU countries almost doubled. While it still represents a comparatively small proportion of all employment, its significance lies in the effects on other firms and economic activities. APS plays an active role in innovation and company formation, technical improvement, market expansion and competitiveness. The increased flexibility of companies has led to a greater externalisation of functions through the use of consultants, specialists and sub-contractors.

The growth of R&D in private sector investment, in particular, is an indicator of the importance attached to product diversity. Development involves niche changing as well as niche filling. R&D contributes to product improvement, better processing methods, greater flexibility of production, improvements in product quality and service, lower costs and methods enabling a quicker response to changes in market demand. In the core countries most R&D is carried out by the private sector rather than the public sector. Even within the core countries there are "islands of innovation" which tend to be relatively small and predominantly urban e.g. Greater London, Rotterdam/ Amsterdam, Frankfurt, Turin. Less developed countries and regions are hampered in their R&D potential by the lack of innovation and openness to new ideas necessary for funding through venture capital. Public policy may support the provision of science and digital parks as a means of encouraging new firms through good infrastructure and networking potential. There is some debate as to their value where they have been artificially created as opposed to spontaneously developed. In the less wealthy regions it is sometimes possible to identify areas where there is a policy for high government spending on R&D in an effort to boost the region's economic base. However, this is often accompanied by low R&D expenditure by the private sector (e.g. Nisia Aigaiou, Kriti). When a regional technological infrastructure is developed, its strength is largely dependent on competent governments and companies working together and supporting one another for the benefit of the region. Research has shown that interaction does not necessarily take place even where there is geographic proximity. It is likely that a synergy is needed involving social structures such as sociability and trust as well as an industrial structure conducive to company interaction e.g. highly linked industries making flexibly changing products.

Matching the increase in R&D is the increase in demand for skilled workers. Regional offices, corporate headquarters and R&D facilities seek to locate to areas where air and motorway transport facilities are good and where there is an availability of executive or professional talent (as opposed to labour). It has been argued that a region's ability to attract and retain educated people is as important as its ability to attract firms. There is an increased emphasis on the need for national economies to ensure that they have an abundance of technically skilled workers in order to increase the attractiveness of a region to FDI beyond branch plant location.

In general, economies in the larger regions are more diverse and produce a larger proportion of local needs than the smaller regions. It is important for all regions to have a broad range of sectors if they are to avoid economic fluctuations and uncertainties. The type of industries in a region is important to its economy. Amin and Thrift (1993) have found that diversity and adaptability in a region, derived from external links, are vital for promoting new ideas, people and opportunities. Industrial diversity is also related to higher rates of new company formation. High technology tends to be an innovative sector and because it employs highly educated and skilled workers it has positive multiplier effects. As a source of innovation it encourages entrepreneurialism and the establishment of new companies and industries. Although not directly employing large numbers of people it has the potential to create jobs. This can be seen in the growth of the leisure and health service industries that are meeting the demands of relatively high income earners with structured working hours.

As part of the process of modernisation, diversification within the economy is vital if regions are to thrive and develop. However, regions are often diversifying in different directions, depending largely on whether they are at the core or the periphery of the world economy. Those at the core are most likely to have high technology industries

and services as well as tourism and therefore they have a wider base and a greater resistance to economic fluctuations. Areas at the periphery and the semi-periphery will be more susceptible to economic uncertainties, particularly if they base most of their economic development on the tourist trade and associated services, much of which is highly dependent on the larger global economy.

3.3.2 Indicators and data availability

In this study a relatively small number of key indicators has been used to provide a methodology for considering both the inputs and outputs in a region. The indicators for the inputs are based on the sectoral structure of the regions, education, R&D and infrastructure. Ideally it should have been possible to use very specific indicators for the sectoral structure, such as the number employed in Advanced Producer Services or per capita tourism revenue. This would have aided the development of the typology. However, because of the limitations of the database at a regional level, some compromises have had to be made. The broader sectoral indicators used were employment in agriculture and services as a percentage of total employment. As an indicator for advanced education it would have been useful to measure the number of PhDs per thousand inhabitants, possibly alongside the number of students in higher level education. The latter would have had the advantage of indicating future human resources and potential while the former would have indicated the existing number of very highly skilled workers. Instead, because it provided better comparable data and was still useful, the variable used was the percentage of all 25–59 year olds who had achieved a higher educational (i. e. third level) qualification.

Two main indicators measure the inputs from R&D. The percentage of the active population employed in R&D in the business enterprise sector is used to determine the level of R&D in the private sector. The importance attached to product diversity is further measured by the expenditure on R&D by both government and private sectors as a percentage of total expenditure. The (total) number of kilometres of motorway and rail per square kilometre is used to measure the level of physical infrastructure.

The outputs indicate the performance of the region in terms of modernising by measuring a number of factors. These include sectoral productivity using the indicators of GVA at factor cost for market services as a percentage of the total and GVA at factor cost for agriculture as a percentage of the total. It should be noted that this study is primarily concerned with those regions at the extreme ends of the modernisation and diversification process.

This is reflected in the inputs and outputs which deal with what are considered to be the poles of modernisation/diversification, that is, a high level of R&D and market services on the one hand, and on the other a high reliance on a single sector, typically agriculture (see table 3.3.2.1). As a result, regions with a strong base in the manufacturing and non-market services sector will not always emerge as highly as their GDP suggests they should. Such regions include regions of northern Italy and south-east England, among others.

The output indicator of employment has a number of purposes. High long-term unemployment is most commonly associated with urban regions where there can be social polarisation within the region itself. Measuring GDP per capita would not, by itself, be able to pick this up. High long-term unemployment is also indicative of structural problems and may be experienced in regions undergoing the early stages of sectoral change. Female unemployment is most prevalent in the sparsely populated (rural) regions but similar figures can be found in some urban regions. High female employment is associated with a modernised and diversified economy, particularly where service employment features strongly. Employment as a percentage of the labour force and female employment are both strongest in the intermediate regions i. e. between the densely and sparsely populated regions.

In this study the output in R&D is measured using the number of patents granted per 100,000 inhabitants. The alternative – patent *applications* per one million inhabitants – was preferable in that it would have given an indication of the level of innovation and R&D activity in a region whether the patent was granted or not. However, the former indicator was used because data was available for a greater number of regions. For both of the patent

measurements there is a shortcoming in that the patent is assigned to the inventor's place of residence and particularly in the case of large companies this may vary from the actual place of invention.

GDP per capita is an acknowledged indicator of a region's economic wealth. One of its weaknesses lies in its inability to identify enclaves of social deprivation within regions of high GDP unless analysis is carried out at, for instance, a NUTS 5 level where data considerations make it very difficult. Further considerations which need to be taken into account have already been discussed in the section on classical indicators, particularly with regard to productivity and employment, and the lack of inclusive environmental accounting.

Another indicator of the standard of living is the number of private cars per 1,000 inhabitants. This indicator is used as an output measure of consumption in the expectation that a good infrastructural base combined with high GDP would encourage a greater number of cars per inhabitants.

Further indicators that would have been useful but which were not available because of data difficulties include a measurement of models of governance which would give some indication of the level of centrality of government and also of the links between government and private investment. As a further measure of innovation the rate of new company formation would have been useful in assessing the level of innovative culture and activity in a region.

For some of the indicators data was available for 1997, but such recent data did not exist for all of the indicators (see table 3.3.2.1). This problem was more evident in the NUTS 2 and 3 regions than in the higher level regions. With the more complex indicators there was sometimes the disadvantage of having to combine datasets from different years in an effort to utilise the most comprehensive information available from the REGIO database.

Table 3.3.2.1
Input and output indicators of modernisation and diversification

Input indicator	Output indicator
Sectoral structure • Employment in agriculture 1997, as % of total employment • Employment in market services 1997, as % of total employment	**Sectoral productivity** • GVA at factor cost for agriculture 1994, as % of total value added • GVA at factor cost for services 1994, as % of total value added
Education • 25–59 year olds with third level education 1997, as % of all 25–59 year olds	**Employment** • Long-term unemployment 1997, as % of working population • Female working population 1997, as % of total female population • Working population 1997, as % of total population
Research and Development (R&D) • Active population employed in R&D in business business sector 1995[a], as % of total active population • Government expenditure in R&D 1995[b], as % of total expenditure • Private sector expenditure in R&D 1995[b], as % of total expenditure	**Research and Development** • Number of patents 1997, per 100,000 inhabitants
Infrastructure • Kilometre of motorway 1996, per km^2 • Kilometre of railway lines 1996, per km^2	**Standard of living** • Number of cars 1994, per 1,000 inhabitants **GDP** • Purchasing power standard (PPS) per capita 1997

[a] R&D employment data for Austria are from 1993, data on active population from 1995
[b] Spain, France, Italy, the Netherlands 1994, Denmark, Greece, Germany and Austria 1993

3.3.3 Methodology and interpretation

Based on the concepts for modernisation and diversification a broad typology has been set out in table 3.3.3.1.

Typologies of the individual factor values based on data for the NUTS 1 regions include a spatial classification that follows the Eurostat classification of areas:

- Densely populated areas are defined as groups of contiguous municipalities, each with a population density of more than 500 inhabitants per square kilometre and a total population for the area of more than 50,000.
- Intermediate areas are defined as groups of municipalities, each with a population density of more than 100 inhabitants per square kilometre, but not belonging to a densely populated area. The area's total population must be at least 50,000 or the area must be adjacent to a densely populated one. (A municipality or a contiguous group of municipalities with an area of less than 100 square kilometre, not reaching the required density but fully contained within a dense or intermediate area, is considered to be part of that area. If contained by a mixture of dense and intermediate areas, it is considered intermediate.)
- All other areas are classified as sparsely populated.
- Densely populated areas are referred to as urban and sparsely populated areas as rural.

The data used in this analysis was extracted from the Eurostat REGIO database, June 1999. As already noted the most recent data available for the indicators varied from year to year and between Member States. The resulting data for the sixteen indicators was compiled manually and transferred to SPSS for factor analysis.

Analysis was initially carried out at NUTS 2 level but given the gaps in the dataset for certain regions and indicators the outcome was not satisfactory. As a result it was decided to reduce the data to NUTS 1 level where, with the exception of the new German Länder, no missing values had to be inserted. The analysis was conducted using principal component analysis with orthogonal varimax rotation. Using eigenvalues greater than one it was possible to extract five factors which represented 83 % of the total variance (table 3.3.3.2). The

Table 3.3.3.1
General typology of modernisation and diversification

Factors of modernisation and diversification	High level of modernisation and diversification	Low level of modernisation and diversification
Sectoral shifts	Advanced technologies and producer/financial services; quaternary service growth	Single sector economic base; dependence on low technological sector, manual work
Education	High percentage of graduates in the labour force; technical education institutions	Little further education in the labour force; poor educational infrastructure; high percentage of early school leavers
Infrastructure	Science/digital parks. Inter-company networks; advanced telecommunications networks; technopoles; good road, rail and air networks	Poor IT infrastructure and networking facilities; underdeveloped transport networks
Mode of governance	Mixture of bottom-up and top-down approaches through partnerships of business and regional institutions; increased authority vested in local and regional government	Dominance of central down government through a top-down approach; little regional/local autonomy
Innovative systems	Availability of venture capital; indigenous private sector investment in R&D complementary to state/institutional support; companies co-operating with higher education institutions; active role of entrepreneurs	Very little, if any, venture capital investment; low private sector investment in R&D; lack of linkages between companies and education institutions; dearth of entrepreneural activity
Adaptability industry/	Diversification within and between economic sectors; rural diversification; new tourist products; high rate of new company formations	Reliance on a single branch plant; agriculture as the major or only economic base; low rate of new company formations

Table 3.3.3.2
Explained total variance of modernisation and diversification

Component	Initial eigenvalues			Rotation sums of squared loadings		
	Total	Explained variance in %	Cumulative %	Total	Explained variance in %	Cumulative %
1	6.270	**39.186**	39.186	3.613	**22.579**	22.579
2	3.171	**19.818**	59.004	2.904	**18.152**	40.731
3	1.522	**9.513**	68.517	2.694	**16.839**	57.570
4	1.191	**7.442**	75.959	2.537	**15.856**	73.426
5	1.140	**7.126**	83.085	1.545	**9.658**	83.085
6	0.825	5.154	88.234			
7	0.463	2.892	91.130			
8	0.330	2.061	93.192			
9	0.268	1.673	94.864			
10	0.217	1.358	96.222			
11	0.180	1.118	97.340			
12	0.162	1.010	98.350			
13	0.143	0.892	99.242			
14	0.075	0.470	99.712			
15	0.029	0.180	99.891			
16	0.017	0.110	100.000			

Extraction method: principal component analysis

Table 3.3.3.3
Rotated component matrix of modernisation and diversification

Indicator	Component				
	Labour market	Sectoral structure	Physical infra-structure	Inno-vation	Living standards
Inputs					
Employment in agriculture 1997, as % of total employment		**-0.629**		-0.504	-0.412
Employment in services 1997, as % of total employment		**0.901**			
25–59-year-olds with third level education 1997, as % of all 25–59-years-old	0.378	**0.608**			-0.385
Active population employed in R&D in business sector 1995[a], as % of total active population	0.493		0.499	0.464	
Government expenditure in R&D 1995[b], as % of total expenditure				**-0.920**	
Private sector expenditure in R&D 1995[b], as % of total expenditure	0.431			**0.757**	
Kilometre of motorway 1996, per km²			**0.799**		
Kilometre of railway lines 1996, per km²			**0.820**		
Outputs					
Number of patents 1997, per 100,000 inhabitants	0.480		0.412	0.446	
Purchasing power standard (PPS) per capita 1997	0.358		**0.758**		0.353
GVA at factor cost for services 1994, as % of total value added		**0.785**	0.372		
GVA at factor cost for agriculture 1994, as % of total value added		**-0.623**		-0.466	-0.487
Long-term unemployment 1997, as % of working population	**-0.914**				
Female working population 1997, as % of total female population	**0.907**				
Working population 1997, as % of total population	**0.944**				
Number of cars 1994, per 1,000 inhabitants					**0.892**

Only correlations with values > 0.30 and < -0.30 are listed; correlations > 0.60 and < -0.60 are in bold; Eigenvalues > 1

factor scores were then examined manually and typologies were constructed for the individual factor values based on the above spatial classification. The factors were also mapped thematically based on the regional values for each factor.

As a further step, the regions were clustered based on the factor analysis values. A number of clusters were examined using different methods and cluster numbers. In terms of providing a relatively even distribution of regions and interpreting the results, the Ward method of clustering using eight clusters was selected as the most useful. A dendrograph of the regions based on their factor values further helped to clarify the relationship between regions.

Factor analysis

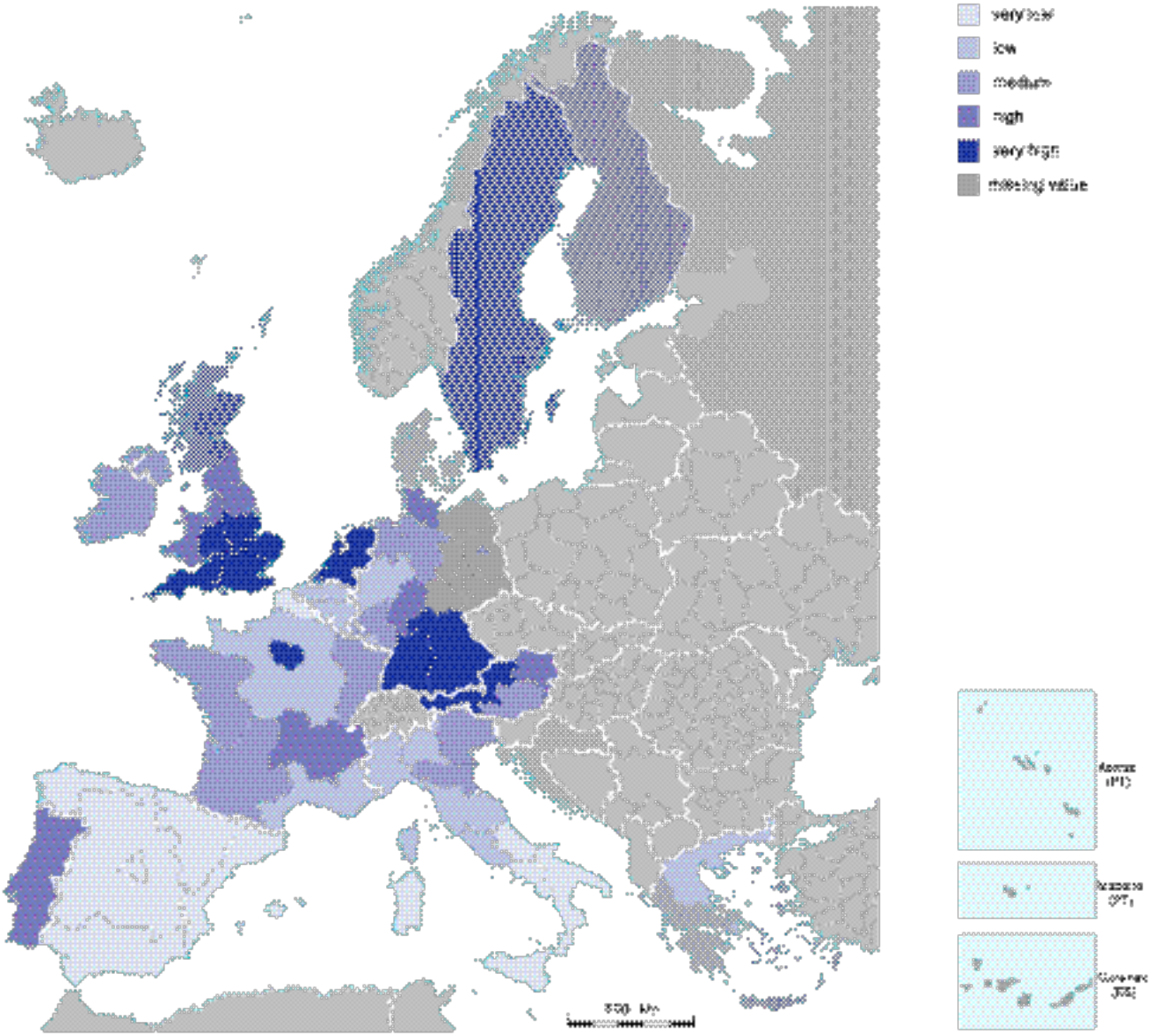
Using factor analysis, five themes were identified from the indicators on modernisation (table 3.3.3.3). These are examined in the following paragraphs.

Factor 1 – Labour market adjustment under modernisation

This first factor accounted for 22.6 per cent of the rotated total variance (table 3.3.3.2, page 27). Table 3.3.3.3 demonstrates the significance of the labour market variables for this factor. They are represented as the output indicators of long-term unemployment, female employment relative to the total female population and working population relative to the total population. Where long-term unemployment is low, the latter two indicators are high. There is some correlation with high GDP and the number of patents granted but these indicators are more significant in other factors. On the input side, both the expenditure by the business enterprise sector and the percentage of the active population employed in R&D correlates positively with the employment indicators.

