

Reaching the Peripheral Regional Growth Centres

Centre-periphery convergence through the Structural Funds' transport infrastructure actions and the evolution of the centre-periphery paradigm

Jörgen Gren

Jörgen Gren works in the European Commission General Directorate for Regional policy and also lectures in European studies and regionalism at the University of Gothenburg and Université de Sorbonne (Paris I). He has published several books and articles on regionalism. The opinions and views expressed in this article are personal and do not necessarily reflect official Commission views. Contact details of the author are: Dr Jörgen Gren (cantab), CEC, DG REGIO, BE-1049 Brussels, Belgium.

Abstract

The centre-periphery concept can be used in a wide variety of ways, not the least to extract funding, as is shown in the Nordic case. More importantly, the centre-periphery concept is at the very heart of most national regional policies and aid schemes as well as being at the heart of the EU's cohesion/convergence efforts undertaken in the framework of the Structural and cohesion funds. It then follows that the goal of virtually all studies concerning the centre-periphery paradigm has been to assess whether there is convergence or divergence in development between the centre and the periphery, and what are the factors associated with the "success" of core regions or the atypical success-stories in peripheral areas. In this context, the importance of transport infrastructure for improving the accessibility and competitiveness of peripheral regions is recognised in the context of the Structural Funds. The long-term structural effort needed to reduce disparities in terms of basic infrastructure, of which transport is a large part, is particularly reflected in the allocation of almost 1/3 of total EU funding to these types of measures (objective 1 areas).

The purpose of this article is to provide a systematic analysis of the contribution and impact on centre-periphery convergence of the Structural Funds transport infrastructure actions, but also to discuss the possible evolution of the centre-periphery paradigm in the light of recent developments in economic development, cohesion and accessibility in European peripheral areas. Indeed, it seems as if infrastructure investments under the Structural Funds have actually been quite successful in reducing the gap between core and periphery. To understand why and how, we have to analyse the emergence of regional growth centres in peripheral areas. The article will argue that these regional growth centres play an increasingly important role in the definition of the centre-periphery concept as well as in challenging the traditional centre-periphery paradigm.

Introduction

Following the reform of Structural Funds in 1988, community support for investment in transport infrastructure increased dramatically, while at the same time assuming the specific aim of stimulating economic development in the lagging peripheral regions of the European Union. This trend was further strengthened in the period 1994-99 and confirmed in the last period 2000-2006.

The purpose of this article is to provide a systematic analysis of the contribution and impact on centre-periphery convergence of the Structural Funds transport infrastructure actions while also to discussing the possible evolution of the centre-periphery paradigm in the light of recent developments in economic development, cohesion and accessibility in the European peripheral areas. The overarching objective is to analyse the emergence of the regional growth centres that play an increasingly important role in the definition of the centre-periphery concept.

The key issues in the article include the following:

- (1) The centre-periphery concept: definition and use at the EU-level.
- (2) Structural funds and the transport infrastructure perspective: what are the strategies in terms of the structural funds interventions in support of improving accessibility and, consequently, economic development (both vital elements in defining peripherality)?
- (3) The emergence of regional growth centres in peripheral areas: Their role and how they pose an indirect challenge to the traditional centre-periphery paradigm.

The conclusions of the article will draw upon the findings of the preceding parts, and will then try to shed new light on the centre-periphery paradigm and the consequences of the emergence of regional growth centres.

Centre-periphery paradigm: Definition of the concept, and uses on the European level

Core-periphery conceptual frameworks i.e. the contrast between an economically disadvantaged and peripheral zone with a wealthy and (relatively) powerful core have been in the frontline of regional policy analysis for several decades, from the 1960s onward. They have also been at the forefront of regional policy decision-making, at least at the European level where, for instance, peripherality is intimately connected with objective status (see Gren 1999).

Peripherality and the European level

The different objective areas as defined supra-nationally are the following (Council Regulation (EC) No 1260/1999 of 21 June 1999):

Objective 1

The regions covered by Objective 1 correspond to NUTS level II and those regions that have a per capita GDP that is less than 75 % of the Community average. They also include the outermost regions of the Union (the French overseas departments, the

Azores, the Canary Islands and Madeira), all of which are below the 75 % threshold, as well as areas eligible under Objective 6 for the period 1995 to 1999 in Austria, Finland and Sweden (defined in population density terms).

Objective 2

The regions covered by Objective 2 include in particular areas undergoing socio-economic change in the industrial and service sectors, declining rural areas with low population density, urban areas in difficulty and depressed areas dependent on fisheries. Objective 1 and 2 together represent some 147 276 Meuro for the period 2000-2006 for all 15 Member States (objective 1: 127 543 Meuro and objective 2: 19 733 Meuro).

As can be seen from the above, part of the new objective 2 (old title: objective 5b) are defined in terms often associated with peripheral regions i.e. low density even if this alone does not suffice for defining the concept. It is also the case that virtually all of the objective 1 areas from 1989 onwards have been, and often still are, highly peripheral even if the criteria for objective status did not, from the outset, take into consideration this factor. This changed when the Nordic governments (Sweden and Finland) successfully persuaded their European partners that their northern-most areas should be considered as objective 1 areas (old title: objective 6) more because of their low population density than because of any, at least relative to the other objective 1 areas, economic disadvantage. It should also be noted that the “outermost areas” (the French overseas departments, the Azores, Madeira and the Canary Islands) are mentioned specifically, both in the Regulation and in the Treaty itself (Article 299(2)). Interestingly enough, the word “peripheral” is not used in the general provision Regulation ((EC) No 1260/1999, of 21 June 1999), mainly in order to avoid any definition problems related to this elusive concept.