The mapping of the factor scores for employment (see map 3.3.3.1) illustrates

Map 3.3.3.1
Factor 1 – Labour market adjustment under modernisation



Calculations: NUI Maynooth

Table 3.3.3.4
Factor 1 – Spatial classification of labour market integration

Settlement structure	Labour market integration				
	Very high	**High**	**Medium**	**Low**	**Very low**
Urban	South-East (UK)	Hamburg, Hessen, Ile-de-France	Berlin, Nordrhein-Westfalen, Rheinland-Pfalz, North-West (UK)	Bruxelles, Bremen, Athens, Madrid	
Intermediate	Baden-Württemberg, Bayern, East Anglia, South-West (UK)	Schleswig-Holstein, Luxembourg, Nederland, Ostösterreich, Portugal, Stockholm, Yorkshire, West Midlands, East Midlands	Vlaams Gewest, Niedersachsen, Est (FR), Lombardy, Nord Est (IT), Emilia-Romagna, North (UK), Wales, Northern Ireland, Danmark	Région Wallonne, Saarland, Mediterranée, Nord Ovest (IT), Centro (IT), Lazio, Abruzzo-Molise, Este (ES), Nord-Pas-de-Calais	Campania, Sud (IT), Sicilia
Rural	Östra Mellansverige, Mellersta Norrland, Ovre Norrland	Ahvenanmaa/Åland, Nisia Aigaioiu, Kriti, Centre-Est (FR), Westösterreich, Manner-Suomi, Sydsverige, Norra Mellansverige, Scotland	Voreia Ellada, Kentriki Ellada, Bassin Parisien, Ouest (FR), Sud-Ouest (FR), Ireland, Südösterreich	Noreste (ES)	Noroeste (ES), Centro (ES), Sur (ES), Sardegna

the poor labour market conditions in most of Spain and southern Italy. In contrast, Portugal (treated here as one region) and many regions of Greece emerge as having good employment statistics in spite of the poor inputs for education, GDP per capita and the number of patents granted. This confirms the weak relationship in some regions, already identified in the classic indicators, between employment and GDP/employee (productivity). The Greek regions are interesting in that there is diversity in their distribution. Athens, with a higher GDP and better sectoral mix than its surrounding regions, scores the lowest and Nisia Aigaiou, Kriti the highest. This contrasts strongly with factor 2 (sectoral structure) and is an indication that Greece is still in the early stages of development and can expect widening intraregional disparities in the short- to medium-term both in its employment rates and in its sectoral structure.

This factor also identifies certain Objective 2 status regions that continue to have problems with unemployment due to an over-reliance on declining industries. For instance, in Germany the regions of Saarland and Bremen do not score well in this factor, emphasising the importance of attaining better employment rates if modernisation is to be facilitated. This will involve the targeting of an improved skills base among the young and active population. In contrast, Hessen and Schleswig-Holstein have emerged as having positive employment figures suggesting that policy needs to focus more on other factors of modernisation within these areas. In France, Nord-Pas-de-Calais and the Mediterranean regions show high unemployment levels while the scores for the Paris Basin suggest that employment is not the most significant factor in the process of modernisation within that region.

This factor illustrates the fact that labour market data alone cannot be used as a measure of economic performance within a region. There are some regions that have a high level of employment but very low or moderate GDP per capita and a poor structural base. Equally there are regions, the most striking of which is Région Bruxelles, where GDP per capita is very high but where the employment figures are poor, particularly in comparison to other urban regions outside Objective 2 status.

(8) Market Services are as defined in Nace-Clio, branch R6 (B68) "Recovery, repair, trade, lodging, and catering services. Transport and communication services. Services of credit and insurance institutions. Other market services".

Factor 2 – Sectoral structure

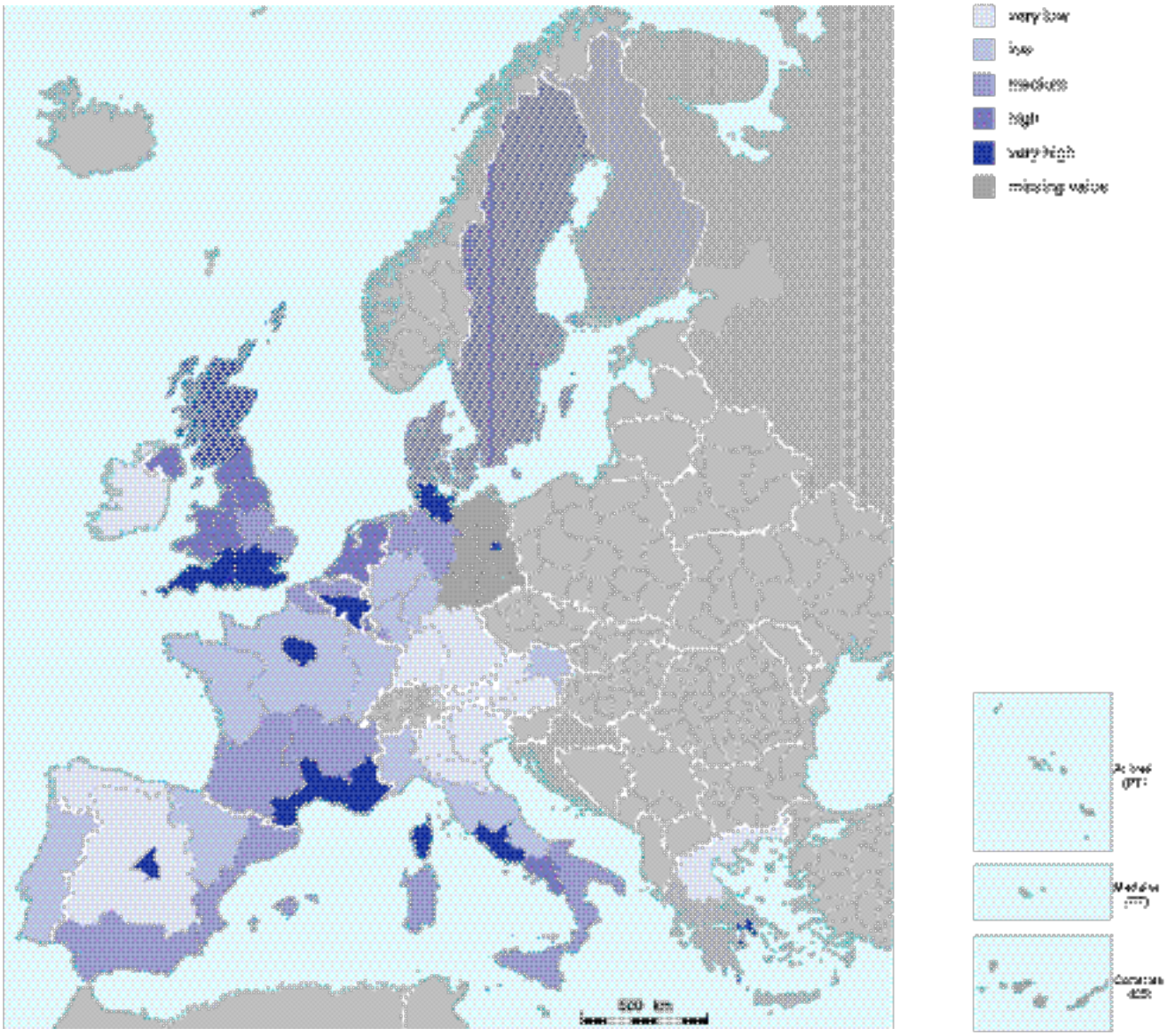
This factor represents 18% of the total variance in the dataset. There is a high correlation between the inputs of employment in market services[8] and educational attainment and outputs measured by gross value added in market services. These are negatively correlated to employment in agriculture and the output of gross value added in agriculture.

A very strong pattern emerges with capital cities and regions displaying high scores (see map 3.3.3.2). The only non-capital region to show such high levels of employment and gross value added in market services is the Mediterranean region of France. This reflects the high density of SMEs located in this region. Unlike in the northern Member States these are not generally concentrated in the more dynamic sectors of the economy and tend to be small family businesses with few employees. As a result the potential for job creation and growth is limited and this is borne out by the poor employment profile of the Mediterranean region outlined in factor 1. The main difference to the other regions of Southern Europe with a high density of SMEs is the very high number of people employed in services and the relatively fewer inhabitants employed in agriculture. The Mediterranean also has a higher educational attainment than, for instance, the regions of southern Italy, and the rural regions of Greece and Portugal.

In contrast the regions of northern Italy including Lombardia and north-east Italy have emerged as weak in the market services sector and also in the percentage of 25–59-year-olds with third level education. In this latter indicator they have some of the lowest attainment levels in the EU, with only the other regions of Italy and two regions of Austria displaying less education at third level. However, GDP per capita for Lombardia, the north-east of Italy, and Emilia-Romagna is above the EU average reflecting the strong manufacturing and industrial tradition of these regions which is not picked up in this factor.

Within the core of Northern Europe there are a number of declining industrial regions that are continuing to experience structural problems. In particular, there are a number of urban and intermediate regions in Germany and France. This factor has illustrated not only a general core-periphery dichotomy in sectoral structure based largely on urban-

Map 3.3.3.2
Factor 2 – Sectoral structure



Calculations: NUI Maynooth

Table 3.3.3.5
Factor 2 – Spatial classification of sectoral structure correlated with educational attainment

Settlement structure	Sectoral structure correlated educational attainment				
	Very high	**High**	**Medium**	**Low**	**Very low**
Urban	Bruxelles, Berlin, Athens, Madrid, Ile-de-France, South-East (UK)	Hamburg, South-East (UK)		Bremen, Nordrhein-Westfalen, Rheinland-Pfalz, Hessen	
Intermediate	Stockholm, Lazio, Meditérranée	Région Wallonne, Danmark, Schleswig-Holstein, Yorkshire, South-West (UK), Northern Ireland	Vlaams Gewest, Campania, Sud (IT), Sicilia, Luxembourg, Nederland, North (UK), East Midlands, East Anglia, West Midlands, North-West (UK), Wales	Baden-Württemberg, Bayern, Niedersachsen, Saarland, Este (ES), Nord-Pas-de-Calais, Est (FR), Nord Ovest (IT), Centro (IT), Abruzzo-Molise, Ostösterreich, PT	Lombardia, Nord Est (IT), Emilia-Romagna
Rural		Övre Norrland	Sur (ES), Sud-Ouest (FR), Sardegna, Östra Mellansverige, Sydsverige, Mellersta Norrland	Noroeste (ES), Noreste (ES), Centro (ES), Ouest (FR), Centre-Est (FR), Ireland, Norra Mellansverige, Manner-Suomi, Ahvenanmaa/Åland	Voreia Ellada, Kentriki Ellada, Nisia Aigaiou, Kriti, Südösterreich, Westösterreich

rural disparities but also an urban divide within the core region.

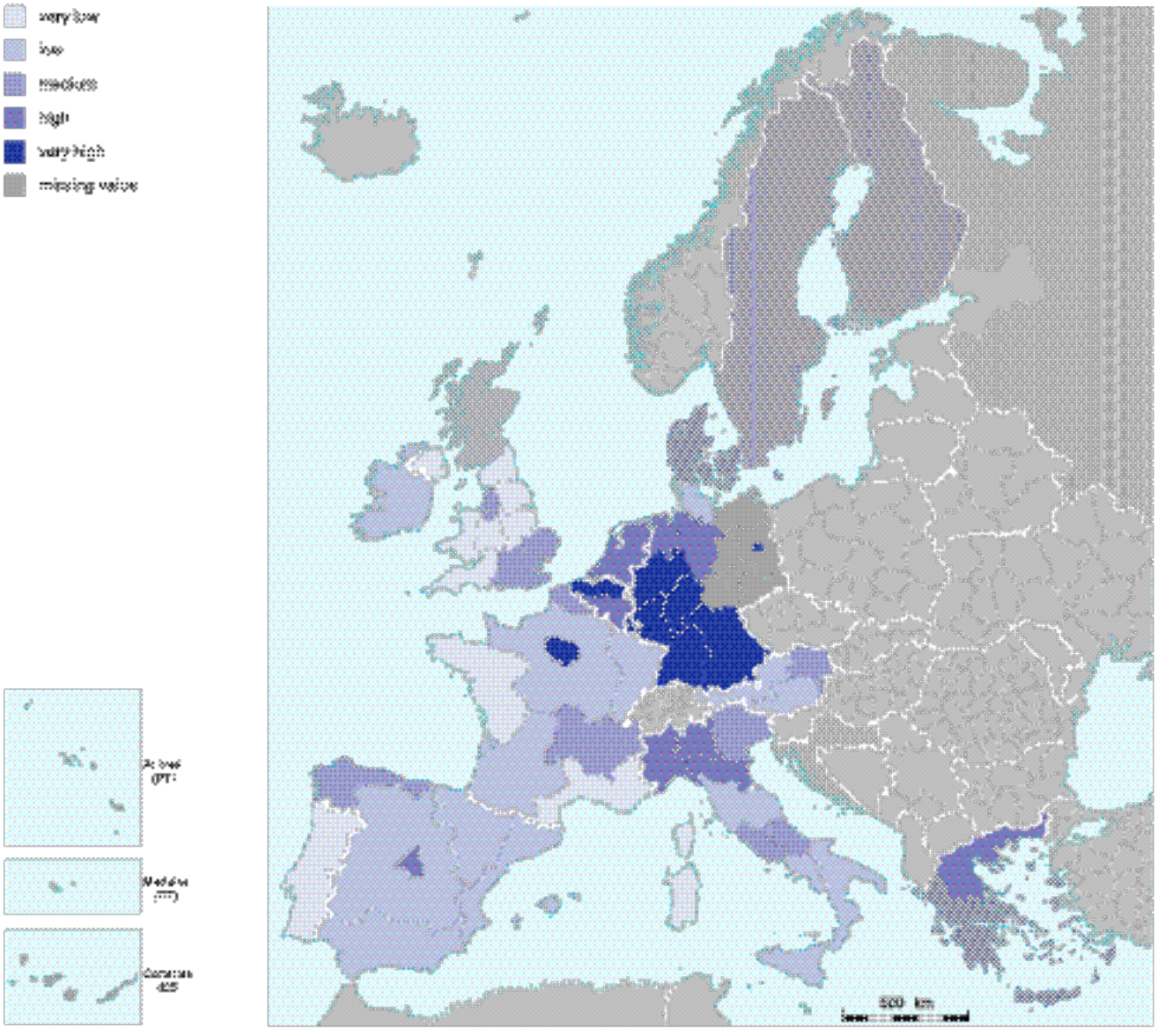
Factor 3 – Infrastructure and GDP

This factor accounts for almost 17 % of the total variance. On the input side it examines the physical infrastructure measured by the total length of motorway and railway. High levels of infrastructure are strongly correlated with high levels of GDP (see appendix 4).

A strong urban/intermediate-rural/ intermediate divide is evident. Core urban regions of Northern Europe are grouped in the high values with no rural regions represented on the left-hand side of the classification in table 3.3.3.6. In contrast, the rural regions are highly represented within the lower levels reflecting their low level of physical infrastructure and, in most cases, a lower than average GDP.

This factor has presented some results that at first glance do not appear to fit the expected pattern for measurements of infrastructure. For instance, the scores for some of the Greek regions are considered insignificant and are not dissimilar to those for south-east England and the Netherlands. However, when the other factors of modernisation are taken into account the results are not so surprising. Sectoral structure and innovation are far more significant determinants of modernisation for these peripheral Greek regions than physical infrastructure. On the other hand, Athens has a broader sectoral

Map 3.3.3.3
Factor 3 – Physical infrastructure



Calculations: NUI Maynooth

Table 3.3.3.6
Factor 3 – Spatial classification of physical infrastructure

Settlement structure	Physical infrastructure				
	Very high	**High**	**Medium**	**Low**	**Very low**
Urban	Bruxelles, Bremen, Hamburg	Berlin, Hessen, Ile-de-France, Nordrhein-Westfalen, Rheinland-Pfalz	South-East (UK), Madrid	Athens, North-West (UK)	
Intermediate		Baden-Württemberg, Saarland, Luxembourg, Vlaams Gewest, Bayern, Nord Ovest (IT) Stockholm	Région Wallone, Schleswig-Holstein, Nord-Pas-de-Calais, Niedersachsen, Est (FR), Lombardia, Nord Est (IT), Centro (IT), Abruzzo-Molise, Emilia-Romagna, Nederlands, Ostösterreich, Danmark, East Anglia, Lazio	Este (ES), West Midlands, South-West (UK), Yorkshire, East Midlands, Meditérranée, Sud (IT), Sicilia, Campania, Portugal	North (UK), Wales, Northern Ireland
Rural			Südösterreich Westösterreich Ahvenanmaa/Åland, Kentriki Ellada, Nisia Aigaiou, Kriti, Voreia Ellada, Centre-Est (FR)	Noreste (ES) Noroeste (ES), Centro (ES), Sur (ES), Bassin Parisien, Sud-Ouest (FR), Norra Mellansverige, Östra Mellansverige, Manner-Suomi, Sydsverige, Ireland, Sardegna	Mellersta Norrland, Övre Norrland, Scotland

base but its poor physical infrastructure, low level of innovation and negative employment figures suggest that there are several problems associated with modernisation.

To some extent this factor demonstrates the difficulties, from a policy viewpoint, in considering any single factor of modernisation in isolation. Physical infrastructure is strongly correlated with GDP and is also positively correlated with gross value added in the market services sector. It would be difficult to perceive of any region, which is weak in infrastructure terms, attracting the inward investment necessary for diversification. While the factors are useful for distinguishing areas within the process of modernisation where regions are particularly weak or strong, they cannot be treated individually as the basis for a narrowly focused orientation of policy.

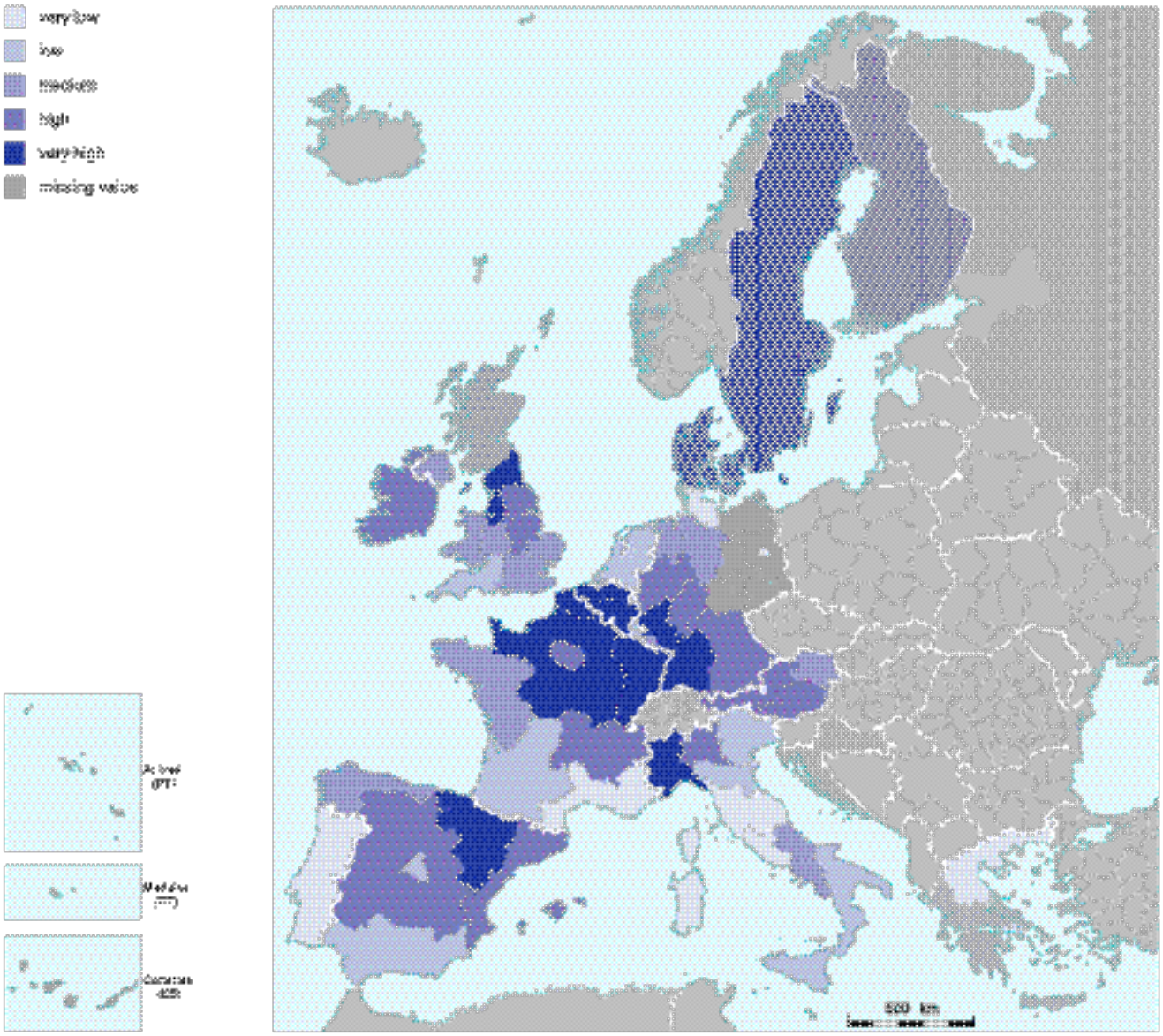
Map 3.3.3.3 illustrates the broad core-periphery divide that exists for this factor. In particular, regions along the Atlantic Arc, the Baltic regions and most of the Mediterranean regions have been identified as needing improvements to their physical infrastructure as a means of encouraging other factors of modernisation.

Factor 4 – Innovation

The performance of efforts to diversify the product base of regions is reflected in the fourth factor, innovation, which accounts for 15.8% of the total variance. It deals primarily with the inputs and outputs associated with investment in R&D. More specifically it is concerned with the indicators of low government investment in R&D and high business sector investment. This is further correlated on the input side to employment in the R&D sector and on the output side to patent grants (see appendix 4). A pattern emerges of regions with a high level of government expenditure on R&D displaying a narrow sectoral base with a high level of employment in agriculture. There are exceptions to this in some urban and intermediate regions.

This is not unexpected because, to a large degree, this factor is related to national government policies on R&D expenditure. The regions that are identified at the lower end of the factor scores are mostly peripheral and have Objective 1 or 6 status e.g. large areas of Spain, Portugal, Greece, southern Italy and Finland (see map 3.3.3.4 and table 3.3.3.7). Their high level of government

Map 3.3.3.4
Factor 4 – Innovation



Calculations: NUI Maynooth

Table 3.3.3.7
Factor 4 – Spatial classification of innovation

Settlement structure	Innovation				
	Very high	High	Medium	Low	Very low
Urban		Hessen, Rheinland-Pfalz, North-West (UK)	South-East (UK), Bremen, Nordrhein-Westfalen, Ile-de-France	Bruxelles, Berlin, Hamburg, Athens, Madrid	
Intermediate	Stockholm, Baden-Württemberg	Vlaams Gewest, Région Wallonne, Danmark, Bayern, Nord-Pas-de-Calais, Est (FR), Nord Ovest (IT), Lombardia, North (UK), East Midlands, Este (ES)	Yorkshire, East Anglia, West Midlands, Niedersachsen, Northern Ireland, Wales, Abruzzo-Molise, Campania, Ostöster-reich, Luxembourg, Nederland, Sicilia	South-West (UK), Schleswig-Holstein, Saarland, Westöster-reich, Mediterránée, Nord-Est (IT), Emilia-Romagna, Centro (IT), Sud (IT)	Portugal, Lazio
Rural	Noreste (ES)	Bassin Parisien, Centre-Est (FR), Östra Mellansverige, Sydsverige, Ireland	Noroeste (ES), Centro (ES), Ouest (FR), Süd-österreich, Manner-Suomi, Nora Mellan-sverige, Mellersta Norrland, Övre Norrland	Scotland, Voreia Ellada, Kentriki Ellada, Sur (ES), Sud-Ouest (FR), Sardegna, Westöster-reich, South-West (UK)	Nisia Aigaiou, Kriti, Ahvenanmaa/Åland

expenditure is associated with specific strategic policies. These are designed to increase the capacity of the regions to take advantage of scientific and technological developments necessary to improve their structural base. They are often assisted in this through the Structural Funds which seek to promote regional capabilities by funding measures aimed at maximising human resources and increasing the rate of innovation and technology up-take by firms.

Alongside the more peripheral capital regions in the low scores are the core urban regions of Berlin, Brussels and Hamburg. In Berlin government expenditure on R&D is almost as high as private expenditure and this must be interpreted in the context of its recent political history. In contrast, while Hamburg has high government expenditure on R&D, it has over twice as much expenditure attributable to the private sector. Brussels shows an unusual mix within the urban core. It has a profile of government spending which is not high relative to other core regions but unlike the other regions government spending is not complemented by high private investment in R&D. With the exception of the German Länder, the only surrounding Member State regions with lower private expenditure are Berlin, Saarland and Schleswig-Holstein (Objective 2 regions). Athens has a very high government expenditure on R&D (31.3 % of the total) which is only just exceeded by private spending (32.6 % of total). Madrid has similar government expenditure but higher private expenditure on R&D at 52 % of the total. The region of Lazio, which includes Rome, is unique among urban regions at NUTS 1 level in having higher government expenditure on R&D (52.2 %) than private expenditure (30 %).

Differentiation in government expenditure on R&D can be broadly explained by two diverse policies: On the one hand, policy designed to aid peripheral regions through large transfers of public funds and, on the other hand, a situation where government expenditure on R&D is based on hard research in strong regions with good infrastructure and a solid economic base.

The Noreste region of Spain displayed a very high score in this factor emphasising the importance attached to R&D in the modernisation of this region. The region is associated with a high level of industry and includes the NUTS 2 regions of Pais Vasco, Navarro, Rioja and Aragon. Pais Vasco, in particular, has been the target of a number of framework programmes, through its Objective 2 status, that have sought to strengthen the innovative capacity of institutions and businesses in the region. Further research is required to establish why this region appears to have performed better than others under similar circumstances. The Este region of Spain has also performed well in this factor in contrast to the preceding three factors where it is to be found at the lower end of the distribution of the values alongside the Noreste region. Ireland, which did not score well in physical infrastructure or sectoral structure measured by employment in market services, has also scored well in this factor. In the case of Ireland, the treatment of it as one region hides the intraregional differentiation that exists for all factors, most specifically between the eastern region and the rest of the country.

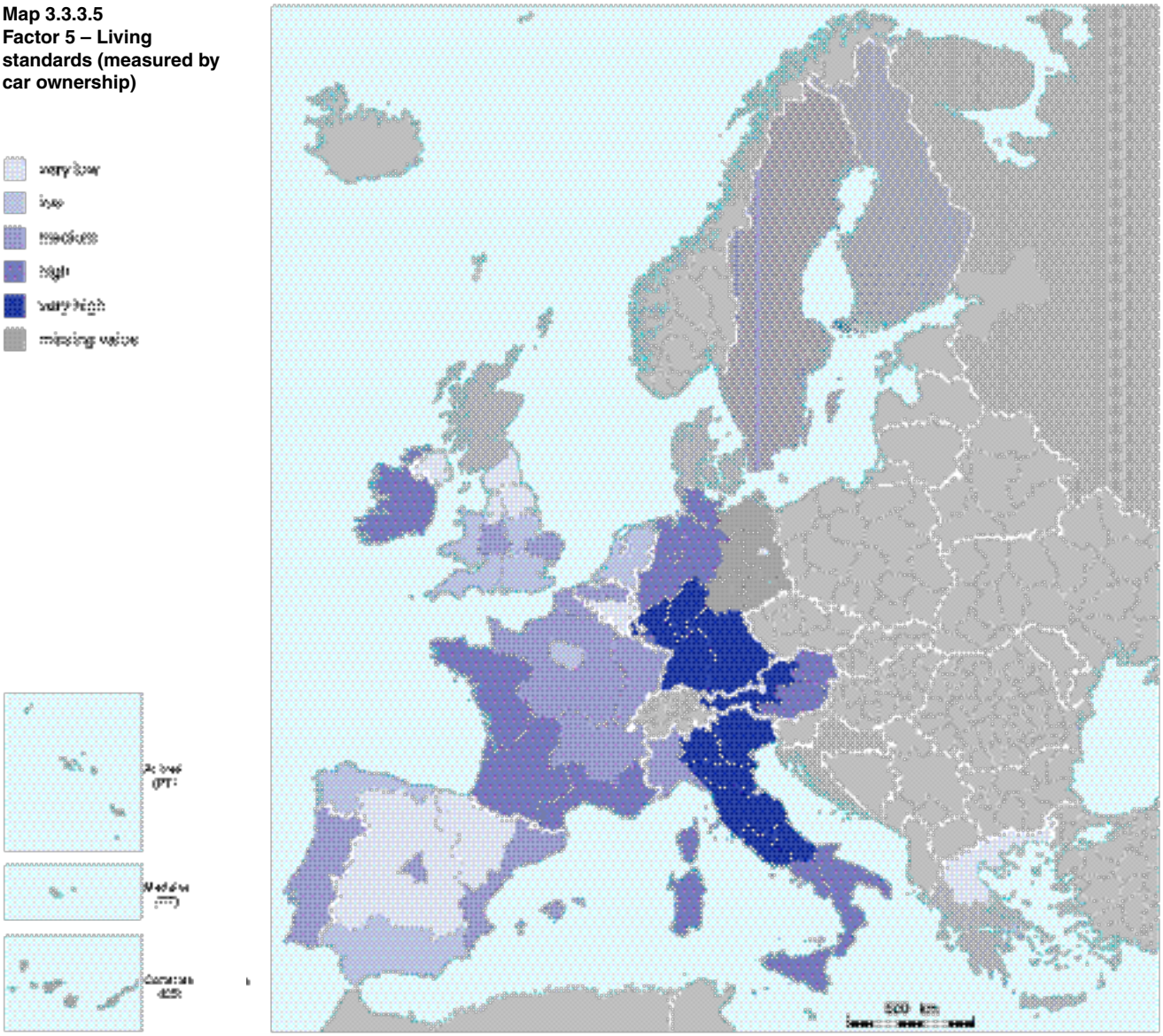
Factor 5 – Living standards (car ownership)

This fifth factor has identified regions where the level of car ownership is high. The indicator was used as a guide to living standards but obviously it could be argued that very high living standards would negate the need for cars, especially in view of environmental concerns. There was a small positive correlation with GDP and car ownership and a small negative correlation with the inputs and outputs of agriculture and with higher educational attainment.

Table 3.3.3.8 (page 36, see also map 3.3.3.5) reveals an interesting spatial pattern that appears to be highly influenced by national attitudes towards car ownership and culture. For instance, with the exception of Luxembourg, all of the regions that scored extremely highly are intermediate regions of Italy. However, given this strong car culture, a north-south divide in Italy is evident between the high and extremely high values. As a result no Italian regions are represented at the lower end of the distribution of factor scores. This is the only factor in which, for instance, Sicily and Sardinia appear in the high scoring regions.

A further trend is evident in the high value scores where, with the exception of Italy, the urban and intermediate regions are all in Germany. Furthermore, they are generally in old industrial regions, parts of which qualify

Map 3.3.3.5
Factor 5 – Living standards (measured by car ownership)



Calculations: NUI Maynooth

Table 3.3.3.8
Factor 5 – Spatial classification of living standards

Settlement structure	Living standards (measured by car ownership)				
	Very high	**High**	**Medium**	**Low**	**Very low**
Urban		Hessen, Nordrhein-Westfalen, Rheinland-Pfalz	Bremen, Hamburg, Madrid, North-West (UK)	Athens, South-East (UK), Bruxelles, Ile-de-France	Berlin
Intermediate	Lombardy, Nord Est (IT), Emilia-Romagna, Centro (IT), Lazio, Luxembourg	Saarland, Baden-Württemberg, Bayern, Niedersachsen, Schleswig-Holstein, Abruzzo-Molise, Sicilia	Vlaams Gewest, Nord-Pas-de-Calais, Est (FR), Meditérranée, Nord Ovest (IT), Campania, Sud (IT), Portugal, Nederland, North (UK), Yorkshire, East Midlands, East Anglia, South-West (UK), West Midlands, North-West (UK), Wales	Northern Ireland, Région Wallonne, Danmark	Stockholm
Rural		Ireland, Sardegna, Südösterreich, Westösterreich, Ahvenanmaa/Åland, Norra Mellansverige, Mellersta Norrland, Övre Norrland	Ouest (FR), Sud-Ouest (FR), Centre-Est (FR), Bassin Parisien, Östra Mellansverige, Sydsverige	Scotland, Noroeste (ES), Noreste (ES), Centro (ES), Sur (ES), Manner-Suomi	Voreia Ellada, Kentrike Ellada, Nisia Aigaioiu, Kriti

for Objective 2 status and which have a GDP just at or above the EU average. Only Hessen and Baden-Württemberg have much higher than average GDP.

The lower value scores also reveal some interesting trends. The rural regions are highly represented by Greece and Spain, reflecting their poorer performance in most of the other factors. On the other hand, the urban regions represented are, with the exception of Athens, all capitals of the North European core (Brussels, Berlin, Stockholm, South-East (UK) and Ile-de-France. This suggests that at a certain stage of an urban region's development and/or density, car ownership decreases. This may be in part due to the disincentives of increased congestion on the roads but also to a more readily available and efficient public transport system. It is also interesting to note that, with the exception of the new German Länder, these capital regions rank in the top five for higher educational attainment (if the Länder were included in the ranking the capitals would all be within the top ten NUTS 1 regions). It is not for this study theme to assess whether this is due to a natural pull of educated people to urban areas or whether it can be argued that highly educated people are, for whatever reasons, more environmentally aware.

The measure of living standards by car ownership should therefore be applied very cautiously. It appears to have more relevance to the factors of modernisation in the rural regions (with the exception of Italy) where higher car ownership is associated for the most part with higher GDP and higher educational attainment than in those regions where the inhabitants own fewer cars.

Cluster analysis

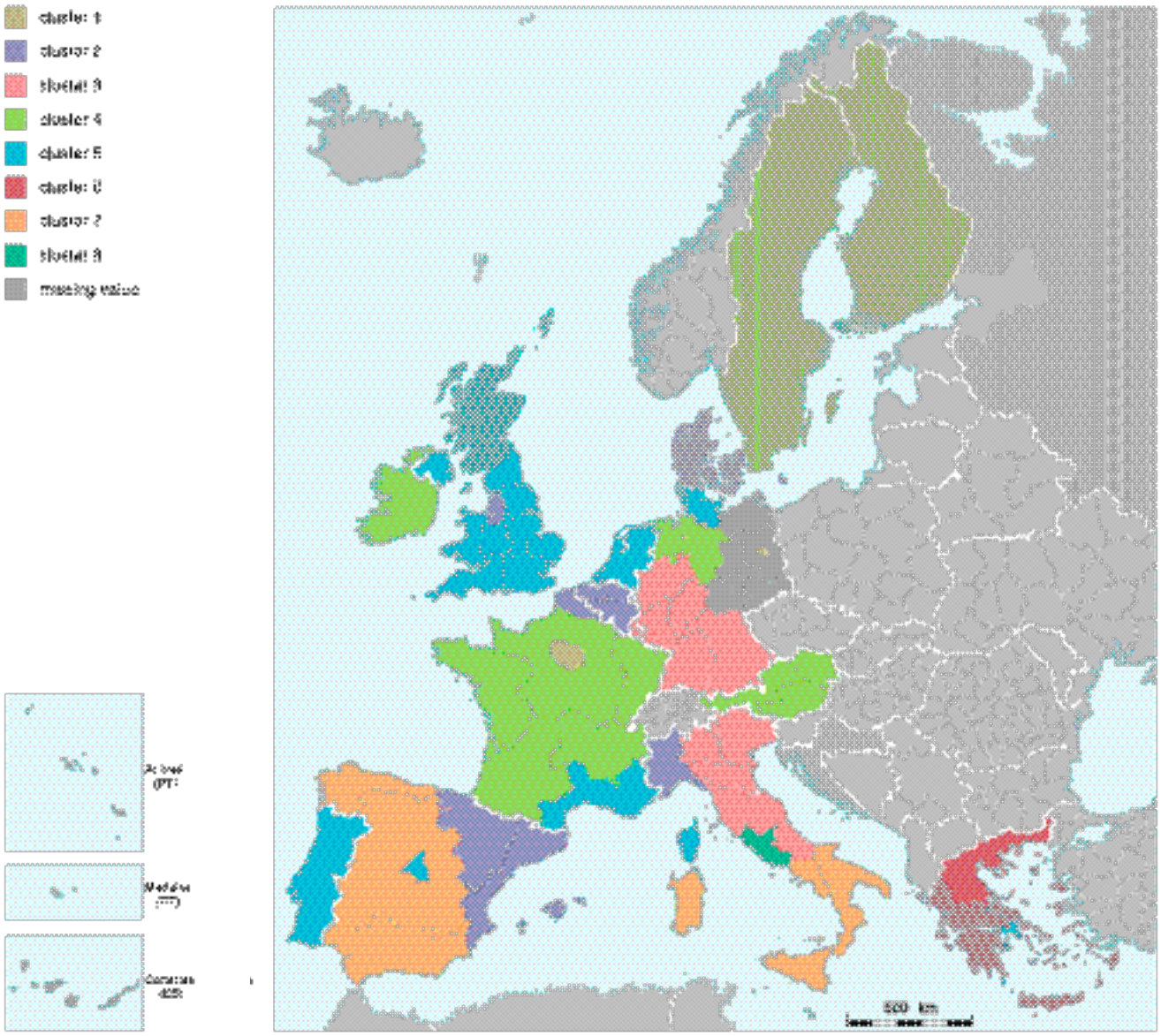
Using the Ward method, eight regional clusters were identified as being the most useful for this analysis. Using seven clusters had the effect of grouping together clusters two and four to make one very dominant cluster. Lazio and Ahvenanmaa/Åland were consistently clustered when examining results of up to ten clusters. Similarly, the Greek rural regions were always clustered as a discrete group.

In general, strong national patterns emerged from the clustering. These patterns can be accounted for at least in part by the spatial impacts of national policies but they have been further emphasised by the analysis at NUTS 1 level which, for instance, treated all of Sweden and the continent of Portugal as one region. However, within these broader patterns national disparities were also evident (map 3.3.3.6, page 38).

Core urban/capital regions, comprising Brussels, Berlin, Bremen, Hamburg and Ile-de-France, formed an elite cluster in the northern Member States (cluster 1). These regions displayed a positive sectoral structure with very high infrastructural endowment. Using the variables in this study their levels of innovation were not high; however, output indicators of innovation such as patents do not take account of technology transfer which may be just as important. The employment figures were mixed for these regions with Ile-de-France showing positive employment while Brussels had relatively high unemployment. All of these regions displayed a low level of car ownership, which may reflect good public transport infrastructure and/or congestion acting as a deterrent to car ownership.

Within the southern Member States the capitals of Madrid, Athens and Lisbon (Portugal treated as one region) were clustered alongside the Mediterranean, the UK regions (with the exception of the North-West), Schleswig-Holstein and the Netherlands (cluster 5). Their innovative performance is poor with the exceptions of the northern and East Midlands regions of England. Geographically, a dual pattern emerges between regions in the northern Member States, particularly the UK, and the capital regions of the southern Member States. Portugal, because it is treated as one region, displays positive labour market performance and a negative sectoral structure. However, at a NUTS 2 level Lisbon has a similar percentage of employment in the market service sector to either Athens or Madrid (i. e. just over 70 % of total employment) but unlike the other southern regions the Portuguese capital does not suffer from high unemployment rates. The northern Member States all have positive labour market rates and this reflects the different biases within the sectoral structure that were discussed above in the section on factor 2 "sectoral structure". A further factor influencing the level of modernisation within these regions was their infrastructural endowment. The level of infrastructure differs between the regions

Map 3.3.3.6
Cluster analysis of modernisation and diversification



Calculations: NUI Maynooth

but, for the purposes of modernisation within this cluster, it plays a significant role relative to the other inputs. The dendrograph (see appendix 1) further explains the relationship at a sub-cluster level between the regions based on the five factor scores.

Within Italy a north-south divide is evident with the northern and some central regions grouped alongside largely urban German regions and Luxembourg. With the exception of Luxembourg (cluster 3), these regions do not have a strong market service sector but they do share a strong manufacturing base. On the input side, the German regions and Luxembourg display a positive physical infrastructure and this is complemented in the outputs by high car ownership. Car ownership is also high in Italy but the Italian regions do not have the strong physical infrastructure displayed by the other regions in this cluster. Car ownership in Italy appears to be independent on the variables of modernisation and more dependent on cultural attitudes. As such it cannot be taken as an indication of living standards.

Within Spain an east-west divide is apparent between the north-eastern and eastern regions and the rest of Spain with the exception of Madrid. These eastern regions are clustered with the north-west of Italy, north-west England and Denmark and the southern regions of Belgium and Nord-Pas-de-Calais (cluster 2). They are associated with high levels of innovation

measured by high private investment in R&D but low government expenditure on R&D. The remaining regions of Spain, except Madrid, are clustered with the southern regions of Italy (cluster 7). They are all either rural or intermediate areas and suffer from extremely high unemployment. Most of them also have a weak sectoral structure although both Campagnia and Sicilia display a higher level of market services. All of these regions show a poor infrastructural base. The Centro region of Spain is the only area with a positive value for innovation in spite of negative values for all of the other four factors.