When studying the different Single Programming Documents (SPD) or the Community Support Frameworks (the “contracts” signed between the Commission and the Member States on how to spend the funds for the periods 1989-93, 1994-99 or 2000-2006), it is clear that peripheral location is at the top of virtually all SWOT-analyses, and, of course, always contained in the section on weaknesses. This is also the case, in the new period, for instance not only for Finland, Sweden, Portugal, Greece, Scotland, and the Canary Islands but also for certain regions in central France, the French Caribbean Islands etc. In short, even without defining clearly what peripherality is, it is still a potent political concept used in the establishment and implementation of regional policy.

Defining peripherality

For many authors (Naustdalslid 1983, Keeble et al 1988, Spiekermann and Wegener 1996, Copus 1997), peripherality can be defined in geographical terms resulting mainly from the lack of accessibility and/or economic and political importance when compared to the core (however this is defined). The models used to decide the level of peripherality are based mainly on travel-time or economic gravity. This disadvantageous location then spills over into other associated negative factors such as: costs of assembling materials, access to markets, lack of innovation and entrepreneurship, exogenous control of the means of production, concentration of powers to the core, lack of competitiveness etc. All these factors then reinforce each other so that, for instance, the cost of access to markets will prohibit the investment needed to bring accessibility up to standard in a situation of “normal” (market based)

funding possibilities, or the concentration of powers to the core will, in itself, make it less interesting to be active in the periphery (political, social or economic activities).

On the other hand, various studies (e.g. Milne 1997 Krugman 1991, Krugman and Venables 1995) also point to spatial factors – human and social factors, the quality of institutions, governance etc. – in trying to define how a region will become “successful” or how to pinpoint where development will be concentrated. Some of these studies try to challenge the idea of peripherality as a mainly geographical factor but it would seem that in fact they simply underline the geographical problem, inside a given framework, by actually stressing the aspatial factors. The point made here seems however to be valid i.e. that the patterns of centre-periphery are not permanent but are rather reconstructed by economic actors. Indeed, as Naustdalslid has concluded in his study on centre-periphery models: “*There is no such thing as a single centre-periphery theory or concept...*” (Naustdalslid 1983, p. 17).

A number of studies on centre-periphery relations have been undertaken in an attempt to define what periphery actually is or means. Such studies have mostly been based on two types of models: economic potential/gravity models or accessibility/travel time models.

Economic potential/gravity models

The gravity models (see for instance Keeble et al 1988, Gutierrez and Urbano 1996, Copus 1997) that are used are in fact variants of a 1930s model developed by Christaller (1933) on spatial economy. Christaller’s theory is based on a hypothesis about the centralisation of demand and supply of goods and services to central areas. However, the supply and demand for goods and services are not only focused on one central point but is also decentralised, as a certain amount of spillover of the supply and the demand dynamics takes place. This spillover grows thinner the further away from the central area one goes. In between these regions are border-areas where market intensity is low. A region would thus be peripheral or central according to the market intensity and gravity exercised by one central location. Modern gravity models (or the economic potential models mentioned above) assume that the potential for activity in a region is a result of economic mass and proximity to other centres of economic activities. The potential of one region would then be proportional to the volume of economic activities in centres surrounding it and inversely proportional to the distances separating them i.e. the higher the distance the less the potential.

Keeble studied NUTS I and II regions and applied the economic potential model and found that GDP was the best size of activity variable. He also calculated distances between the centres of activity and came up with an accessibility model with a “golden plateau” (or a map of “economic potential isoliners”) reminiscent of the “blue banana” only without its southern tip. This model is not very helpful in bringing about an understanding of what is peripheral however, as virtually all of the non-central areas in Europe are considered peripheral (Italy and Öresund are, for instance, included). The Gutierrez and Urbano model (1996) gives a slightly different view and is based on the accessibility of major centres of economic activity (cities over 300.000 inhabitants, rather than regions) and the impact of Trans-European Transport Networks (TENT). The general pattern from Keeble is repeated but is added to by the conclusion that the greatest increases in accessibility are likely to occur in non-central areas such as Northern UK, Greece, Italy and Spain. This, as we shall see in the next

section, is indeed true, though such analysis does not deliver additional, perhaps more important, impacts.

An additional model, closely related to Keeble is that of Copus (1997) made for the Highlands and Islands European Partnership. Clearly, the model findings replicate to a certain extent the Keeble findings albeit with up-dated economic information. The maps produced – with economic mass as a factor – extend south and north somewhat, making areas such as Berlin, Stockholm and Barcelona less peripheral. This corresponds perfectly to the general development between the 1982 (Keeble) and the 1997 (Copus) models.

This brings us to the coherence of these models. Already a problem at the time of Christaller's theories, the economic potential models are not able to bring about concrete coherence to what would seem to be a regional reality. It is certainly the case that these models rely on homogeneity and insert a certain unitarian structure into the regional concept. However, certain authors do not agree with this concept. Mény (1985), for instance, sees neither the centre, nor the periphery as a homogenous entity but rather sees both as being fragmented. This, as will also be shown below, is certainly the conclusion that can be drawn from the experience of the structural funds.

It should also be noted that these models do not take into consideration, as a general rule (Gutierrez and Urbano do to a certain extent), the all-important, from a regional point of view, peripheral regional growth centres – i.e. smaller non-capital urban areas pulling with them the rest of the regional economy. Indeed this is a recurrent feature in France, Sweden and Finland (in the two latter cases, this would for example include the cities along the Bothnia sea coastline) but also in Portugal and Spain.

Accessibility/travel time models

The second model is perhaps more straightforward though possibly less dynamic as it does not incorporate a weighting system i.e. all measurable factors (cities/regions/population) are treated as equal even if in reality they are not. In any case, this model is based on the cost/time of travel and accessibility factors (e.g. Lutter et al 1992, Spiekerman and Wegener 1996).