Cluster 4 is comprised of northern regions ot the EU that are for the most part rural and performing relatively well. They are represented by large parts of France, all of Austria, Sweden (one region), Manner-Suomi in Finland and Ireland. Their clustering is based on a mixture of inputs and outputs. In general the labour market statistics are positive (with the exception of Südösterreich and the Parisien) but the sectoral structure is inclined towards a narrow base with low input and output from market services. The level of infrastructure is generally poor or not significant in terms of their modernisation performance. In spite of this the regions of Ireland, Sweden, Manner-Suomi and Westösterreich, in particular, display high values for innovation.

The clustering of Lazio and Ahvenanmaa/Åland is unusual in that it is the only cluster that displays no spatial proximity (cluster 8). However, these two regions are different because they have a much higher input of government expenditure than private expenditure on R&D. With the exceptions of the German Länder regions of Mecklenburg-Vorpommern and Brandenburg, the only other regions to have higher government expenditure on R&D were Portugal, Sardegna and Nisia Aigaiou, Kriti. However, unlike the latter, Lazio and Ahvenanmaa/Åland both have a higher than average GDP per capita. Lazio, which includes the Italian capital of Rome, has a good sectoral base but poor employment statistics while Ahvenanmaa/Åland shows a strong reliance on agriculture but has low rates of unemployment.

The Greek regions have shown some of the least favourable conditions for modernisation within the EU (cluster 6). They are highly dependent on agriculture, show low levels of innovation and a low level of GDP per capita. Allied to this are a poor physical infrastructure and a generally low level of educational attainment. Unemployment is generally low or average although long-term unemployment and female and youth unemployment are high in some regions. Furthermore there appears to have been a general increase in unemployment rates between 1987 and 1997. The widening disparities between Athens and the other Greek regions would suggest that Greece is still in the early stages of development.

3.3.4 Conclusion

The analysis has emphasised the economic divide between urban and rural regions, which still exists within the EU. It has pointed to sectoral structure as one of the most important elements in assessing the modernisation of a regional economy. At the same time it has shown where similar outcomes occur between the regions, notably in terms of employment and unemployment type. Long-term unemployment crosses the rural-urban/core-periphery divide but is more prevalent in dense urban regions and in specific rural/intermediate regions that are undergoing economic restructuring.

The Scandinavian countries are generally an exception in that they have strong rural regions with relatively high GDP per capita and a very high percentage share of employment in research and development. Stockholm emerges as a very strong region with high service employment, very high levels of educational achievement and R&D employment. The Finnish region of Ahvenanmaa/Åland is more of an anomaly. It is located on the extreme edge of the European periphery. It displays very low educational attainment and high government expenditure on R&D. This is combined with very little employment in R&D and with the exception of the Greek regions it has the highest employment in agriculture in the EU. Possibly because of its advanced welfare system it has a GDP well above the EU average.

GDP per capita remains highest in the urban regions. There are a significant number of regions that lie between the two extremes and this is a positive feature. It suggests that some of the more peripheral

regions are making strong efforts to converge towards the core regions. In order that the regions can catch up and ensure sustained growth it is important that both diversification and supply side improvements occur.

The Greek regions, with the exception of Athens, stand out as one of the least modernised/diversified areas with a very high percentage of employment remaining in agriculture. These regions also offer a very low base of educational attainment, which combined with the strong reliance on agriculture, does not augur well for future diversification. On the other hand, the growth in unemployment (see *classic indicators*) in some of the regions which have traditionally experienced high employment, may indicate the early stages of structural change. This will create the potential, at least in the short-medium term, for greater marginalisation of local communities if they do not have the capacity to adapt to wider economic forces.

A number of regions displayed a high level of innovation even where other inputs suggested that they were not economically strong. This has resulted in some more peripheral and rural regions, where infrastructure is not very good and where the sectoral base does not have a strong market service sector, performing better than expected. Such regions include Ireland and western Austria. Other regions that tend to have high levels of innovation are the old industrial regions centred on the northern core of Europe and including the north-west of England and the north and north-east of Spain. Many of these regions have traditionally suffered from high long-term unemployment rates in particular but, with the exception of Nord Ovest (IT) and Nord-Pas-de-Calais the unemployment rate in these regions is showing signs of a decrease.

Examining the broad spatial pattern, the analysis has confirmed a north-south divide and a general core-periphery differentiation. There is also a very strong national pattern within which intra-regional disparities exist. If any one factor of modernisation were capable of overcoming economic backwardness it would seem to be innovation. However, the attainment of a critical mass on all the indicators is vital if regions are to achieve their full potential. This is evident from both the correlations in the component matrix (table 3.3.3.3) and in the correlation matrix for the indicators (see appendices 2 to 4).

3.4 Competitiveness (Luxembourg)

3.4.1 Supporting concept/theory

Regional competitiveness appears to be the most comprehensive concept with which to measure the economic strength of spatial units. Competitiveness aims at measuring the potential and actual performance of the spatial units in globalised markets. In this respect, competitiveness considers most of the other concepts already described. One possible approach would be to create a new model of competitiveness using the different approaches; however, a range of concepts on competitiveness already exists. Therefore, it seems to be a better approach to use these models initially and then try to develop links by comparing the results of the different approaches.

A variety of literature exists on the national dimension of competitiveness in the wake of the globalisation debate (Durand 1992, Hirst/Thompson 1996, Fischer 1998; most critical: Krugman 1994, Rodric 1997). These national approaches are only partly useful on a regional level as the national dimension of competitiveness is much more reliant on macro indicators such as currency rates, interest, saving ratios and national regulations. But competitiveness is also linked to the micro level which incorporates the innovation capacity of companies, enterprise strategies and culture which are considered in the approaches outlined previously. Regional competitiveness has to be allocated at an intermediate or meso level (Thierstein 1996) and therefore needs to be approached in a different way. Regional competitiveness was broadly discussed in the wake of the finalisation of the single market. The most prominent approach has been the “blue banana” by the French DATAR/RECLUS (Brunet et al. 1989) alongside other studies e. g. the BFLR (Irmen/Sinz 1989) and British researchers (e. g. Keeble 1989).

Any methodology and indicator system should lead to a kind of typology which allows for the classification of spatial units in a transparent and comprehensible manner which will assist policy-makers in decision-making. As an example, Irmen/Sinz (1989) developed a typology for competitiveness in the wake of the Common Market studies which had to work with the restricted availability of data at that time. In order to measure the competitiveness of the European regions, two main sets of indicators were developed: the *level of development* (determined by the indicators GDP per capita (PPP), industrial income per capita (PPP) and share of gross value added (factor costs) in export oriented branches) and the *development dynamics* (determined by the indicators growth of GDP per capita (PPP) in per cent, development of employment in per cent). Following on from this differentiation, nine types of region were identified as the following figure shows (see table 3.4.1.1).

The most competitive regions are those that score highly both on the level and on the dynamics of development. Regions with different profiles face different problems in terms of competitiveness such as a high level of development but a lacking dynamism, or a low level together with strong dynamics. This approach was interesting in terms of describing the situation of regions but it did not explain much about the reasons for competitiveness. Another approach was chosen by the Commission in the Sixth Periodic Report (European Commission 1999: 35 ff.) starting from a definition of the OECD (1996) where competitiveness is defined "… by the ability to produce goods and services which meet the test of international markets, while at the same time maintaining high and sustainable levels of income" or more generally "the ability of companies, industries, regions to generate, while being exposed to international competition, relatively high income and employment levels" (European Commission 1999: 32). The link between the competitiveness issue and globalisation (section 3.2) is obvious, keeping in mind that there is a different quality in the kind of local/regional rootedness of economic development (see section 3.2). On that basis a simple model of the relationship between regional GDP/capita and the most significant features contributing to this was constructed. The main factors cited in the literature which explain variations in regional GDP were included to define adequate indicators. Four indicators explained almost two-thirds of the variations in GDP per capita i.e. 65 % of the variations between the GDP of the regions were associated with differences in the following factors:

- the structure of economic activity – indicated by high concentrations of employment in market services and/or manufacturing;
- the extent of innovation activity – indicated by a high number of patent applications;
- regional accessibility – indicated by a new index of DG Regio on the basis of good accessibility in respect of transport infrastructure;
- the skill of the work force – indicated by a high proportion of relatively highly qualified workers aged between 25 and 59.

Without repeating the results of the study – they are developed in the interpretation of the results of this study – one may conclude that the lines between the causal factors cannot be drawn in a direct manner; the factors may not have the same effect in

Table 3.4.1.1
Typology of regional competitiveness

Dynamics of development \ Level of development	Above average	Average	Below average
Above average	Prosperous metropolises and highly specialised regions	Booming rural areas	Booming regions in the periphery
Average	Economic centres with lesser growth	Regions in-between prosperous and problem regions	Peripheral regions with weak development
Below average	Old-industrialised regions	Regions with structural problems	Peripheral regions without development impulses

Source: own compilation on the basis of Irmen/Sinz 1989

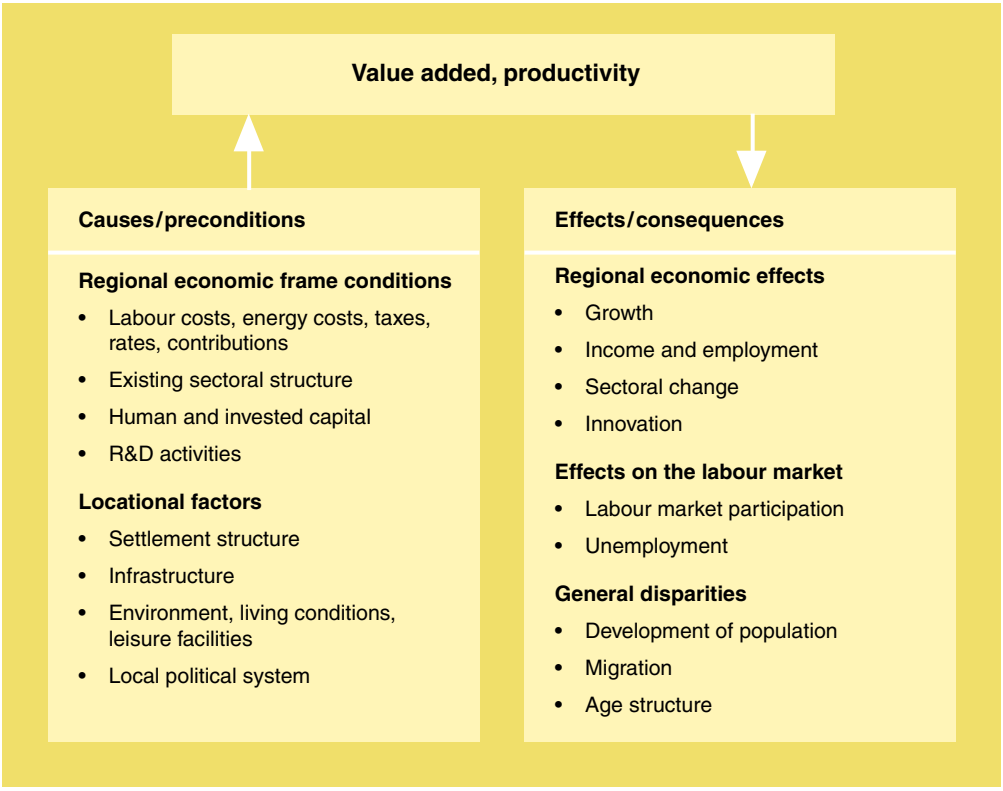
isolation, and other factors not included in the analyses might influence the measured factors (in particular institutional factors) (European Commission 1999). The existence of the factors does not reveal anything about how to address their consequences from a political point of view in particular, because the regional development path involves simultaneous changes across a wide range of factors.

One of the main criticisms of this approach concerns the definition of the effects or the success of competitiveness that results mainly in the level of GDP per capita. There is no doubting the importance of this variable but from our point of view an approach ought to be chosen which covers a broader range of success variables than the ones outlined in the previous approaches. A second consideration that has to be taken into account for the selection of the approach outlined below were the constraints in data availability. In addition, using an approach which was already applied to the main features some seven years ago has allowed some cautious comparisons of these results with previous results.

The BFLR (now BBR) tried to develop a comprehensive model which sought to integrate various approaches (Schmidt/Sinz 1993). Their approach is used as the basis for further elaboration of the competitiveness concept as it considers not only the causal variables and preconditions but also the effects and consequences of competitiveness in a broader approach (see figure 3.4.1.1). The regional value added or productivity stands in the middle in that it is determined by the input preconditions/causal side. However, productivity also represents the output indicating regional economic performance and effects.

A broad range of theories taken from the literature and previous studies support the hypothesis of the kind of interaction outlined. The restrictions imposed by data availability are still considerable but the methodology allows for the production of results that fit within the framework of the studies cited. Also, it has to be kept in mind that one aim of this study is to define the approaches for further in-depth analysis.

Figure 3.4.1.1
The causes-effects approach of regional competitiveness



Source:
Schmidt/Sinz 1993, 595

3.4.2 Indicators and data availability

In many cases, data is available from the Eurostat REGIO database and has been amended by the data of the BBR in Germany. The idea of the following list of indicators was to come as close as possible to the concept outlined above, taking into account the availability of indicators. Table 3.4.2.1 reveals big gaps for specific data but the main areas of the indicators are covered.

Table 3.4.2.1
Indicators of regional competitiveness

Dimension	Indicator in Schmidt/Sinz	Indicator in this study	Data source for this study
1 Productivity, value added	Average GDP per employee in ECU 1988–1993, new German Länder: 1989–1991 (EUR15=100)	Average GDP (in Mio. ECU) per employee, 1993–95 (EU15=100)	Eurostat - REGIO
2 Causes/preconditions			
2a Regional economic frame conditions			
Labour costs, energy costs, taxes, rates, contributions	Labour costs in manufacturing sector 1988	Labour costs in manufacturing sector 1996[1]	Eurostat (latest data)
Existing sectoral structure	Share of employees in agricultural sector 1989	Share of employees in agricultural sector 1997	Eurostat - REGIO
Human and invested capital	Employment age: Share of 15–35-year-olds 1989	Employment age: Share of 15–35-year-olds 1997	Eurostat - REGIO
R&D activities	Deviation of innovation activities in the regions from the EU average	R&D employees: Share of R&D employees in private companies to total R&D employment in 1995	Eurostat - REGIO
		R&D investment: Share of R&D investment (in all sectors) to GDP in 1993	Eurostat - REGIO
2b Locational factors			
Settlement structure	–	–	
Infrastructure	*Regional location* Average road travel time to the next centre (22 selected centres)	Regional location (see Schmidt/Sinz)	BBR compilation
	EU location Average travel time using combined transport to all centres in minutes	EU location (see Schmidt/Sinz)	BBR compilation
	Transport accessibility Average speed as the crow flies to all centres using rail transport	Transport accessibility (see Schmidt/Sinz)	BBR compilation
	Production related infrastructure Production relevant infrastructure 1985/1989	Infrastructure endowment Length of motorway in km per square km	Eurostat - REGIO
	Enviromental situation Sulphur dioxide emissions 1985 (German new Länder 1989), in 1,000 tons per square kilometre		
Local political system	–	–	
3 Effects/consequences			
3a Regional economic effects			
Growth	Average change of GDP in ECU 1984–1989, in %	Average change of GDP (Mio. ECU) 1995–1997	Eurostat - REGIO
Income and employment	Average change of employment 1986–1990 in %	Average change of employment 1995–1997	Eurostat - REGIO
Sectoral change	–	Change of sectoral structure such as innovation branches Change in industrial sector	
Innovation	–	Change of R&D activities	
3b Effects on the labour market			
Labour market participation	–	–	
Unemployment	Unemployment rate April 1992 (German new Länder: January 1993)	Unemployment rate 1997	Eurostat - REGIO
	Change of unemployment 1985–1990 (German new Länder 1990–1993), in percentage points	Change of unemployment 1991–1997	Eurostat - REGIO
3c General disparities			
Development of population	Population change 1985–1990, in %	Population change 1990–1996	Eurostat - REGIO
Migration	Cumulated balance of migration 1980–1988, per 1,000 inhabitants	Cumulated balance of migration 1990–1995, per 1,000 inhabitants	BBR compilation
Age structure	Share of 60+-year-olds, 1990	Share of 60+-year-olds, 1996	Eurostat - REGIO

[1] Labour costs for UK and Italy were generated by multiplying labour costs per hour in 1995 with the annual working hours in 1992
Source: Schmidt/Sinz 1993 with additions

3.4.3 Methodology and interpretation

(1) **Descriptive statistics** were prepared in a first step (see table 3.4.3.1) giving the basic values for average, minimum, maximum and quartiles. The values give a first impression of the indicators for competitiveness and were used to detect emerging trends within the dataset.

(2) The **correlation analysis** of all indicators (see table 3.4.3.2) started with the correlation coefficients of productivity with the causal variables. The correlation coefficients display the expected values and, with the exception of working age, all correlations are highly significant. A comparison with the study of Schmidt/Sinz (1993) reveals that the association of causal variables and productivity has lessened slightly, in particular in the case of the indicators concerning accessibility and location. This is obviously good news in the sense that productivity is not necessarily bound to these indicators due to the influence of information technologies. An exception is the increased association of labour costs which is correlated more highly with productivity than in 1993.

The correlations between the indicators on the causal side and the effects side were examined in the next step (see table 3.4.3.4) and created a mixed picture.

On the one hand, 46% and 61% of the correlation coefficients deviate significantly from zero at the 1% and 5% level (Schmidt/Sinz 1993: 33% and 43%). On the other hand, the correlation coefficient values do not score highly and remain in the range of below 0.3 (Schmidt/Sinz 1993 also had values >0.6). Correlations are obviously on the effect side but the data suggests deviating patterns; among the different indicators some are positively and some are negatively interrelated.

An in-depth analysis of single effect indicators reveals many significant and relatively high correlations of effect variables such as growth, unemployment rate, migration and population development with causal variables. The correlation values of the first three have risen with migration for all of the indicators, whereas the correlation of the development of population has weakened in comparison to the 1993 study. Some significant changes in the signs that

Table 3.4.3.1
Descriptive statistics for the dataset of regional competitiveness

Indicators	Mean	Maximum	Location	Minimum	Location	25th percentile	50th percentile	75th percentile
Productivity, value added								
Productivity	93.5	209.7	Bruxelles	31.8	Centro	73.0	92.8	109.3
Regional economic frame condition								
Labour costs	2650.1	4518.0	Hamburg	759.0	Norte	2120.0	2576.0	3311.0
Sectoral structure	6.2	40.1	Peloponnisos	0.1	Merseyside	2.2	3.9	7.6
Employment age	41.6	50.3	Campania	31.4	Ahvenanmaa/Åland	39.3	41.4	43.4
R&D employees	44.3	95.8	Picardie	0.3	Açores	24.7	42.8	60.4
R&D investment	1.5	3.9	Baden-Württemberg (NUTS 1)	0.0	Dytiki, Makedonia	0.7	1.5	2.0
Locational conditions								
Location (regional)	147.8	758.0	Notio Aigaio*	0.0	14 centres	49.7	101.0	172.4
Location (EU)	312.6	605.1	Highlands, Islands*	199.4	Darmstadt	258.0	293.9	345.1
Transport accessibility	69.0	85.7	Wien	46.4	Sardegna*	66.7	69.1	72.1
Infrastructure endowment	27.8	200.4	Flevoland	0.0	e.g. Sardegna,	8.3	20.7	34.7
					Highlands, Corse,		Thessalia	
Effects on regional economy								
Economic growth	11.5	53.3	Thüringen	-18.0	Sardegna	-0.3	16.5	21.6
Employment trend	0.7	14.1	Ceuta y Melilla	-17.2	Corse	-1.6	0.6	3.3
Effects on labour market								
Unemployment rate	10.0	32.0	Andalucia	2.5	Luxembourg	5.8	8.5	12.2
Unemployment trend	2.5	12.8	Dessau	-5.7	Northern Ireland	0.1	2.7	4.4
General disparities								
Population trend	2.7	22.5	Flevoland	-16.3	Halle	0.9	2.8	4.6
Age structure	21.2	30.2	Liguria	12.3	Flevoland	19.4	21.1	22.8
Migration	31.4	230.1	Oberbayern	-145.4	Ile-de-France	2.1	20.0	56.4

* Due to missing data Ceuta y Melilla, Acores and Madeira were counted with the same values

	Productivity/ value added	Regional economic frame conditions					Locational conditions		
	Productivity	Labour costs	Sectoral structure	Employ-ment age	R&D invest-ment	R&D employees	Location (regional)	Location (EU)	Transport acces-sibility
Productivity/value added									
Productivity									
Regional economic frame conditions									
Labour costs	**0.80****								
Sectoral structure	**-0.46****	**-0.53****							
Employment age	-0.01	-0.16*	-0.13						
R&D investment	**0.38****	**0.56****	**-0.47****	-0.25**					
R&D employees	**0.37****	**0.49****	**-0.36****	-0.26**	**0.43****				
Locational conditions									
Location (regional)	**-0.31****	**-0.41****	**0.43****	0.09*	**-0.34****	**-0.47****			
Location (EU)	**-0.57****	**-0.67****	**0.61****	0.08	**-0.51****	**-0.55****	**0.73****		
Transport accessibility	0.20**	**0.37****	-0.17**	-0.18*	0.25**	0.21**	**-0.55****	**-0.42****	
Infrastructure endowment	**0.43****	**0.42****	**-0.41****	0.06	0.27**	0.22**	**-0.46****	**-0.58****	0.17 *

Table 3.4.3.2
Correlation matrix: causes of regional competitiveness

**/* Correlation is significant at p = 0.01 / 0.05; correlations > 0.30 and < -0.30 are printed in bold

Effects	Effects on regional economy		Effects on labour market		General disparities		Produc-tivity
	Economic growth	Employment trend	Unemployment rate	Unemployment trend	Population trend	Age structure	
Effects on regional economy							
Economic growth							0.09
Employment trend	-0.05						-0.10
Effects on labour market							
Unemployment rate	-0.19**	-0.01					-0.05
Unemployment trend	0.05	**-0.39****	**0.56****				0.16*
General disparities							
Population trend	0.06	0.07	**-0.40****	-0.22**			0.22**
Age structure	-0.24**	-0.26**	0.00	0.15*	**-0.33****		-0.08
Migration	0.10	-0.10	-0.30**	0.01	**0.55****	0.09	**0.36****

Table 3.4.3.3
Correlation matrix: effects of regional competitiveness

**/* Correlation is significant at p = 0.01 / 0.05; correlations > 0.30 and < -0.30 are printed in bold

	Effects on regional economy		Effects on labour market		General disparities		
	Economic growth	Employment trend	Rate of unemploy-ment	Unemploy-ment trend	Population trend	Age structure	Migration
Productivity/ value added							
Productivity	0.09	-0.10	-0.05	0.16*	0.22*	-0.08	**0.36****
Regional economic frame conditions							
Labour costs	0.22**	-0.27**	-0.14*	0.22**	0.29**	-0.11	**0.43****
Sectoral structure	0.00	0.07	0.03	0.06	0.06	0.26**	-0.10
Employment age	-0.30**	**0.32****	0.27**	-0.24**	0.02	**-0.46****	-0.25**
R&D investment	0.09	-0.19**	-0.26**	0.10	-0.21**	0.18	**0.32****
R&D employees	.21**	-0.14*	**-0.32****	-0.06	0.22**	-0.05	0.26**
Locational conditions							
Location (regional)	-0.16*	0.11	0.30**	0.08	-0.06	0.06	-0.16*
Location (EU)	-0.26**	0.18*	**0.35****	0.04	-0.15*	0.13	-0.29**
Transport accessibility	0.00	**-0.36****	-0.10	0.22**	-0.01	0.09	0.17*
Infrastructure endowment	0.19**	0.10	-0.19**	-0.15*	0.23**	-0.24**	0.18*

Table 3.4.3.4
Correlation matrix: causes and effects of regional competitiveness

**/* Correlation is significant at p = 0.01/ 0.05; correlations > 0.30 and < -0.30 are printed in bold

are worth noting show changed relations between the variables:

- economic growth and working age: from 0.43 to -0.31;
- unemployment and productivity: from -0.25 to 0.16;
- development of unemployment and accessibility: from -0.18 to 0.22;
- migration and location: from 0.13 to -0.29.

The careful interpretation of these shifts points to improved economic development together with worsened developments on the labour markets for those central regions with good accessibility, a relatively old working population and high productivity i.e. mainly the "blue banana" regions. The other correlation coefficients for indicators of the development of unemployment support the conjecture that increasing unemployment is also the case in better developed regions. The stronger associations between migration and the causal variables point at increased migration towards regions with better potentials in the defined scope of causal indicators i.e. economically stronger regions in the centre of the EU and the regional centres of the periphery.

(3) **Creation of combined indicators – manual compilation of indices and factor analysis**

Further analysis demanded a reduction of the existing indicators (17) towards a smaller number in two ways.

a) **Manually by building combined indices** of the causal variables and the effect indicators.

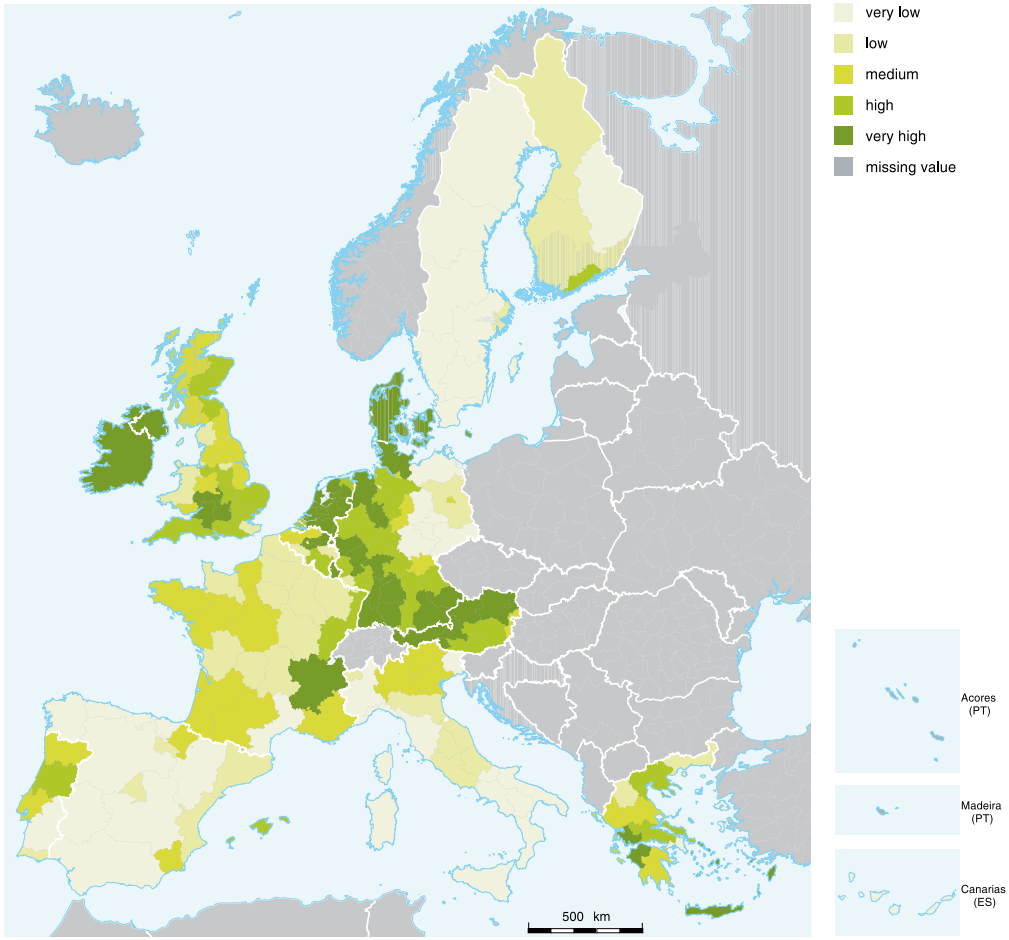
As a first step, indicators were standardised in order to avoid scale-related effects. "Negative" defined variables such as average travel time or the unemployment rate were transformed by a multiplication with -1, so that positive values represented positive facts. An index was compiled by an additive and multiplicative combination of the transformed and standardised values for both the causal and the effect indicators.

The additive compilation allowed complete substitution of the values of the indicators within the resulting indices. The multiplicative compilation method only allowed a limited substitution which led in real terms to the following results: stronger deviations of regions for one indicator, in terms of a weakness, influenced the index towards the negative, and conversely, strengths pushed the index upwards thus allowing for better compensation (limited substitution instead of full substitution). The problem of negative values in the multiplication procedure was overcome by adding 10 to all values, which shifted all indicator values into the positive range and allowed the multiplication process to proceed without changing signs. Finally the indices for the causal and the effect sides had to be standardised because of differing numbers of causal and effect indicators.

The comparison of both methods led to the conclusion that there were hardly any differences in the distribution of values when building classes. Nevertheless, the multiplicative method is better able to take account of the reality by assuming limited substitution of locational factors. Therefore, further analysis was built on the multiplicative method.

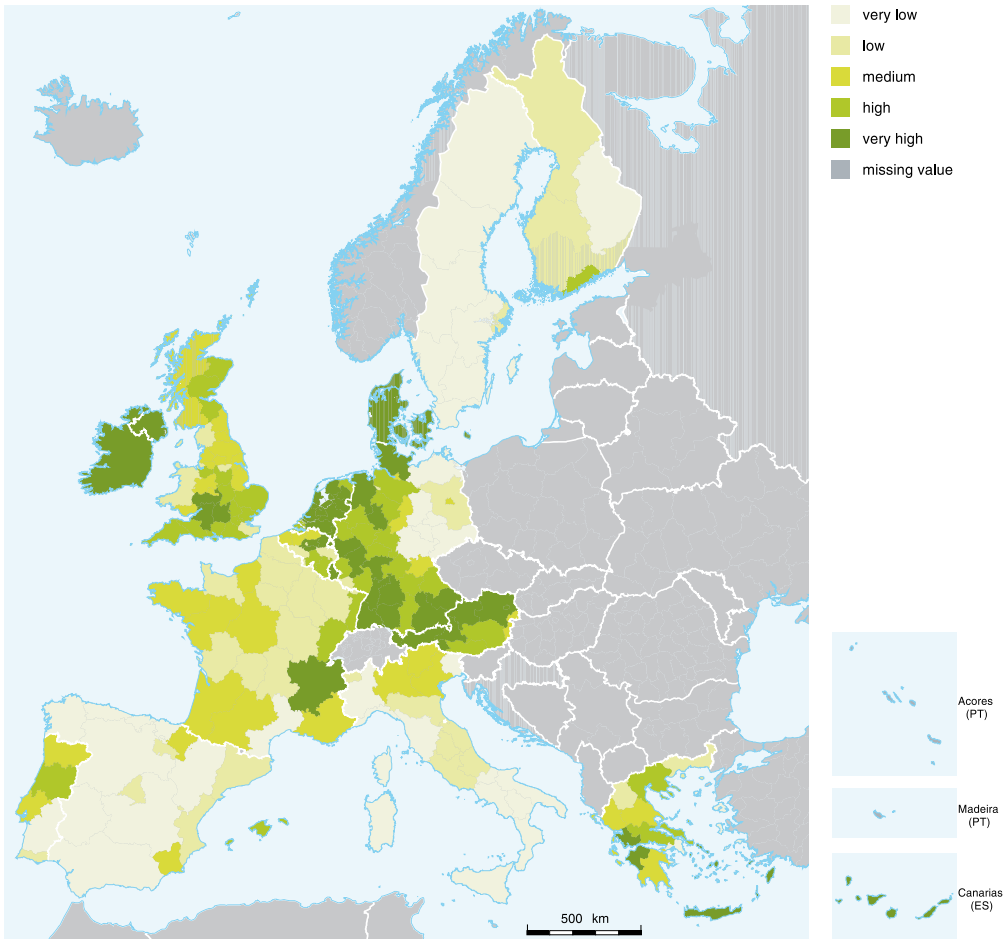
Maps 3.4.3.1 and 3.4.3.2 show how the regions of the EU are classified on the causal and the effect sides using the multiplicative method. It is interesting to note that the causal side follows more or less completely the EU-wide centre-periphery pattern and the centre periphery pattern on a regional scale, in particular on the outer ring of the EU, with only minor exceptions. This does not apply to the effect side, suggesting that the peripheral regions are better developed than one would expect from the causal side and vice versa. Therefore, it would be interesting to take a closer look at the regions which differ in both directions i.e. develop worse than expected and also develop better than expected from the causal side. The effects are much more diverse for both the EU-wide and the regional centre-periphery pattern. The maps, therefore, confirm findings already expected from tables 3.4.3.2, 3.4.3.3 and 3.4.3.4 (page 45) where relations between the single causal factors and the single effect factors have not been strong.

To visualise the differences between the causal and effect dimensions, these have been cross-tabled in a rough form using a 3 x 3 matrix approach (see map 3.4.3.3, page 48). Unsurprisingly, the capital regions of the outer ring of the EU show stronger development trends but there also seems to be a national pattern overshadowing the whole structure. The Italian regions and southern Sweden as a whole are performing



Map 3.4.3.1
Causes index of competitiveness for the EU regions (manual multiplicative compilation)

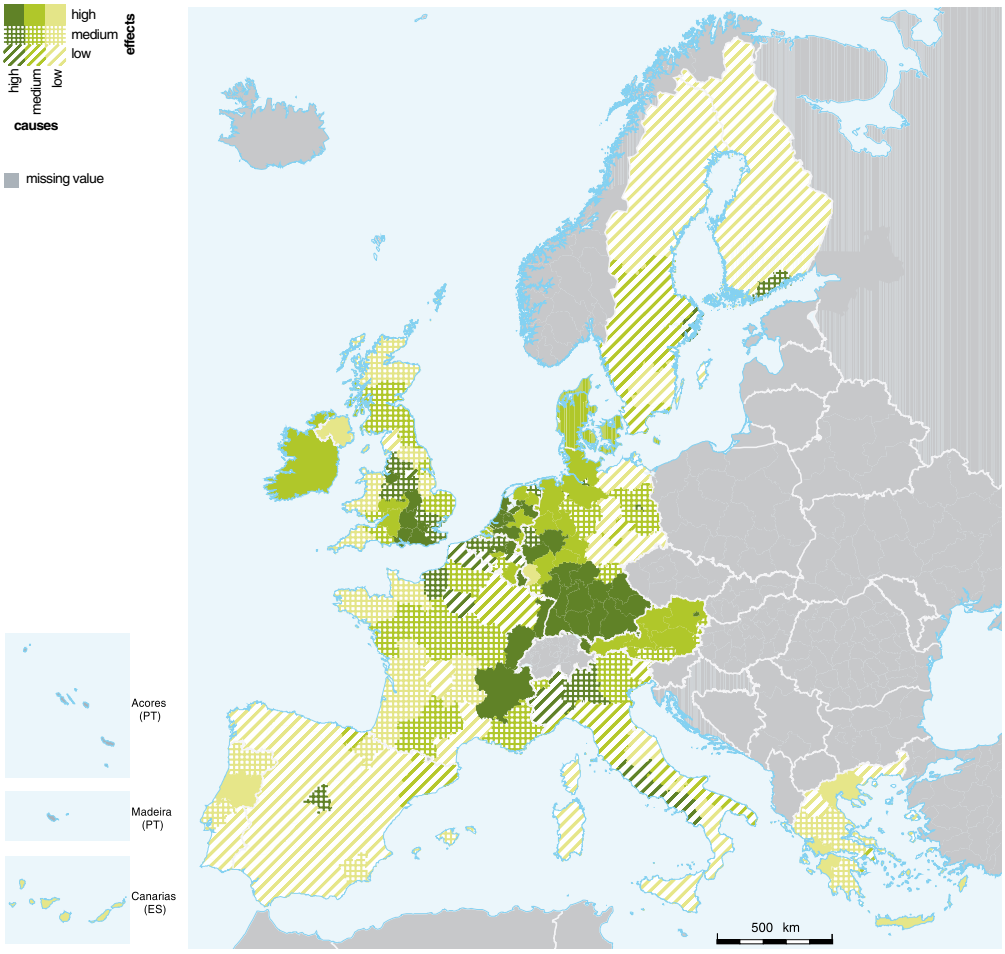
Calculations: TAURUS



Map 3.4.3.2
Effects index of competitiveness for the EU regions (manual multiplicative compilation)

Calculations: TAURUS

Map 3.4.3.3
Cross-table of causes and effects indices (manual multiplicative



Calculations: TAURUS

worse than expected whereas the Irish regions and the UK regions are nearly all performing better than average. This also applies for most of Denmark, Austria and northern Germany and the central region of France apart from the Ile-de-France. So it is necessary to observe the national pattern alongside the other methods before drawing conclusions.

b) Statistically by conducting a **factor analysis** and creating clusters of regions.

Apart from the manual creation of indices, factor analysis was used to detect the complex indicators hidden behind the causal and effect variables. The multivariate procedure of factor analysis allowed for a reduction in the number of variables by using extraction methods and orthogonal and other rotation procedures (since there were no significant differences, the orthogonal procedure was chosen for further analysis due to its better compatibility with the proceeding cluster analysis). As the other procedures also led to invalid communality estimates >1, the principal component method in combination with varimax rotation was finally chosen.

The investigation of a range of factors (two to five) led to the selection of five factors with eigenvalues >1 which explain 70 % of the variance of the whole sample. In comparison to the other models with two to four factors the solution of five factors was also most convincing in terms of possible interpretations (see table 3.4.3.5). The orthogonal rotation has to be assessed critically because of the high correlation between the indicators, but this method was also a necessary precondition for the following cluster analysis.

It is important to note that from the wider perspective there are few differences between the different methods of analysing competitiveness with the dataset, but this perspective needs to be refined when examining single regions. This is best demonstrated by the finding of the factor analysis that there is a high correlation between indicators which have been defined as preconditions or causes for competitiveness, but the relationship between the preconditions and success is not as clear (see table 3.4.3.3, page 45).