Spiekerman and Wegener (1996) used a complex model (rail travel only) to evaluate the effect of Trans-European Transport Networks (TEN-T) on the core-periphery issue in the EU. The model was based on 10-km grids combined with a rail network where travel times were estimated between each pair of grids. The authors concluded that the TEN-T would probably widen the gap between centre and periphery rather than narrowing it. In the older Lutter (1992) report to the Commission on accessibility, the same model, albeit in a simpler version, was used by calculating average multi-modal travel times measuring accessibility between NUTS III regions and almost 200 major cities. This modified model came to similar conclusions to those of the gravity models mentioned above i.e. that the objective status regions are more peripheral and have a lower economic activity than does the centre.

In all, these studies confirm the existence of an intuitive map of Europe in terms of what is centre and what is periphery. Copus (1999) very usefully combined these models in order to find a trend in the centre-periphery paradigm. His findings were that in 1990, regions with above-average levels of GDP and growth were to be found in the centre (the most accessible parts). The low and slow-growing GDP regions

were to be found predominantly in the periphery. He concluded that core-periphery processes (in general) have had a significant impact on the broad macro level of European economy activity. Indeed, the findings of the second cohesion report produced by the Commission (2001) largely confirms this analysis.

Thus follows the question: are core-periphery contrasts weakening as infrastructure investments increase accessibility by bringing people closer to the core, and does this stimulate the development of regional growth centres?

In this context, the importance of transport infrastructure for improving the accessibility and competitiveness of peripheral regions is recognised not only in academic work on this issue but also in the context of the Structural Funds and the European Spatial Development Perspective (see CEC 1999b and 2001). Indeed, the long-term structural effort to reduce disparities in terms of basic infrastructure, part-financed by the funds, is particularly reflected in the allocation of almost 1/3 of total EU funding to these types of measures in the objective 1 areas.

In the analysis to follow, first, the transport strategies and actual level of funding for the countries mostly affected by the centre-periphery phenomenon (cohesion countries) will be surveyed briefly. Second, the actual impacts of the investments in terms of accessibility (reducing peripherality), economic growth and convergence will be analysed in some depth.

Structural funds and the transport infrastructure perspective¹

Infrastructure strategies

All of the main objective 1 countries (Italy, Spain, Portugal, Greece, Ireland)² benefiting from support during the period 1994 – 99 have pursued mixed infrastructure development strategies that combine elements of road, rail, airport, port and urban transport strategies. Structural funding is channelled to transport projects in each county by means of an Operational Programme for Transport (OPT)³.

The less developed and generally peripheral parts of the Union tend to have a less extensive road network than do the other more developed parts. In terms of a basic composite indicator which gives equal weight to surface area and population, the road network in Belgium is over 3 times more extensive than the EU average (according to data for 1994), while in France, the Netherlands, Luxembourg and Denmark, it is over 1½ times more extensive. By contrast, the network is much less extensive in most of the peripheral and/or less developed parts, under 50% of the average in Spain and Greece and only around 75% of the average in Portugal. The main exception to this tendency is Ireland, where the road network is twice as extensive as in the EU generally, given its land area and population, which in part reflects the relatively scattered distribution of settlements

The overall extent of the road network, relative to area and population, does not differ significantly between regions within Member States. Motorways, however, tend to be concentrated in the more central areas with higher levels of economic activity. In France, there are significantly fewer kilometres of motorway in the West and Southwest than over the country as a whole (some 30-40% less). Similarly, in Sweden

and Finland, where the overall provision is well below the Union average and in the Northern region the figures do not exceed 20% of the average.

Overall, the focus of expenditure during the programme period has been towards road infrastructure development, accounting for 64% of actual Operational Programme for Transport spending (1994-99 figures). It should be noted, however, that the balance of spending does vary considerably between countries. For example in Spain road spending accounts for 77% of the total spend, whereas in Italy rail infrastructure accounts for the largest spend, while road infrastructure spending accounts for 84% of the actual OPT. The focus on road infrastructure has been viewed by national administrations as appropriate due to the need to bring the basic level of infrastructure provision closer to EU “norm”.

There is some evidence of a change in strategy emphasis in terms of the types of schemes that are currently demanding priority attention. The initial emphasis was clearly towards primary route or inter-urban schemes forming the backbone of the national networks that either connect urban centres or improve access to remote Objective 1 areas. Two different types of road infrastructure are now becoming more prominent, specifically:

- The secondary road network (for example in Ireland, Italy, and Portugal) that serves as a feeder system to the primary road network.
- Peri-urban road schemes that aim to relieve congestion in major cities (e.g. Lisbon, Dublin).

In Ireland and Portugal this shift of emphasis seems to be synonymous with rapid economic development, reduction in unemployment levels and therefore a new focus on labour supply rather than job creation. In other words, internal dynamics are at play in the peripheral regions, mainly in big cities but also in the regional growth centres.

Indeed there are concerns that the recent high economic growth levels achieved in major economic centres, such as Dublin and Lisbon, could be rapidly compromised by rising congestion. The strategies employed in the 1994-99 Operational Programmes for Transport do contain schemes that aim to address the urban congestion issue, such as the Atiko Metro in Athens and the ring road systems of Lisbon and Porto. This move from purely new infrastructure provision towards the better management of infrastructure represents an interesting trend that has been continued in the new period (2000-2006).