Preconditions were highly correlated with the first factor of the factor analysis and the complex indicator built from multiplying the standardised values of the precondition. This means that the preconditions listed are leaning in the same direction and none can be entirely excluded. Given these findings it may be concluded that all of the preconditions mentioned have to be present somehow and that substitution is only possible to a limited extent. The Sixth Periodic Report extracted four main factors that, with the exception of the last one, are represented in this study (European Commission 1999: 35 ff). These are: the structure of economic activity; innovative activity; regional accessibility; skills of the workforce as driving factors for the wealth of a region based on the equation:

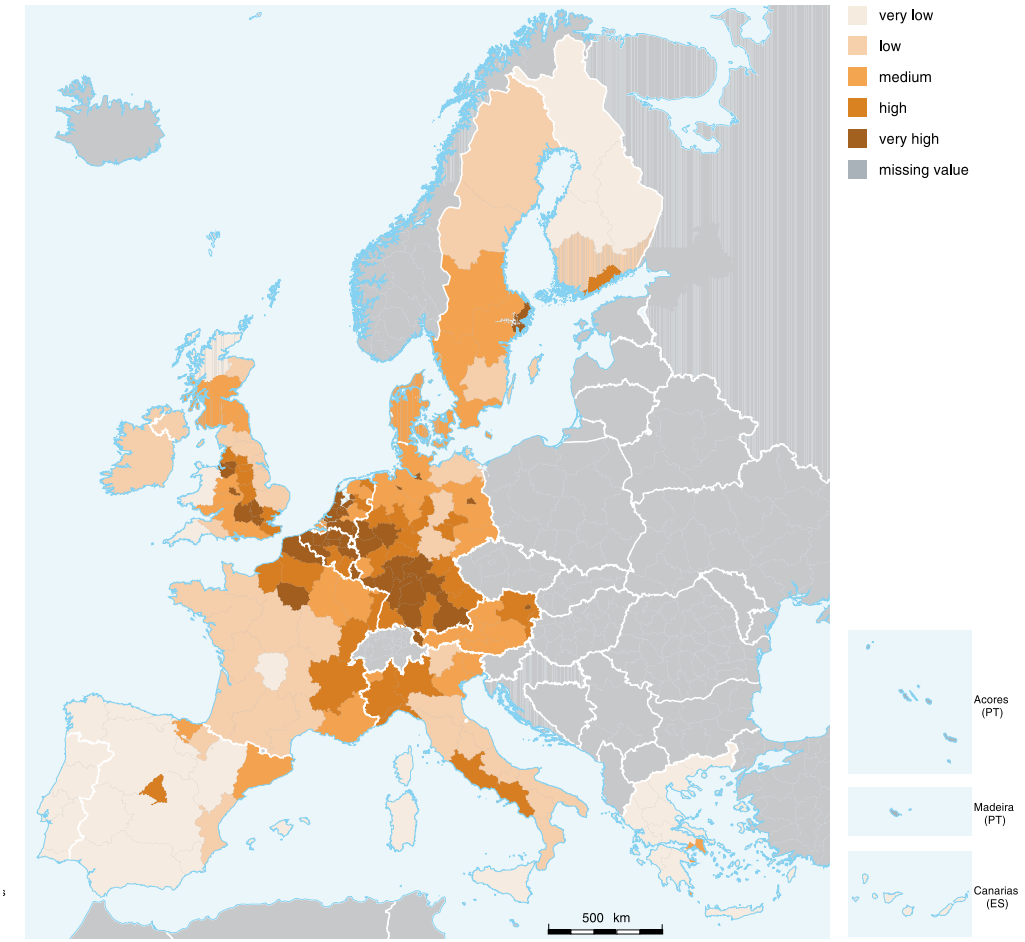
$$\frac{\text{GDP}}{\text{capita}} = \frac{\text{GDP}}{\text{employment}} = \frac{\text{employment}}{\text{total population}}$$

Let us start with the hypothesis of strong associations between the causal variables (table 3.4.3.5; map 3.4.3.4). It is interesting to see that the spatial pattern follows an

Table 3.4.3.5
Matrix of five-factor-solution of regional competitiveness (main component method, orthogonal varimax rotation)

	Factor 1 Causes	Factor 2 Employ-ment	Factor 3 Population	Factor 4 Labour market	Factor 5 Growth
Location (EU)	**-.890**				
Location (regional)	**-.788**				
Sectoral structure	**-.775**				
Labour costs	**.725**		.461		
Productivity	**.633**		.432	.317	
Infrastructure endowment	**.633**				
R&D investment	.572		.341		
R&D employees	.561				
Transport accessibility	.525	-.475			
Age structure		**-.766**			
Employment age		**.733**			-.488
Employment trend		**.613**		-.324	
Population trend			**.821**		
Migration			**.809**		
Unemployment trend		-.330		**.844**	
Unemployment rate			-.329	**.788**	
Economic growth					**.931**

All factors with eigenvalues > 1; total share of variance explained 69.7 %;
extraction: main component analysis; rotation: varimax.
Only factor values > 0.30 and < -0.30; correlations > 0.60 and < -0.60 are printed in bold



Map 3.4.3.4
On factor 1 – Causal effects

Calculations: TAURUS

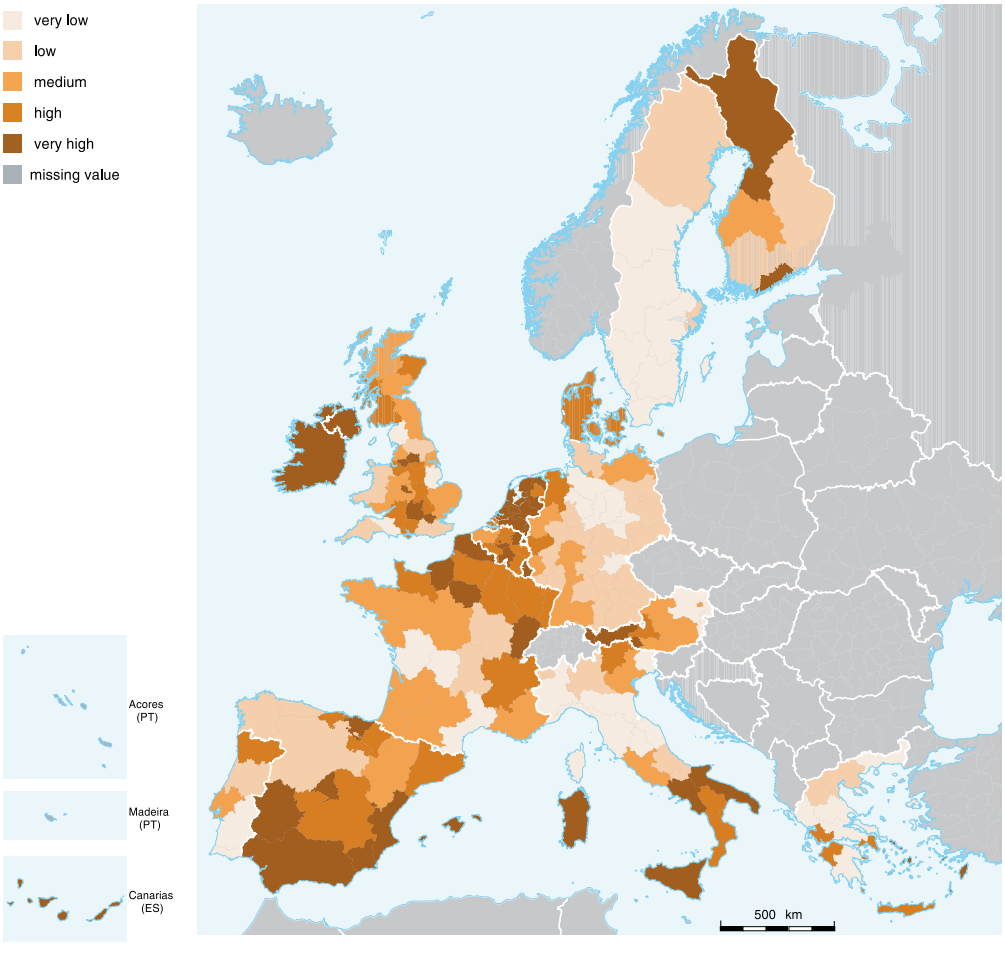
almost perfect periphery-centre pattern. Productivity is also strongly related with this factor but GDP/capita is not which confirms that high productivity is not necessarily indicative of wealth. It is clear that the development of employment is not associated with productivity.

Addressing factor 2 (map 3.4.3.5) which is highly associated with changes in employment, the relationship with productivity is quite weak. Instead, the age structure in terms of the share of elderly is adversely correlated whereas the share of young people in working age is positively related. The regional picture reveals a mosaic throughout the EU showing better values for southern Spain and Italy, all of Ireland and the northern areas of Finland and also a brighter stretch in north-eastern France and the Benelux. There is a hypothesis that this effect combines the fact of increasing employment dynamics starting from a level with a certain age structure.

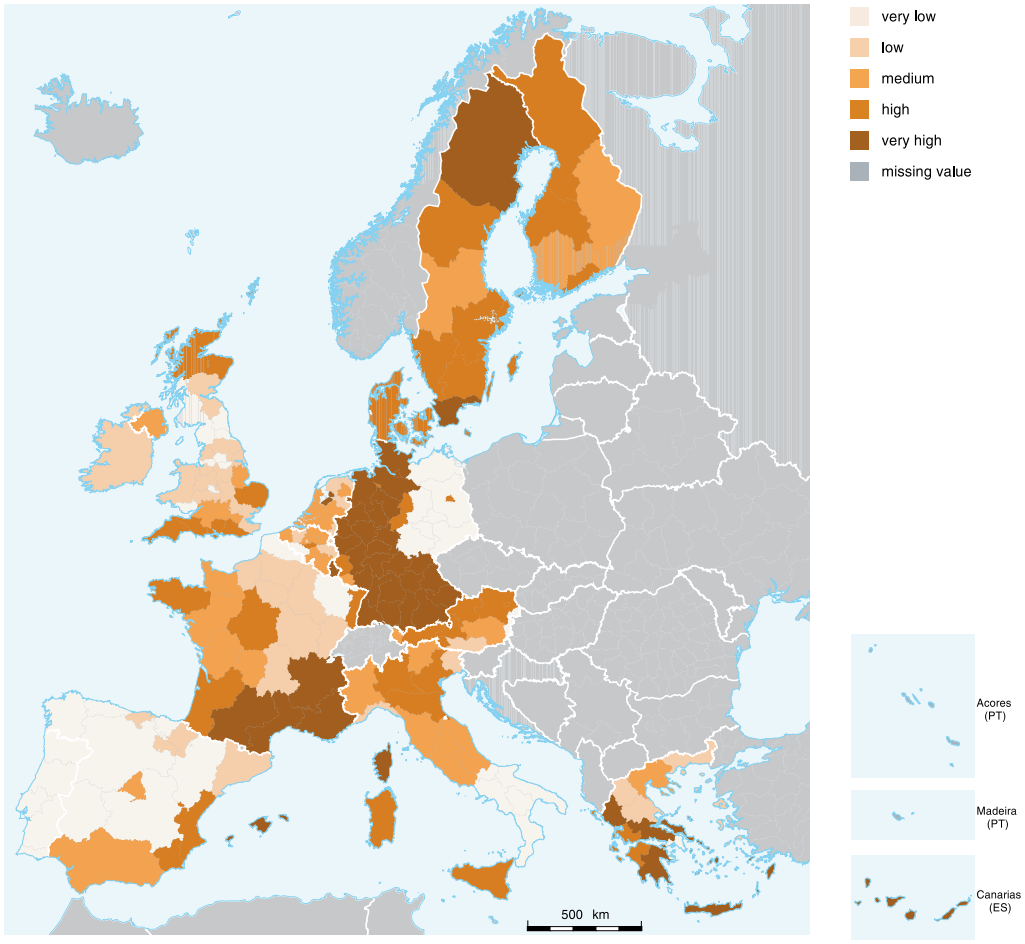
Factor 3 represents changes in population, highly correlated with population development and migration (map 3.4.3.6). It is important to note that changes in the population are most strongly correlated with the factors describing the causal variables of competitiveness in the dataset. This could be interpreted to mean that the causal variables attract people and that the level of unemployment also plays a stronger role than the dynamics of unemployment.

Factor 4 (see map 3.4.3.7) could be described as the labour market factor in which there is a high association between the level and the dynamics of the labour market. Some national patterns are emerging which emphasise the continuing importance of national employment policies which lead to an increase in total employment. The most dynamic countries under this factor are Ireland, the UK, the Netherlands and Denmark. These regions may also be responsible for the links with the development of productivity. In contrast, the positive development in Portugal, Austria, Greece, north-east Italy and central France must be related to other factors as they do not score highly in factors 1 and 2. It is not possible to further qualify this labour market development on the basis of the data available in this study. However, it is possible to conclude that positive

Map 3.4.3.5
On factor 2 – Employment

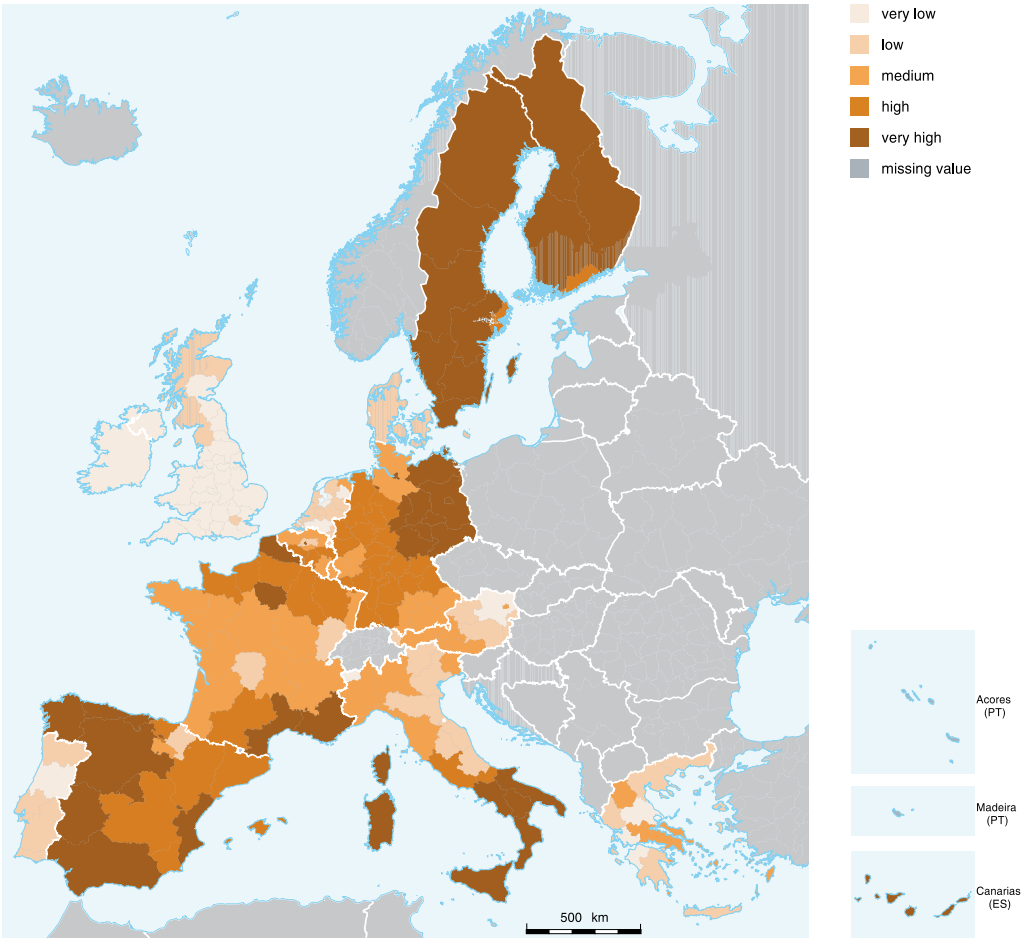


Calculations: TAURUS



Map 3.4.3.6
On factor 3 – Population

Calculations: TAURUS



Map 3.4.3.7
On factor 4 – Labour

Calculations: TAURUS

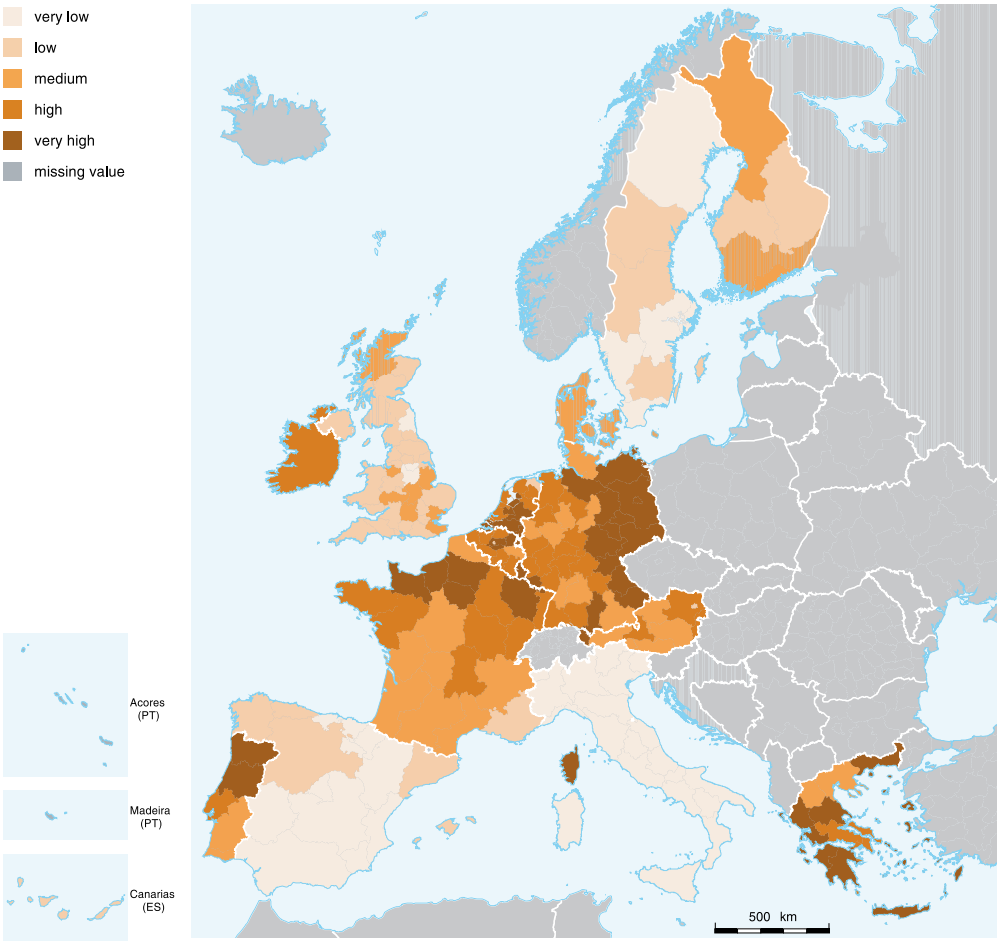
development in these latter regions is put at risk by change because it is not sustained by other hard factors, and its relationship to increasing productivity is weak.

Finally, the last factor is dominated by growth rates and the map clearly indicates a national pattern which is not surprising given that the growth rate covers a time span of only three years (see map 3.4.3.8). National tendencies are obvious in virtually all of the countries apart from Germany which displays a strong east-west divide. Since the factor is also related to the share of young workers (but only with -0.44) the characteristics of those regions are supported by this pattern. The growth rate itself has to take account of the base effect for the growth of structurally weak regions in comparison to regions which already have high GDP levels.

(4) The creation of indices by the methods outlined was followed by a **cluster analysis** which classified the regions on the basis of factor values arising from the five factor results and the manual indices. It has to be borne in mind that the precondition for statistically independent variables does not apply to the manually compiled indices. The significant deviation of correlation coefficients for both additive (0.24) and multiplicative (0.36) indices clearly revealed this problem. Therefore, the cluster analysis of the manually compiled regions has not been considered further.

The dissimilarity coefficients of the factor analysis data suggest clustering at least seven groups to reach a sufficient homogeneity within the clusters but we decided to consider nine groups to allow for a more refined analysis. Different procedures were applied but the Ward method produced the most convincing results. In contrast to the other methods, this procedure created relatively evenly populated clusters. Other methods tended to build a few large clusters leaving others almost unoccupied. The nine Ward clusters each contains between 3.5 % and 29 % of the regions (clustering on the basis of factor values) whereas the single linkage procedure (as an extreme case) computed one cluster encompassing 92 % of the regions followed by three clusters with one.