Spending pattern (input from the European level)

The funding for the OPT comes from four sources:

1. The Structural Funds.
2. The Cohesion Fund, established under the Maastricht Treaty, to assist the physical and economic integration of peripheral countries. Qualifying Member States are Greece, Ireland, Portugal and Spain.
3. Loans from the European Investment Bank (EIB).
4. National Funds.

In overall terms, spending on transport infrastructure represented in the period 1994-99 around 1/3 of all objective 1 spending. The figures are similar in the current period (2000-2006) where the overall transport infrastructure spending for the four cohesion countries (E, P, Ire, Gre) is around 27%.

The total Operational Programme for all five countries for the 1994 - 1999 period amounted to 40,6 billion Euro. The contribution from each funding source was as follows:

	(Meuro)
Structural Funds	11010
Cohesion Funds	8370
EIB Loans	7549
National Funds	11065
Other	2632
Total	40625

As can be seen from the chart, national funding makes up approximately 25% of the total. In the case of the structural and cohesion funds, they can contribute up to 75-85% or more of a projects costs depending on the situation.

The allocations to each country were as follows:

	(Meuro) Planned	Euro/Head
Spain	15779	684
Portugal	9284	948
Greece	8354	819
Ireland	4500	1278
Italy	2710	141
Total	40625	508

The highest figure per head is Ireland, while Spain is clearly the highest receiver in absolute terms.

The allocations to each mode were as follows;

	Planned (Meuro)
Road	22726
Rail	9896
Metro	3217
Air	2082
Ports	1795
Other/Mixed Modes	909
Total	40625

As can be seen from the figures, the largest sums are being invested in road networks. This was a clear trend for the period 1994-99 with Spain, Portugal and Greece orienting their transport strategies towards road (around $\frac{3}{4}$ of all OPT spending in Spain, less for the other countries). Italy had a different approach and directed the funding mainly towards rail (around $\frac{4}{5}$ of the OPT resources). What was then the actual impact of this massive input in terms of accessibility and economic impacts, both vital elements in defining peripherality as seen from the models above?

Economic Development Impacts and Accessibility

Some analytical premises

Investment in physical transport infrastructure can affect the economy through two different channels:

1. Through the demand for goods and services in building, operating and maintaining the infrastructure – the demand-side impacts.
2. Through the effects on the competitiveness of the economy of the provision of infrastructure – the supply-side impacts.

Impacts can be both direct and indirect. The direct effect of transport investment is increased employment within the construction sector as output within that sector increases. The demand for materials and machinery increases also. The indirect effects of this are increased spending on goods and services due to increased incomes and prices adjusting to the changes in demand.

The spending of money generates demand side effects within the economy through the purchase of goods and services. This impact is generally substantially larger than the supply side effects, but of course only lasts while the actual expenditure itself continues. The long-term impact of the investment will ultimately be determined by the potential output of the economy. Clearly the direct employment and economic benefits of investment depend on:

- The amount of “new” money invested.
- The labour intensity of the sector in which the investment is made.

- The unemployment rate.

In broad terms, the investment of the Structural Funds in transport projects has been beneficial. The investment made by the European Commission in terms of the Structural Funds clearly represents *additional* investment as far as the recipient countries are concerned. Construction is a rather labour intensive sector of the economy, and therefore investment in transport construction is an effective way of boosting demand side employment effects although only in the short term. In addition, the assisted regions generally have both low employment rates and high unemployment rates, so in theory at least new transport construction should assist in increasing the number of people in work.

The more important long-term effects of infrastructure investment in transport can be expected on the supply side of the economy, improving the efficiency of both the product and labour markets. These can potentially occur through the following mechanisms:

- In the product market, time and money cost savings deriving from improved infrastructure investment generate cost efficiencies for industry. This increases competitiveness and profitability, encouraging growth and investment.
- In the labour market, shorter commuting times and reduced journey costs expand labour catchment areas by encouraging workers to consider jobs at locations more distant from their homes. Firms can therefore draw on labour from wider catchment areas with positive impacts on productive efficiency.
- In terms of accessibility and further closeness to the centre.

With respect to modes of travel, a significant volume of investment has been directed towards inter-urban road and rail projects, and urban public transport projects. These projects are less likely to generate benefits in terms of centre-periphery relations but are crucial to other aspects of the activities in these areas. One example is that the most beneficial form of investment in congested urban areas will surely be public transport projects such as new or rehabilitated metro and tram systems.

These theoretical premises can be tested in quantified terms. The choices here have been to look more closely at GDP/growth and the effects that can be attributed to the transport investments, employment impacts as well as accessibility (defined in terms of time-saving and capacity improvement)⁴.

GDP and growth

GDP has been a key element in the gravity models discussed, it is therefore interesting to note the development of GDP in the most peripheral countries in the EU.

Modelisation of the impact of the CSF and OP have been made for Spain, Portugal and Ireland. The implementation of the CSF (from 1988) has coincided with significant increases in GDP in the assisted areas. For example, between 1992 and 1998 GDP in the Objective 1 regions of Spain increased by between 4% and 5% *per annum*, approximately double the national increase. In Portugal, GDP increased by 23% between 1994 and 1998, of which a little less than 1/5 is estimated to be attributable to the national plan (implemented largely through the structural funds).

Transport infrastructure is a significant part of the CSFs e.g. 25% in the case of Spain, and 13% in the case of Portugal. It then seems reasonable to conclude that these transport investments played their part in the realisation of the increase in GDP/per head in the objective 1 regions. The allocation of CSF funding coincided with a recovery in GDP, so there are strong indications that there is a causal link between the two. This link has been demonstrated in terms of employment figures (as will be shown below) by authors such as Martin and Tyler (2000).

With regard to supply-side effects, the most detailed information available is for Ireland, where a conservative estimate of these effects was an annual benefit of 134.000 Euro per 1 Meuro invested. This would then be equivalent to a very high first year rate of return of 13.4%.