Map 3.4.3.8
On factor 5 – Growth

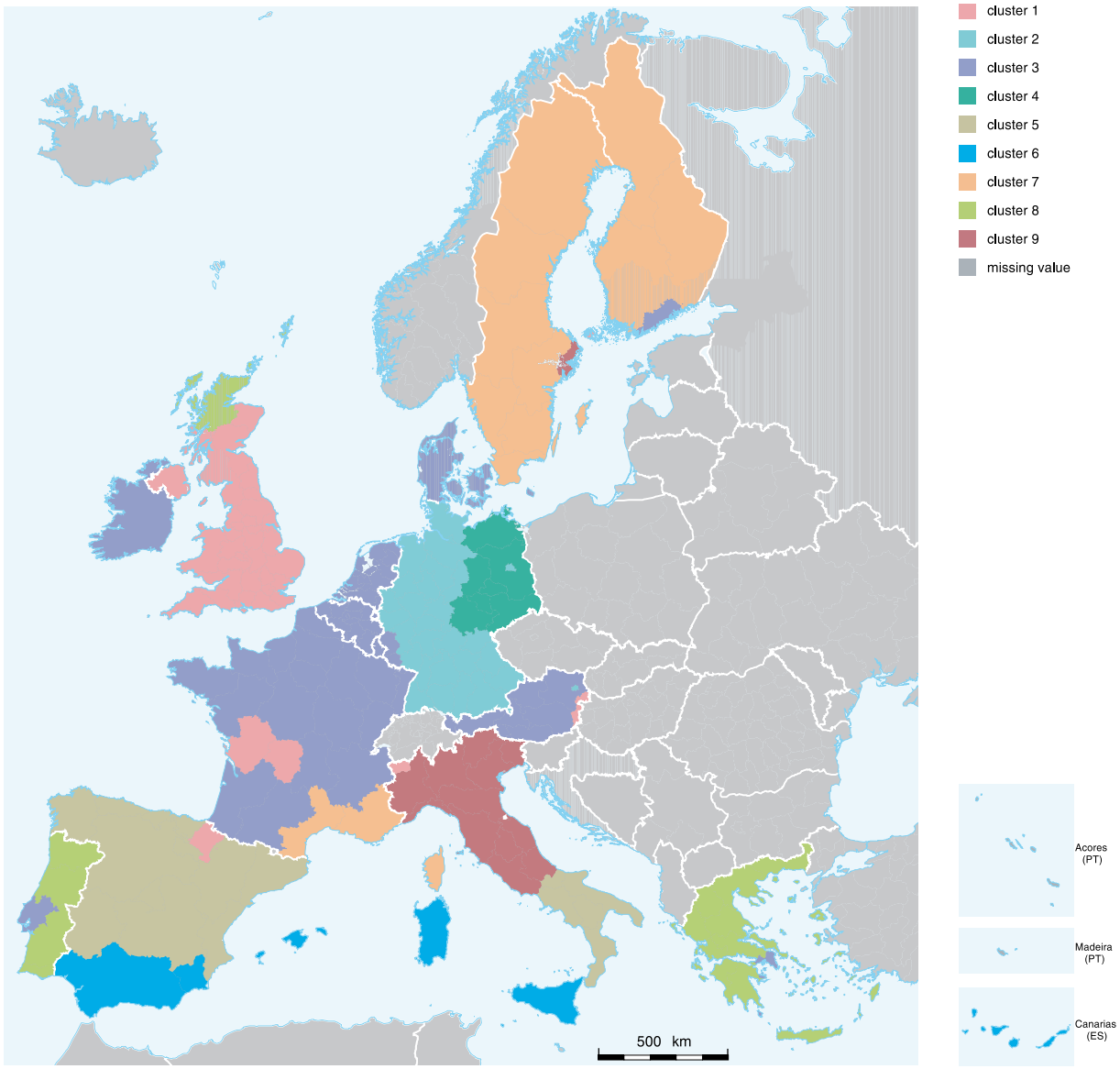


Calculations: TAURUS

The **discriminant analysis** was carried out to test and correct the results of the cluster analysis. Less than 11 % of cases had to be regrouped which was taken as further proof that clustering according to factor values had a high discriminatory power. The result of that procedure is reproduced in map 3.4.3.9. The regional pattern was built on the basis of nine clusters; the reduction to seven clusters would have led to the unification of clusters 5 and 7 (i. e. remote Swedish and Finnish regions would have joined northern/central Spain and southern Italy) and clusters 1 and 9 would have been grouped together (i. e. northern/central Italy together with the UK)

Map 3.4.3.9 solves the problem of unclear relations between the causal and the effect sides which have been detected in the correlation cross-table and in the factor analysis which created one causal factor and four effect factors. The key to this difference seems to be that national characteristics dominate when clustering the regions' factors. This would also support the hypothesis that there is a kind of choice on how well potentials can be used and that this choice is made at national level. Apart from the national strategies, the clustering identifies only very strong differences at national level, such as the west-east divide in Germany, the north-south divide in Italy and

Map 3.4.3.9
Clusters of regions on the basis of the factor analysis on regional competitiveness (five-factor solution)



Calculations: TAURUS

centre-periphery pattern in the countries on the outer circle of the EU.

(5) **Comparisons of the mean values** of the indices and factor values of all clusters were used to describe the clusters generated by the cluster and discriminant analyses (see table 3.4.3.6). The clusters illustrated in map 3.4.3.9 (page 53) need to be elaborated upon. As the factor values and their mean values are difficult to understand, the mean values for the clusters using the manual multiplicative method were also calculated. Table 3.4.3.6 shows that the second cluster (mainly Germany) the third cluster (mainly Denmark, France, Austria, and Ireland) and the first cluster (mainly UK) have the same high mean values for both the causal and the effect sides of all variables. East Germany is a unique case and while it has advantages in accessibility, it still has several structural problems. Cluster 8 (Portugal excluding Lisbon, Greece excluding Athens) combines the lowest levels on the causal side with a "midfield" performance, whereas the situation in cluster 6 (southern Spain, Sicily and Sardinia) is not as bad on the causal side but worse on the effect side. Cluster 5 (central/northern Spain and southern Italy) performs at a lower level than one would expect from the causal side. The analysis produces a varied picture on the regional situation across the EU territory.

(6) Finally, the study could be extended in the field of distinguishing different **types of settlement structure** in order to expand on the very important area of spatial planning. The distinction of different types of region was taken from Schmidt-Seiwert (1997) who identified six types of region (see table 3.4.3.7).

Table 3.4.3.6
Mean factor values and indices for the nine factor clusters of competitveness (manual multiplicative method)

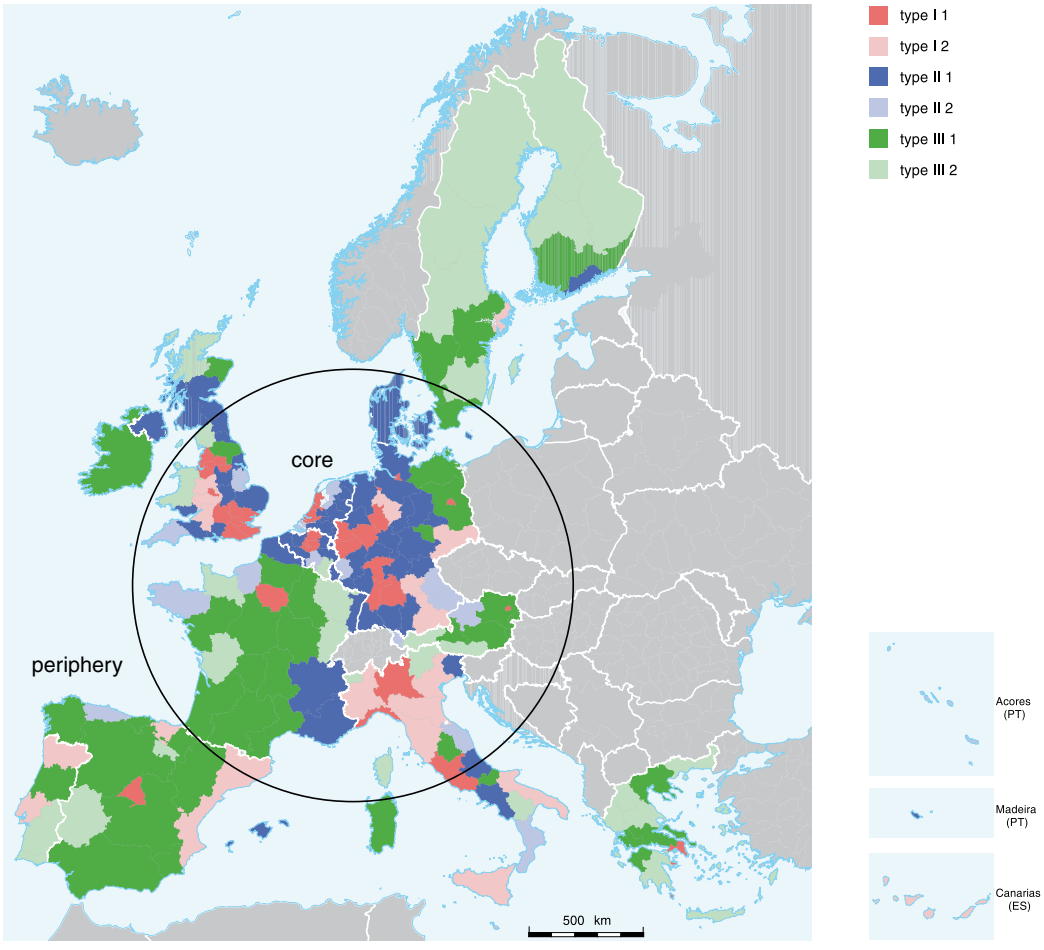
		Factor values					Values for factor clusters from multiplicative method and ranking				Clusters compiled on the base of manual multiplicative method (no map available)		
Classi-fication		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Rank	Causes	Rank	Effect	Classi-fication	Causes	Effects
1	Mean	.197	-.096	-.435	-1.127	-.460	(3)	.280	(3)	.117	1	-.325	-.026
	Standard deviation	.537	.697	.571	.345	.402		.921		.482		.290	.272
	N	40	40	40	40	40		40		40		37	37
2	Mean	.806	-.397	1.326	.344	.443	(1)	.832	(1)	.649	2	.174	.887
	Standard deviation	.419	.295	.552	.328	.236		.755		.543		.247	.401
	N	30	30	30	30	30		30		30		29	29
3	Mean	.477	.530	-.088	-.180	.559	(2)	.376	(2)	.541	3	2.126	-.224
	Standard deviation	.488	.771	.656	.643	.321		.678		1.157		.579	.583
	N	55	55	55	55	55		55		55		12	12
4	Mean	.202	-.890	-2.262	1.735	2.644	(5)	-.364	(9)	-1.312	4	1.068	1.386
	Standard deviation	.229	.489	.934	.485	.263		.242		.539		.325	.362
	N	7	7	7	7	7		7		7		16	16
5	Mean	-.387	.322	-.961	1.036	-1.291	(7)	-.545	(8)	-1.199	5	.768	.236
	Standard deviation	.553	.604	.594	.585	.529		.668		.442		.259	.346
	N	17	17	17	17	17		17		17		30	30
6	Mean	-1.496	2.468	.552	1.395	-1.085	(8)	-1.329	(5)	-.204	6	.070	-1.052
	Standard deviation	.720	1.173	.481	.760	.613		.476		.940		.345	.427
	N	7	7	7	7	7		7		7		25	25
7	Mean	-.201	-.845	.588	1.528	-.436	(6)	-.535	(7)	-1.105	7	-.941	-1.093
	Standard deviation	.467	.784	.403	.467	.529		.492		.418		.351	.385
	N	14	14	14	14	14		14		14		35	35
8	Mean	-2.252	-.406	.106	-.633	.773	(9)	-1.648	(4)	.079	8	-1.728	.387
	Standard deviation	.700	1.248	1.080	.485	.412		.337		.619		.286	.437
	N	19	19	19	19	19		19		19		17	17
9	Mean	.226	-.798	.037	-.328	-1.785	(4)	.237	(6)	-.687	9	1.944	6.655
	Standard deviation	.430	.578	.336	.476	.312		.715		.444		–	–
	N	13	13	13	13	13		13		13		1	1
	Total	**202**	**202**	**202**	**202**	**202**		**202**		**202**		**202**	**202**

It is clear that this distinction between different types of region is constructed from a Central European perspective. The perception of a large centre and a medium-sized town varies between countries i.e. Sweden or Portugal. Even here, a distinction between the EU core and the periphery, arrived at intuitively, seems to be important. Existing borders of EU Member States were used except in the cases of Italy and the UK. The core comprises Germany, Belgium, the Netherlands, Luxembourg, France, England/ Wales, northern Italy, Denmark and Austria whereas the periphery includes all other countries and regions of the outer ring (see discussion below). It would be useful to try to introduce country dummies and varying population densities and city sizes. The proposed classification leads to a map (see map 3.4.3.10) which creates a helpful tool, although it might prompt some criticism.

Table 3.4.3.7
Typology of settlement structure by number of EU regions (total, in the core and in the periphery)

Type		Core	Periphery	Total
I Agglomerated regions with a centre > 300,000 inhabitants	I1: Population density > 300 inhabitants/km²	34	2	36
	I2: Population density < 300 inhabitants/km²	11	9	20
II Urbanised regions with a centre > 150,000 inhabitants	II1: Population density < 300 inhabitants/km² or centre > 300,000 inhabitants and density < 150 inhabitants/km²	47	8	55
	II2: Population density < 150 inhabitants/km²	14	3	17
III Rural regions with a population density < 100 inhabitants/km²	III1: Centre > 125,000 inhabitants	20	19	39
	III2: Centre < 125,000 inhabitants	12	23	35
Total		**138**	**64**	**202**

Source: Schmidt-Seiwert 1997 for the typology of the settlement structure



Map 3.4.3.10
The settlement structure of the EU territory –distinction of core and periphery

Typology: BBR / Schmidt-Seiwer 1997
Distinction: TAURUS

Table 3.4.3.8
Mean causal and effect indices by types of settlement structure

Type			Causal index	Effect index
I Agglomerated regions with a centre > 300.000 inhabitants	I1: Population density > 300 inhabitants/km²	Mean	1.16	0.23
		Stand. dev.	0.82	0.77
		N	36	36
	I2: Population density < 300 inhabitants/km²	Mean	0.05	-0.22
		Stand. dev.	0.88	0.89
		N	20	20
II Urbanised regions with a centre > 150,000 inhabitants	II1: Population density < 300 inhabitants/km² or centre > 300,000 inhabitants and density < 150 inhabitants/km²	Mean	0.24	0.36
		Stand. dev.	0.67	0.84
		N	55	55
	II2: Population density < 150 inhabitants/km²	Mean	-0.10	0.54
		Stand. dev.	0.94	1.80
		N	17	17
III Rural regions with a population density < 100 inhabitants/km²	III1: Centre > 125,000 inhabitants	Mean	-0.54	-0.40
		Stand. dev.	0.61	0.87
		N	39	39
	III2: Centre < 125,000 inhabitants	Mean	-0.94	-0.48
		Stand. dev.	0.70	0.71
		N	35	35
		Total	**202**	**202**

As a first step into the analysis, the mean values of the causal indicators have been listed in table 3.4.3.8 and visualised in figures 3.4.3.1 a to c. The table shows an interesting pattern. Very densely populated agglomerations (type I 1) have the best potential, followed by urbanised regions with higher population densities or bigger centres (type II 1). After the agglomerations with lower density comes the lower category of urban regions (type II 2) and rural regions. Looking at the effect side of performance, it is clear that both types of urbanised region perform relatively better than the agglomerations given the advantages of the latter on the causal side. This seems to be a surprising result that needs further investigation.

Previous results have already suggested (see text to map 3.4.3.3, pages 46–48) that agglomerations at the core of the EU could play a different role to those at the periphery. Agglomerations at the core tend to perform worse in relation to the expectations implied by the causal variables. It would be interesting to investigate this finding further on a regional scale and examine how this pattern is influenced by location at EU level. Therefore, analysis was carried out for the two groups of regions, the core and the periphery. The selection of regions for both of these types was achieved by an intuitive procedure (see map 3.4.3.10, page 55) using existing borders of EU Member States except for in the cases of the UK and Italy where the countries were split into two (for Italy, into South/Sardinia and Central/North, and for the UK, Scotland/Northern Ireland and England/Wales).

The evaluation of the causal and effects variables by core and periphery (see figures 3.4.3.1a, b and c; for data see table 3.4.3.7 and appendix 5 reveals some interesting patterns which are worth noting). Within the investigated part of the EU core, most of the rural regions for both types of centre (>125,000 inhabitants and <125,000 inhabitants) are found in France and Austria. Within the core it is most surprising that the urbanised regions with lower population densities (type II 2) perform best in the relationship between cause and effect.

Taking into account that these regions link the hinterland with the agglomerations and urbanised regions which are mostly found in the EU core, the result is not so surprising as these regions also profit from the causal effects of agglomerations and urbanised regions. This underlines two consequences: relations existing between different types of neighbouring regions and the hypothesis of national clusters. In general, the relationship between the causal and effects variables are less obvious than for the periphery.

At the periphery, the settlement structure of the agglomerations with lower density and the two types of rural region are dominant. This affects the interpretation of the low number of urbanised regions with higher population densities or bigger centres (type II 1) that performed best in the periphery. In overall terms, the urbanised regions do not play a major role at the periphery. Furthermore, in peripheral areas the rural regions performed better than the agglomerations in respect of the causal effects. It is also worth noting that the rural areas perform relatively better in terms of causal-effect relations than the core regions.

3.4.4 Conclusion

The study on competition distinguishes the causal factors and effects of competitiveness taken from theory and previous studies and investigates how these factors are interrelated and present in the regional web. Causal factors which were

considered in the study were productivity, labour costs, sectoral structure, share of young employed, share of R&D employment and expenditure, location in the regional and the European context, accessibility and infrastructural endowment. Effect factors were growth of GDP per capita, employment trends, rates of unemployment, the development of unemployment, population trends, migration and share of over 60-year-olds.

The first finding is that all of the causal factors investigated are more highly correlated than the factors defined as effects of competitiveness. Causal factors follow a strong centre-periphery pattern with the exception of capital regions. The effect factors also follow this trend of centre-periphery but there are many exceptions, especially towards better economic performance at the periphery. Factor analysis with clustering revealed three interesting patterns. The strong interrelation of causal factors was confirmed. The effects are more diverse, and it seems as though the positive effects of competitiveness express themselves in an "either- or" pattern i.e. either there is a strong relationship with developments in the labour market, or the employment ratio, or population development, or growth per capita; or there are some combinations but relationships between these factors tend to be weak. The patterns of causal and effect indices produced by the factor analysis were clustered with the result that a very strong national trend is still visible. One may conclude that national policies and regulations play a decisive role in the performance of regions. An intervening variable could be the deviating growth cycle of national economies, which sustains national patterns at regional level. Recent experience suggests that the achievement of economic and social cohesion between the EU periphery and the central pentagon is possible, sometimes very rapidly. However, this is not achieved as a result of any single process; several factors are essential. These include a transition from government to governance, the ability to establish and maintain competitiveness based on factors associated with comparative advantages, the timely provision and maintenance of infrastructure, the capacity to adapt and reposition within the context of a rapidly changing business environment, and long-term investment in human resource development and social capital.