Continuing on the rate of return measurement, it should be noted that the Economic Internal Rates of Return (EIRR) are appealing when attempting to estimate the interest for the project from a societal point of view. EIRR means investments in relation to financial benefits as well as quantified (monetarised) benefits for society in terms of timesavings, jobs, environment etc. This is opposed to the Financial Rate of Return, which basically means the rate of interest that can be expected from one of these projects (mostly in the order of 3-10%).

The EIRR EU averages for infrastructure projects are as follows (As quoted in CEC 1997):

Mode	Average EIRR %	Standard deviation*
Road	18.63	13
Rail	14	8
Metro	15	3
Airports	17	9
Ports	20	4

** Average spread within the data – standard deviation – is included for clarity of the figures.*

In the case of the cohesion countries, these rates fall between 13% and 23%, and are above the EU average in virtually all cases i.e. a payback-period for a major project of 5-7 years (payback periods in purely financial terms are often 15-20 years).

This, in turn, implies that the projects are more important, on the whole, for these areas than similar projects are for the regions in the centre.

If one was measuring the impact on the growth of the cohesion countries, according to the so-called Beutel model (CEC 2000) it could be seen that the structural Funds have increased GDP growth by an average of:

Country (Period)	Percentage increase (GDP growth)
Greece	
1989-93	0.9
1994-99	1.0
Ireland	
1989-93	0.8
1994-99	0.6
Spain	
1989-93	0.3
1994-99	0.5
Portugal	
1989-93	0.9
1994-99	1.0

If we consider forecasts for the 2000-2006 period (Beutel 2002), Community interventions will also make a large contribution to anticipated growth mainly in the cases of Portugal and Greece. In these two countries, the level of GDP (on average) will be respectively 3.5% and 2.2% higher than it would have been without Community grants. The contribution of Community objective 1 interventions is also impressive in Spain where the figure is around 1.1 %.

In all, these examples show that the structural funds have had quite an impact on the economic growth and GDP/per capita in the countries concerned. Indeed, it is clear that without this massive support from Community transfers, none of the regions would experience enough economic dynamism to be able to achieve above European average growth, i.e. to close the development gap and create cohesion. Indeed, in 1986, the year of the accession to the EU of Spain and Portugal, the four Cohesion countries had a combined GDP per head, in PPS terms, of around 65% of the EU average. Over the next 10 years, growth in the four was higher than that in the rest of the Union and by 1996, their GDP per head had risen to approx. 76% of the EU average, an increase of around 10 percentage points over the decade, adjusting for the effect of German unification (CEC 1999b).

Accessibility and timesavings

In all five countries analysed, the transport infrastructure developments were seen as providing major improvements to both internal and external accessibility (an important distinction as will be shown).

Evidence of substantial reductions in travel times are identified as follows:

- In Greece the completion of improvements to the Athens – Thessaloniki – rail route is expected to produce travel time saving in excess of 1 hour.
- In Ireland national primary road measures are estimated to produce annual travel time savings of over £40m (IRE, approx. 51 Meuro).
- In Portugal it has been estimated that new road infrastructures have reduced average travel times by around 20%, and that rail schemes in northern Portugal have reduced freight transit times by over 70%.

- In Spain the conversion of over 1300 kms of single carriageway roads to motorway standard has produced travel time saving of around 20%, while the upgrading of over 2300 kms of single carriageway route have produced travel timesavings of over 10%.

Transport improvements are also seen as bringing important *reliability* benefits – a feature that is not always evident but that can significantly improve the attractiveness of a peripheral area. It should be noted that virtually all of the time savings deal with travel *inside* or between the objective 1 countries themselves.

The funding also meant large capacity improvements. In terms of rail transport, the OPTs financed a doubling of rail-lines in Portugal, Italy and Greece, which in turn increased capacity in this mode by a factor of 3.

The figures for roads are as follows:

Spain	1400 kms of road where capacity was trebled and 2300 kms where capacity was increased by over 70%
Portugal	400 kms where capacity was trebled and some 850kms where capacity was increased by 70% or more
Ireland	1800 kms of new/improved roads
Greece	400 kms of new motorway

As regards ports and airports, the following outputs can be mentioned:

Ports

- 39% increase in freight tonnage (Spain)
- 15% reduction in port costs generally to freight users

Airports

- Tram access to Barajas Airport (Madrid) completed
- >70% increase in air freight/passengers in Spain
- Spata Airport substantially completed in the 1994-99 period
- Air passenger figures were 36% above target in Ireland (1994-99 objectives)

Again, the physical capacity improvement, in most cases except as regards port and, partly, airport projects focus on travel inside or between the countries themselves.

Trade and employment

Acting as a powerful stimulus to growth, trade and exports from the four cohesion countries to the rest of the EU have increased from 11% of their combined GDP to 15% between 1986 and 1996. At the same time, exports of services to other Member States rose from 4½% of GDP to over 5½% in the same period. The rise is quite significant as their GDP increased by one third over the period. In other words, in real terms their exports nearly doubled.

In terms of employment, most models used on the European level estimate additional job-creation at between 800.000 and 1 million jobs in the period 1994-99 (see Martin and Tyler 2000, CEC 2000, 2001).

However, the disparities within Member States still seem to remain as will be shown below. Indeed, there has been very little change in the ranking of particular regions. The « top-ten » order in terms of GDP per head is much the same today as 10-15 years ago i.e. capitals and historically rich regions such as the German urban areas. As GDP per head in regions with a relatively low level has converged on the average, it has therefore done so at a similar rate in regions with similar GDP per head right across the EU.

The development of the peripheral regional growth centres

The examples given above however tell only part of the story. In fact, the impact of such investment in transport to improve accessibility has been translated predominantly into the better development of *regional growth centres* inside the peripheral areas e.g. Porto, Barcelona, Seville, Thessaloniki (or, of course, the capital cities in these countries).

The backdrop to the analysis of peripheral regional growth centres is that the European Union could be described as unipolar i.e. there is only one economically strong central area. Indeed, the growth “pentagon” of Europe roughly stretching across London-Paris-Milano-Munich-Hamburg constitutes the basis for most centre-periphery models as shown above. The figures show quite clearly the economic power of this area:

The central European pentagon in figures (EU15 = 100%, rough estimations made from information contained in the second cohesion report, CEC 2001)

Area	15 %
Population	30 %
GDP	50 %
R&D	75 %

This gives a reasonable idea of the scale of the challenge related to developing new centres of growth i.e. a polycentric development on a macro-level in Europe (see CEC 2001) similar to that in the USA. In what follows below we have a brief analysis, peripheral country by peripheral country, of the ways in which regional growth centres have developed and how they, to a certain extent, converge economically with the centre.

Ireland

Ireland has been more successful than any of the other objective 1 areas, recording by far the highest rate of growth in the EU over the 1990s even during the depth of the recession years. GDP per head, which was only around 61% of the EU average in 1986, increased to over 96% a decade later and is estimated to have exceeded the EU average in 1998. Inward investment and the development of multinational enterprises have driven much of the growth in specific sectors but there are concerns about the extent of linkages into the local economy and spillovers into other sectors. The regional growth areas in Ireland are the urban areas along the eastern and the southern coast and, of course, Dublin. There is a certain concern in the country about the concentration of development to Dublin, which has created severe congestion and economic overheating problems. In short, there is a lack of polycentric development inside the country even where regional growth centres have developed. This situation

constituted the backdrop to the decision to create regions in Ireland and particularly the Border-Midlands-West-region. This is the only region in Ireland benefiting fully from objective 1 status.

Portugal

Portugal, like Ireland, has also achieved growth above the EU average since 1986, though at a more modest rate. Like Ireland also, regional growth centres have been developed, but growth has been unevenly distributed across the country. On joining the EU, Portugal experienced large inflows of foreign investment and a marked increase in exports, both of which stimulated growth. As a result of this, GDP per head increased from 55% of the EU average in 1986 to 70% a decade later. Growth resumed in 1995 and GDP per head for 1999 is estimated at 72% of the EU average. Development has, however, been concentrated in the coastal strip and the two urbanised regions of Lisbon and Norte, for which most of the gap in GDP per head relative to the EU average has been closed. The poorer regions and the interior are also catching up - typically experiencing a rise of some 15 percent in relative GDP per head over the decade 1986 to 1996 - but significant differences remain. The most dramatic being that between Lisbon, where GDP per head was 88% of the EU average in 1996 (around 100% today), and neighbouring Alentejo, where it has remained at around 60-70%.

Spain

Spain has also experienced relatively high growth since 1986, with GDP per head increasing from 70% of the EU average in 1986 to 79% in 1996. Spain is one of the largest Member States in terms of land area, so it seems obvious that the pattern of development should be uneven. Indeed, growth has been high in the prosperous regions of Madrid and Cataluña, which already had a strong economic base, but also in the very poorest regions in the South, where a strengthening of the economy is evident. On the other hand, regions on or near the Northern coast are performing less well. Nevertheless, GDP per head in only one Spanish region - Murcia - is failing to converge towards the EU average. The strongest growth since 1986 has been in Madrid, driven by a strong service sector, and this has spilled over into neighbouring regions. GDP per head in the capital was just above the EU average in 1996, while in Cataluña, it was only slightly below (99%), as with other regions in the north-east Cataluña was able to build upon a strong industrial base and was thus able to attract significant inward investment. Regions in Southern Spain have historically suffered from a weak economic base and are still some of the poorest in the EU. Significant supply-side improvements however seemed to have paid off, and GDP per head in all of these regions is now converging rapidly towards the EU average. Two of the poorest regions, Castilla-la-Mancha (where GDP per head rose from 54% of the EU average in 1986 to 66% in 1996) and Extremadura (where it rose from 44% to 55%), have recorded some of the highest growth rates in Spain. On the other hand, GDP per head in Murcia and Galicia has remained at 63-67% of the EU average. In short, there has been a development of regional growth centres in Spain even if some regions in the country are lagging behind.

Greece

In Greece, the poorest Member State in the Union, growth has been little higher than in the rest of the EU since 1986. Regional disparities in Greece have historically been small. The economy as a whole is still relatively under-developed and most economic activities are isolated to a significant extent from developments in the rest of the EU. However, increasing trade and competition have begun to have differential effects on

regions, with Athens being favoured, in part because of its better access to the rest of EU, as most air and sea traffic passes through it. GDP in the Athens region is forecast to grow by 1 percentage point more than the national average, while prospects for other areas look poor except for some of the islands.

Italy

Although GDP per head in Italy as a whole is just above the EU average, the regions in the South record levels of between 60% and 80% of the EU average. This is comparable to the level in Greece and Portugal and the poorer regions in Spain. There are, however, certain areas that are developing. The Abruzzo or, to a lesser extent, the Molise regions, for instance, have risen out of objective 1 status and are developing faster than the Mezzogiorno south of their borders.

New Länder

The new Länder in Eastern Germany share many of the problems of the other poor regions of the EU, including outdated and inadequate infrastructure and non-competitive firms. At the time of unification in 1991, GDP per head was around a third of the EU average and the new Länder were the poorest regions in the Union. Major investment by the German Government served to increase output per head to around two-thirds of the EU average in 1994. There are clear signs, however, of a growing concentration of investments (not only public ones) to the area in and around Berlin.