Figure 3.4.3.1a
Causes and effects indicators by settlement structure (all EU regions)

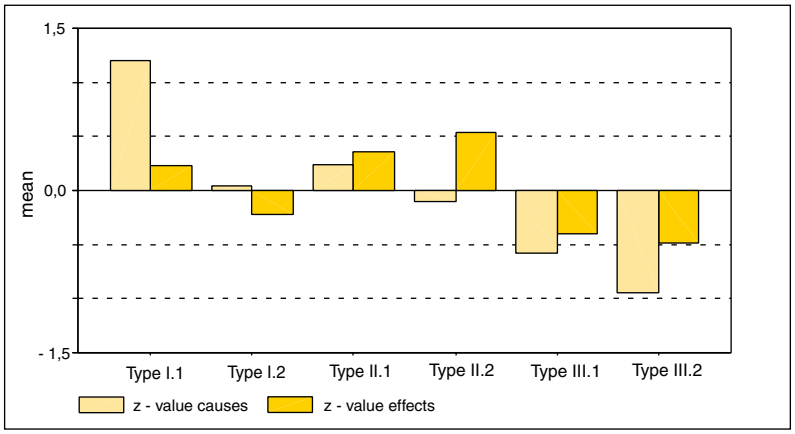


Figure 3.4.3.1b
Causes and effects indicators by settlement structure (core EU regions: AT, BE, DE, DK, FR, IT excluding regions south of Rome and Sardegna, LU, NL, UK excluding Northern Ireland/Scotland)

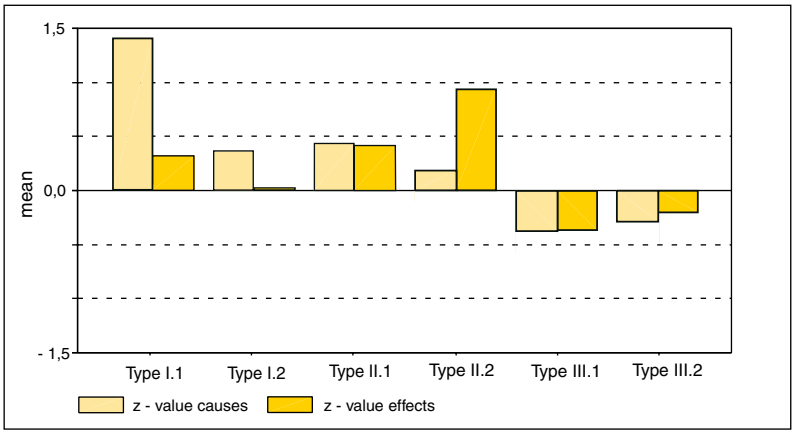
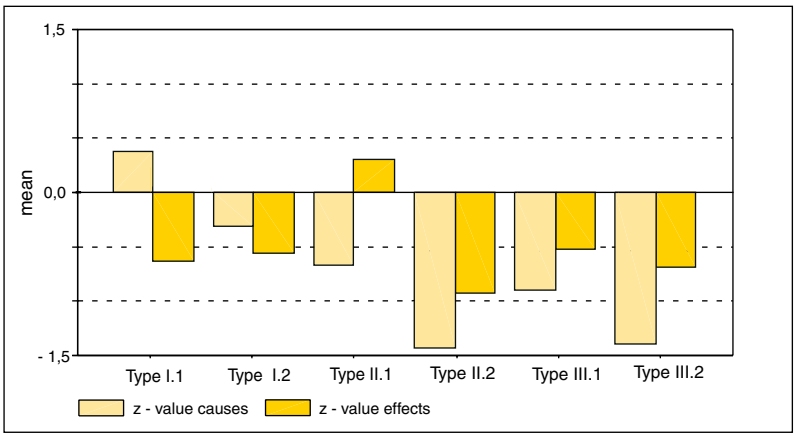


Figure 3.4.3.1c
Causes and effects indicators by settlement structure (peripheral EU regions: ES, FI, GR, IRL, IT regions south of Rome and Sardegna, PT, SE, UK – Northern Ireland/Scotland)



4 Conclusions for policies and further research

(Luxembourg/Ireland)

Amalgamation of the parts of the study

A range of spatial patterns occurs in the European territory which is influenced by some very specific developments in certain regions caused by national and regional conditions and policies. In general (with many exceptions addressed below), all parts of the study confirm the EU wide core-periphery pattern in economic strength which underlies two further sub-patterns detected on the basis of the following working hypothesis: there are factors representing input in terms of the preconditions of economic strength and also factors of output in terms of the effects of economic strength. In relation to the preconditions, polycentric areas in the core perform better in economic terms than agglomerations (particularly those with lower density). At the periphery the lower density agglomerations play a more decisive role in economic development but this is partly a result of the fact that polycentricity in the form of urbanised areas is much less prevalent than at the core of the EU. This latter pattern owes more to the existing settlement structure and population density than to the particular strength of agglomerations.

Just how far the polycentric urbanised areas at the core benefit from agglomerations in terms of draining wages and employment into the surrounding areas with better living conditions is hard to prove at this statistical level.

The rural areas are not necessarily associated with low performance and poor starting conditions. Rural areas with a bigger centre (type III 1) regularly perform better particularly in regions where there are better preconditions in the sectoral structure and in innovation potential. These regions are largely concentrated in the northern part of the EU.

It also became clear that there is a kind of mainstream relationship between the preconditions and inputs for economic development, and the effects and outcome. It is interesting to note that the outcome is less streamlined than the input in terms of the spatial coincidence of different indicators on both sides. The output, usually measured in GDP per capita, was defined in a broad way by considering productivity, participation rates and unemployment which allowed a trade-off between these variables (although the relationship was not precisely modelled). National patterns emerged, particularly on the effect side of economic strength when combining them with the input factors. This result led to the conclusion that policy and institutionally related factors play a determining role in regional economic strength.

Apart from these general results, diverging regions could be identified on both sides i. e. development that was better or worse than the mainstream trend. This was related to a positive or negative combination of locational factors embedded in a specific national context. These findings suggest that it would be worthwhile moving beyond the macro-analytical level through the use of case studies. For example, the Irish case reveals that more than simple factors that are within the reach of policy (such as easy access to the country due to common language). This has to be combined with other appropriate policies, and the trick will be to find the right balance that can address bottlenecks and location-specific potentials to the benefit of spatial development.

Recent experience suggests that the achievement of economic and social cohesion between the EU periphery and the central pentagon is possible, sometimes very rapidly. However, this is not achieved as a result of any single process; several factors are essential. These include a transition from government to governance, the ability to establish and maintain competitiveness based on factors associated with comparative advantages, the timely provision and maintenance of infrastructure, the capacity to adapt and reposition within the context of a rapidly changing business environment, and long-term investment in human resource development and social capital.

… on policies

What conclusions can be drawn for policies? The messages for policy are numerous. Regional and spatial policy should pinpoint the weakest part of the chain within the strongly related causal factors. Spatial development policy must consider all

factors and not concentrate exclusively on single factors such as technology or hard infrastructure. A balanced development of the factors of potential should be envisaged. This applies not only to infrastructure but also to economic structure. Regional policies will always be overshadowed by national trends – with the exception of capital regions it is obviously difficult for the regions to withstand national trends. Strong national trends indicate not only different stages in terms of growth cycles and the overall development level, but also different institutional structures which can hamper or accelerate regional development in comparison with other EU regions. Intra-sectoral productivity differentials are a major source of variation in per capita GDP levels. Convergence among regions will require a shift from low productivity sectors in rural areas and old industrial zones, but a co-ordinated approach is needed in sectoral policies. Similarly, the achievement of policies at different governmental levels can only be attained by employing a spatially co-ordinated approach.

Research on modernisation indicators supports the view that single policies aimed at, for instance, increasing expenditure on R&D in weaker regions, needs to be accompanied by a broader policy framework given the interrelationship between the different causes of modernisation and their effects. In peripheral rural regions in particular, high agricultural employment correlated negatively with all of the other inputs to modernisation except government expenditure on R&D, indicating that this latter variable is not enough on its own to create a modernised economy. To some extent this has been recognised in the most recent programming period. Priorities were refocused from an emphasis on the public sector supply of facilities, to a greater emphasis on building R&D skills alongside the stimulation of demand and promotion of innovation through partnerships. Policies following this direction would promote the development of a polycentric model of spatial development and encourage the spread of economic strength outside of the capital regions.

The positive starting conditions in competitiveness seemed to be strongly overshadowed by national economic policy moves towards growth and by the institutional restrictions in each country. The results support the view that there is a choice in the way in which use is made of the economic potential for employment, growth and/or productivity.

Furthermore, the improvement in regional cohesion and development along a convergence trajectory is most likely to be mediated through the upper levels of the urban system. In this respect, it seems that agglomerations play a stronger role in the periphery whereas polycentric urbanised development dominates the core of Europe. Intraregional differences may deepen so that the strengthening of urban-rural relations is required to counteract these developments. There is a need for support through physical infrastructure and for soft support to facilitate stronger urban-rural links (which need not be territorially constrained) and also for more complex forms of interurban interaction. The links to cohesion and co-ordination issues stressed by the Commission are clear.

In terms of direct links to the policy options of the ESDP, it is particularly important to target the following: spatial integration of sectoral spatial policies; better use of urban-rural relations in urbanised and rural areas; and information exchange on successful institutional arrangements across a broad range of policy fields. Furthermore, the policy options mentioned under the topic of improved accessibility by transport links and of knowledge to support the diffusion of innovation are increasingly important for balanced spatial development. The task of politics in this case lies in the ability to respond to local conditions in an appropriate manner. To achieve this aim it would be useful to learn more about the micro-conditions in the successful and less successful regions identified in this study.

… on further research

The research on this theme has provided a spatial analysis of the economic performance of the EU regions. In investigating the level and dynamics of the regional economies it has sought to identify and give reasons for the spatial differentiation associated with economic strength indicators. While a broad core-periphery divide was evident throughout the research, certain regions were identified as out-performing others in spite of starting from the same baseline potential. Given these findings from a macro point of view, it

would be interesting to conduct **case studies** on those regions focusing on a number of factors, including:

- Institutional frameworks – investigating their structure, the level at which policy decisions are made for the region and who makes them.
- The role of urban-rural relations in determining a region's economic performance. To what extent do overspill effects influence the economic performance of a region, and are urban-rural partnerships a successful mechanism to maximise any benefits?
- An examination of whether regions that have performed less well than expected would benefit from a spatial planning policy that encourages the development of a polycentric model of development. Should this model be based on multiple linkages and nodal points, bearing in mind that the most poorly performing regions are rural areas with a small centre? How feasible would it be to implement such a policy? Research could be linked to the role of urban areas, as distinct from agglomerations, in enhancing economic performance given that they emerged as the most successful regions for the indicators of competitiveness.
- Further investigation of the dimensions of core and periphery in the EU, taking account of population densities. The functions of the system of balance payments between regions needs to be further highlighted in that context.
- Further investigation into the question of territorial rootedness of production and service systems in the context of increasing globalisation and the enlargement of the EU.

It emerged from this study that more data, regularly updated, needs to be provided for the indicators of economic strength. This data should be widely available at a minimum of NUTS 2 level for all indicators and regions. Since much of the information may already be available through research organisations within individual Member States, it could be useful to establish new working networks between Eurostat and data facilitators.

Such an arrangement would enhance further research into economic strength, in particular into the concept of territorial rootedness. Both a model and indicators were outlined for this concept but there was a dearth of available data on a range of indicators including: role of FDI; location of company HQ; IT indicators – ISDN lines, fax lines per 1,000 inhabitants; persistence of enterprise in non-IT branches; share of enterprise with HQ in a particular region; enterprise size in non-IT branches.

Further research should address the questions of choice at regional level concerning labour and/or wealth and/or growth and/or productivity. It would also be useful to investigate the role played by urbanised areas, as these areas are performing better than agglomerations – this topic would also have considerable effects on the spatial development policy of the EU. There needs to be an examination of the improvement in regional cohesion by using the different approaches of polycentric development or a more monocentric oriented growth pole in different spatial contexts and at different productivity levels. Possible interurban, urban-rural and interrural links and their contribution to a more balanced development exploiting the potentials and strengths of different types of region should be looked at using a collaborative approach. The institutional dimension is of special interest in this context.

Macro-level EU-wide regional analysis is limited by the availability of data and the constraints imposed by administrative boundaries used for NUTS classifications. Considerably more in-depth, micro-level analyses of the dynamics of change are required, but these need to be linked to an extended macro-analysis.

Finally, future research on the economic strength of regions will be of greatest value if it continues to be complemented by research on the other themes in this study (i.e. social, cultural, land use and environmental issues). In this way an holistic interpretation of the processes which form regional identity will provide a broader framework for the evaluation of the spatial pattern of individual criteria.

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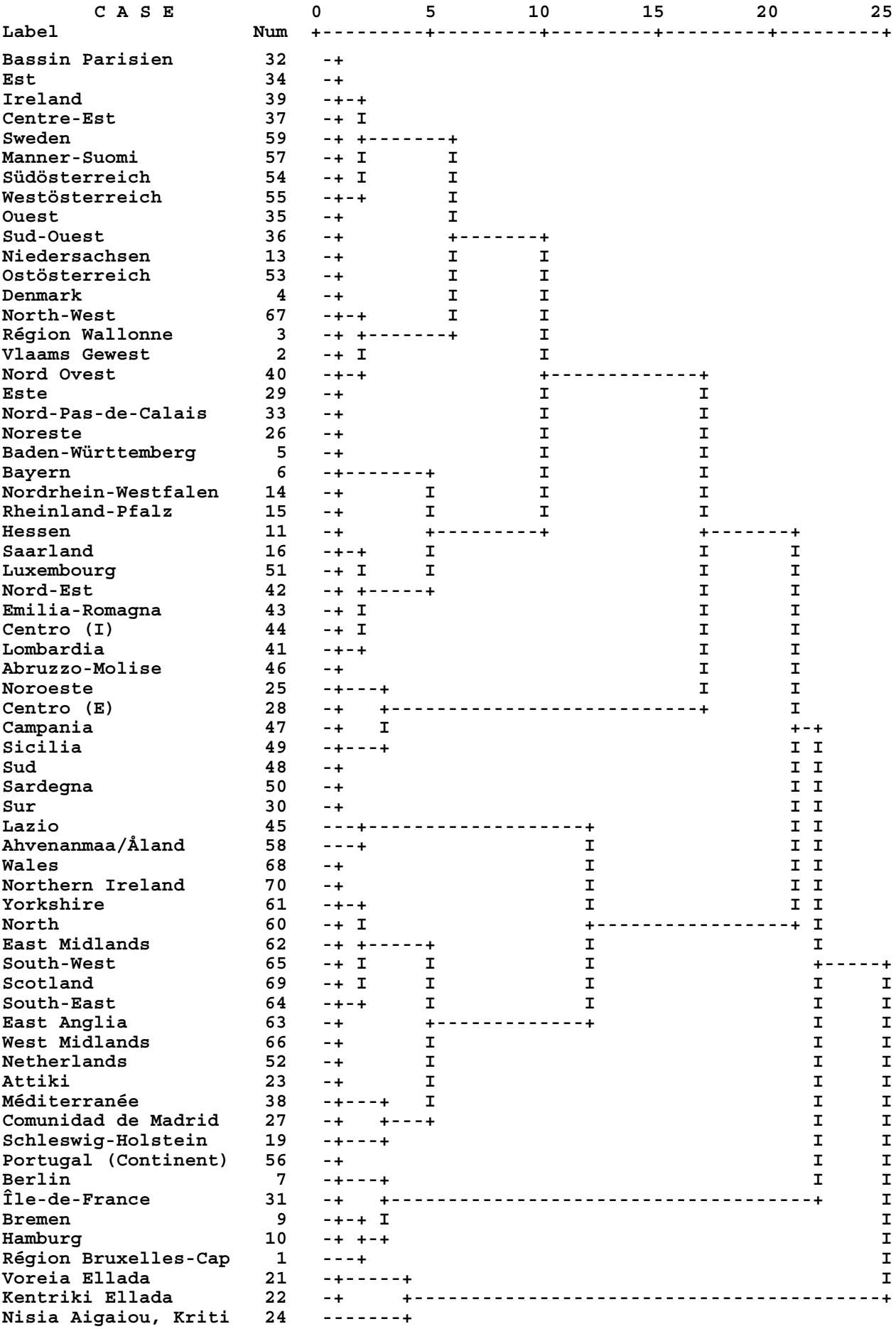
Appendix

Appendix 1
Dendrogram of hierarchical cluster analysis (ward method)



Appendix 2
Correlation matrix: causes

	Employment in agriculture	Employment in services	Third level education	Employment in R&D	Public R&D expenditure	Motorway, km per km²
Employment in agriculture						
Employment in services	**-0.66*** **					
Third level education	**-0.47*** **	**0.59*** **				
Employment in R&D	**-0.53*** **	**0.41*** **	**0.60*** **			
Public R&D expenditure	**-0.45*** **		-0.21*	**-0.32*** **		
Private R&D expenditure	**-0.59*** **	0.20*	**0.40*** **	**0.66*** **	**-0.61*** **	
Motorway, km per km²	**-0.45*** **	**0.39*** **	**0.27** **	**0.37*** **		
Railway lines, km per km²	**-0.32*** **	**0.43*** **	**0.38*** **	**0.31*** **	**0.68*** **	

* significance (1-tailed) at p = 0.05, ** significance at p = 0.01, *** significance at p = 0.005; correlations > 0.30 and < -0.30 are printed in bold

Appendix 3
Correlation matrix: effects

	GDP (PPS) per capita	GVA services	GVA agriculture	Longterm unemployment	Female activity rate	Working population	Patents per 10,000 inhabitants
GVA services	**0.37*** **						
GVA agriculture	**-0.50*** **	**-0.49*** **					
Long-term unemployment	**-0.40** **	0.29**					
Female activity rate	**0.31*** **		**-0.26***	**-0.76*** **			
Working population	**0.31*** **	-0.20*	**-0.18*** **	**0.96*** **			
Patents per 10,000 inhabitants	**0.50*** **		-0.38***	**-0.39*** **	**0.46*** **	**0.41*** **	
Cars per 1,000 inhabitants	**0.41*** **	0.19*	-0.50***				**0.34*** **

* significance (1-tailed) at p = 0.05, ** significance at p = 0.01, *** significance at p = 0.005; correlations > 0.30 and < -0.30 are printed in bold

Appendix 4
Correlation matrix: causes and effects

	Employ-ment in agriculture	Employ-ment in services	Third level education	Employ-ment in R&D	Public R&D expendi-ture	Private R&D expendi-ture	Motorway km per km²	Railway lines, km per km²
GDP (PPS) per capita	**-0.51*** **	**0.42*** **	**0.32*** **	**0.62*** **		**0.38*** **	**0.57*** **	**0.59*** **
GVA services	**-0.40*** **	**0.75*** **	**0.35*** **	**0.24***	0.24*		**0.46*** **	**0.47*** **
GVA agriculture	**0.94*** **	**-0.61*** **	**-0.39*** **	**-0.47*** **	**0.40*** **	**-0.50*** **	**-0.50*** **	**-0.33*** **
Long-term unemploy-ment	0.21*		-0.22*	**-0.37*** **		**-0.42*** **		
Female activitiy rate	**-0.43*** **	0.25*	**0.47*** **	**0.51*** **	-0.27*	**0.54*** **		
Working population	**-0.35** **		**0.37*** **	**0.46*** **	-0.18*	**0.48*** **		
Patents per 10,000 inhabitants	**-0.41*** **	0.25**	**0.46*** **	**0.80*** **	**-0.33*** **	**0.55*** **	0.22*	0.20*
Cars per 1,000 inhabitants	**-0.45*** **	0.21*		0.20*		0.23*		

* significance (1-tailed) at p = 0.05, ** significance at p = 0.01, *** significance at p = 0.005; correlations > 0.30 and < -0.30 are printed in bold

Appendix 5
Mean values for different types of settlement structure

			All EU regions		Core EU regions[1]		Peripheral EU regions[2]	
			Causes index	Effect index	Causes index	Effect index	Causes index	Effect index
I: Agglomerated regions with a centre > 300,000 inhabitants	I1: Population density > 300 inhabitants/km²	Mean	1.20	0.23	1.25	0.28	0.35	-0.59
		Standard deviation	0.79	0.77	0.77	0.76	0.91	0.45
		N	36	36	34	34	2	2
	I2: Population density > 300 inhabitants/km²	Mean	0.05	-0.22	0.32	-0.02	-0.29	-0,52
		Standard deviation	0.88	0.89	0.51	0.99	1.13	0.7
		N	20	20	11	11	9	9
II: Urbanised regions with a centre >150,000 inhabitants	II1: Population density > 300 inhabitants/km² or centre > 300,000 inhabitants and density < 150 inhabitants/km²	Mean	0.24	0.36	0.39	0.37	-0.62	0.28
		Standard deviation	0.67	0.84	0.47	0.84	1	0.88
		N	55	55	47	47	8	8
	II2: Population density > 150 inhabitants/km²	Mean	-0.10	0.54	0.16	0.84	-1.33	-0.86
		Standard deviation	0.94	1.80	0.76	1.76	0.67	1.46
		N	17	17	14	14	3	3
III: Rural regions with a populations density < 100 inhabitants/km²	III1: Centre > 125,000 inhabitants	Mean	-0.58	-0.40	-0.34	-0.33	-0.84	-0.49
		Standard deviation	0.51	0.87	0.31	0.76	0.56	1
		N	39	39	20	20	19	19
	III2: Centre < 125,000 inhabitants	Mean	-0.94	-0.48	-0.26	-0.18	-1.3	-0.64
		Standard deviation	0.70	0.71	0.49	0.61	0.50	0.72
		N	35	35	12	12	23	23
		Total	**202**	**202**	**138**	**138**	**64**	**64**

[1] AT, BE, DE, DK, FR, IT excluding regions south of Rome and Sardinia, LU, NL, UK excluding Northern Ireland and Scotland

[2] ES, FI, GR, IRL, IT regions south of Rome and Sardinia, PT, SE, Northern Ireland and Scotland