The Nordic countries and Scotland

In both Finland and Sweden, GDP declined significantly in the early 1990s. Between 1989 and 1992, the decline in their relative level of income was unprecedented in the modern EU, GDP per head in Finland falling from 105% of the EU average to 87% and in Sweden, from 109% to 97%. Although both countries have made a partial recovery – to just below the EU average in 1998 – the effects are still being felt in the poorer regions in the Northern part of Sweden and in the North and East of Finland. In this sense, there are clear signs of divergence inside the countries in question. Nevertheless, as a study made by Copus, Hanell and Petrie (2000) shows, there are patterns of economic vitality emerging in the Northern periphery including Northern Scotland. This study shows that strong economic activity are concentrated in places such as Kemi, Rovaniemi (Finland), Östersund, Gävle (Sweden) and Inverness (Scotland) yet again confirming the theory on regional growth centre development inside peripheral areas as espoused here.

In order to further clarify the ideas in the above section, it could be useful to list the respective economic strength of different areas in Europe that could serve as models for regional growth poles, some peripheral, some less so. A second tier of regional growth poles, when compared to the pentagon or the centre, could be the following areas (most of them cutting across national borders, Gren 2002):

Region	BNP/capita in 2000 (Index: EU= 100)
Rhône-Alpes – PACA – Languedoc – Roussillon – Catalonia	90-108
South Sweden – Copenhagen area	91-125
West Slovakia – Wien	97-156
Stockholm – Helsinki areas	136-141

These are quite heterogeneous areas but still represent, in economic terms, "second best" when compared to the pentagon or the centre. Other potential areas, possibly labelled the third tier of growth poles, could be the following (also presented in a cross-border manner, Gren 2002):

Region	BNP/capita in 2000 (Index: EU= 100)
Bilbao - Basque countries - Bordeaux - Aquitaine	89-99
Warsaw - Brandenburg - Berlin	50-70-102
West Sweden - Oslo area	92-150
North Swedish coast - Oulu - Finnish Bothnia region	96-97

These lists are of course hypothetical constructions, but they do still highlight a number of interesting potential developments, and also point towards the emergence of possible new regional growth centres that may even cross borders.

Conclusion: Changes in the paradigm

In summary, what do these figures and examples mean? What is argued here is that the initial state of infrastructure in the peripheral areas have improved dramatically, that the structural funds have had an impact on competitiveness and that the upswing in centre-periphery trade patterns is partly due to this funding.

What is further argued is that the time savings are, in fact, enormous and do translate into better accessibility as regards the peripheral regions, or at least to the core(s) of the periphery but also in terms of "*intra-periphery accessibility*". This is however a new concept which needs more research to explore its full consequences but it does seem important and would imply that the structural funds (and other investments in infrastructure) in the periphery have not only had the result of improving the links between peripheral areas and the centre but also of improving the links between the peripheral areas themselves.

What has happened is that regional growth centres have experienced a triple evolution, they have:

1. Enlarged their hinterland through better accessibility;
2. Improved trade possibilities with the centre through higher speed connections;
3. Improved accessibility levels between themselves (e.g. Madrid-Barcelona-France, Porto-Lisbon-Spain, Thessaloniki-Athens, Dublin-Belfast through better connections, North Swedish coast – Oulo – Finnish Bothnia region through the maintenance of ferry lines, etc.).

The regional growth centres also tend to pull with them their respective (close) hinterlands. This is a development that will most probably take place also in the eastern European candidate countries where structural funds⁵ clearly need to be invested in basic infrastructure to create connections between the eastern periphery and the centre, but also inside the periphery itself. This corresponds to a well-known development phenomenon, where more favoured regions – even if they are situated in the periphery - initially experience faster growth than the less favoured ones.

Thus, increasingly, disparities are not *between* but rather *within* Member States. Consequently, catching up in the periphery has meant the development of one or several regional growth centres (see also Gren 2002). The analysis above indicates that these are doing better now than before (as GDP is the activity variable), that they are more accessible as a result of infrastructure investments, that they cooperate with other peripheral regional growth centres and, as a consequence, that they, *together* with their surrounding regions, have become less peripheral.

Does this development of regional growth centres represent a change in the classic paradigm of the centre vs. the rest? The analysis outlined above would seem to confirm this statement. Indeed, drawing the full conclusion of the material it is clearly possible that the regional growth centres can function as forerunners in creating a polycentric situation in the EU, similar to that in the USA. The main difference between the two situations is that, contrary to the centres in the USA, which are independent from one another, the European centres – roughly the second tier of regional growth centres – overlap or connect the growth pentagon in the margins. For example, the development triangle consisting of Lyon, Barcelona and Nice (or, expressed in regions, Rhône-Alpes – PACA – Languedoc – Roussillon – Catalonia) connects with the southern tip of the pentagon. Another example could be the area made up of Bratislava-Vienna and to a certain extent Prague connecting the pentagon in southeastern Germany and Munich. A third example would be Öresund connecting the pentagon at the level of Hamburg and northern Germany. The not yet fully studied concept of intra-periphery accessibility would also seem to add force to this conclusion.

It is clear that further analysis is needed to explore the extent to which the EU is moving towards a polycentric situation but in my view it is possible to conclude that regional growth centres have developed strongly in the European periphery, in part due to the structural funds, and that this has challenged the traditional paradigm through making the traditional periphery less... peripheral.

Notes

¹ The information contained in this section is mainly original research based on European Commission (CEC) sources. The principal sources are: CEC, *Evaluation of transport infrastructure*, DG REGIO, 2000, CEC, *Ex-post transport project evaluation for the cohesion fund* (SPEA consortium for DG REGIO, internal CEC document) and CEC, *Mid-term evaluation of TEN-T*, DG TREN. Community Support frameworks for the countries in question have been used as well as ex-ante and ex-post evaluations of Cohesion fund projects, Mid-Term or Ex-ante evaluation reports for objective 1 regions or DG REGIO ad-hoc appraisals of the Structural funds programmes (2000-2006).

² All Member States except Denmark and Luxemburg have objective 1 regions but they spend only very small sums on transport infrastructure meaning that the effects of the structural funds are minimal in this area.

³ A CSF is partitioned into Operational Programmes, often sectorally i.e. transport, SME, R&D etc...

⁴ It should also be noted that investment in transport alone does not necessarily lead to a significant narrowing of regional development. For this to be the case, complementary action has been taken to ensure that disadvantaged regions are in a position to *profit from the opportunities* created by improvements in transport.

⁵ The final format of EU regional policy will be decided in 2004-2005.

Selected Bibliography

Berger, S.& Tryselius, K. (2000), *De perifera regionernas roll i de nordiska ländernas IT-strategier*, Nordregio.

Beutel, J. (2002), *The economic impact of objective 1 interventions for the period 2000 – 2006*, final report to DG REGIO, May.

CEC (1997), *Guide de l'analyse des coûts et avantages des grands projets*, DG REGIO, June, Série: Evaluation et documents n° 3

CEC (COM (97) 243) "Action plan on Intermodality".

CEC (COM (98) 806) "Cohesion and Transport".

CEC (1999), *Sixth Periodic Report on the Social and Economic Situation and Development of Regions in the European Union*, DG REGIO.

CEC (1999b), *Report on European Spatial Development Perspective: towards a balanced and sustainable development of the territory of the EU*, DG REGIO.

CEC (1999c), Mid-term evaluation of TEN-T, DG TREN, report prepared by NERA, Kampsax, BPM, TIFSA and Uniconsult, April.

CEC (1999d) *Ex-post transport project evaluation* (SPEA consortium for DG REGIO, internal CEC document.

CEC (2000), *Evaluation of transport infrastructure*, prepared by Oscar Faber for DG REGIO.

CEC (2001), *Unity, solidarity and diversity for Europe its people and its territory, Second report on economic and social cohesion*, DG REGIO.

Christaller, W. (1933), *Die zentralen Orten in Suddeutschland*, München.

Copus, A. (1997), *A new peripherality index for European regions*, Report prepared for the H&I European partnership, Aberdeen, September.

Copus, A. (1999), "Peripherality and peripherality indicators", *North*, N° 1, April.

Copus, A., Hanell, T., Petrie, S. (2000), Mapping patterns of economic vitality in the Northern periphery area, Nordregio/SAC.

Council Regulation (EC) No 1260/1999 of 21 June 1999 laying down general provisions on the Structural Funds.

CSF, Italy objective 1, 1994-99 and 2000-2006

CSF, Greece, 1994-99 and 2000-2006

CSF, Spain objective 1, 1994-99 and 2000-2006

CSF, Portugal, 1994-99 and 2000-2006

CSF Ireland, 1994-99 and 2000-2006

Dabinett, G. (2000), "Mainstreaming the IS in regional management strategies", paper presented at the RSA conference, Aix-en-Provence, September.

Fayman, S., Metge, P., Spiekermann, K., Wegener, M., Flowerdew, T. & Williams, I. (1995), "The regional impact of the channel tunnel: qualitative and quantitative analysis", *European planning studies*, 3.

Gren, J. (1994), "EG:s Regionalpolitik", in Nisser, C., *Europapraktika*, Stockholm.

Gren, J. (1999) *The New Regionalism in the EU: lessons learned from Catalonia, Rhône-Alpes and West Sweden*, Östersund, SIR.

Gren, J. (2000) "Evaluation of the Impact of Structural and Cohesion Funds on Transport Infrastructures (Ireland, Italy, Spain, Portugal and Greece)", paper presented at the RSA conference, Aix-en-Provence, September, 2000.

Gren, J. (2002), *Den Perfekta Regionen*, Lund.

Gutierrez, J., Urbano, P. (1996), "Accessibility in the EU: the impact of the trans-European road network", *Journal of transport geography*, 4.

Hansen, J-C., Naustdalslid, J., Sewel, J. (1983), *Centre-periphery theory: theory and practice*.

Inforegio news, June 1999, N° 65

Keeble, D., Offord, J. & Walker, S. (1988), *Core periphery disparities in a Community of twelve Member States*, report for the CEC.

Krugman, P. (1991), "Increasing returns and economic geography", *Journal of political economy*, 99.

Krugman, P., Venables, A. (1995), "Globalisation and the inequality of nations", *Quarterly Journal of economics*, 110.

Lutter et al.,(1992), *Accessibility and peripherality of Community regions*, CEC, Brussels.

Martin, R. & Tyler, P. (2000), "Regional employment evolutions in the EU: empirics and policy implications", paper presented at the RSA conference, Aix-en-Provence, September 2000.

Mény, Y. & Wright, V. (1985), *Centre-Periphery relations in Western Europe*, London.

Milne, D. (1997), "Placeless power: constitutionalism confronts peripherality", *North*, n° 3, 4 November 1997.

Naustdalslid, J. (1983) "Centre-periphery models and theories" in Hansen, J-C.

Naustdalslid, J., Sewel, J. *Centre-periphery theory: theory and practice*, 1983.

Spiekermann, K., Wegener, M. (1996), "TEN and unequal accessibility in Europe", *EUREG* 4.