ISLANDS AND SMALL STATES INSTITUTE

Occasional Papers on Islands and Small States

THE PERIPHERALITY OF EU REGIONS: A QUANTITATIVE EVALUATION BASED ON ECONOMIC CONCEPTS

Nadia Farrugia*

No.6/2006

ISSN 1024-6282

Introduction

Economics is the study of how scarce resources, including human, physical and technological capital, are allocated between competing uses towards the production of goods and services. This typically involves an assessment of supply capabilities and demand patterns, with prices acting as a signal for resources to move into the most productive and socially desirable applications. Cases of market failure where prices do not effectively perform these functions are notorious, arising out of the existence of external effects and the presence of market imperfections, which may result in an inefficient allocation of resources and an inequitable distribution of income. These instances underpin the economic justification for government intervention in the economy aimed at improving the allocation of resources towards improving social welfare.

Peripherality is a concept that emanates from spatial analysis, broadly relating to differences in outcomes, predominantly of a social nature between one or more central spaces and outlying spaces. Studies of peripherality issues typically emphasise the disadvantages which peripheral regions face relative to the core or cores.

From an economic perspective, peripherality may be considered as an instance of market failure where the process of resource allocation does not take place in a uniform manner across different spaces, thereby resulting in differences in economic outcomes between spaces, which would be economically suboptimal. Economic peripherality may thus be considered as an outcome of various spatial factors which lead to differences in economic performance among different spaces. To the extent that such differences are suboptimal, they would justify a role for policy intervention.

This paper presents an attempt at quantitatively assessing the concept of economic peripherality with respect to regions within the EU. Towards this end, the concept of peripherality in the literature is first assessed, followed by a theoretical exposition of the concept of peripherality from the perspective of economic science. Attempts towards measuring economic peripheralty are subsequently presented.

Peripherality in the Literature

The concept of peripherality and its associated disadvantages has been treated extensively in the literature. Spiekermann et al. (2001) state that the elements of conventional (spatial) concepts of peripheral disadvantage can be of three types: associated, contingent and causal. Associated elements include sparsity of population, dependence on primary industries, poor local and interregional infrastructure; contingent elements include high cost of service provision, weak influence on governance, low rates of innovation/entrepreneurship, poor developed R&D sector; and, causal elements include transport and travel costs and weak and agglomerate disadvantages. White et al. (2000)

identify five factors, which they claim are essential in identifying, measuring and responding to the problems of peripheral regions, which are peripherality to: main transport networks; main urban centres; political decision making; economic opportunities; and social opportunities and social inclusion.

"Peripherality is also associated with relative accessibility or inaccessibility to economic activity" (Keeble, 1988). A peripheral region is defined as a region with low accessibility. Accessibility determines the locational advantage or disadvantage of an area relative to all other areas considered. A lack of accessibility, on the other hand, often coincides with problems relating to economic performance and with problems of population loss through out-migration (Spiekermann and Neubauer, 2002).

In the European Spatial Development Perspective (ESDP document), improvements in accessibility are given a high priority as a policy target: "Good accessibility of European regions improves not only their competitive position but also the competitiveness of Europe as a whole." (ESDP 1999, 69) "The creation of several dynamic zones of global economic integration, well distributed throughout the EU territory and comprising a network of internationally accessible metropolitan regions and their linked hinterland (towns, cities and rural areas of varying sizes), will play a key role in improving spatial balance in Europe" (ESDP, 1999, 20). However, it is admitted that "it is not possible to achieve the same degree of accessibility between all regions of the EU" (ESDP, 1999, 36).

Peripherality is also an important concept in islands and small states studies, where it has been analysed that it partly contributes to the vulnerability of small states (Briguglio, 1997). Vulnerability is often associated with small island developing states because they tend to be very exposed to factors outside their control, and the impact of external shocks tends to be relatively greater on these states. It is argued that peripherality is associated with vulnerability as it gives rises to high transport costs and marginalization from the commercial centres of the world and therefore exacerbates the problems of being highly dependent on international trade in goods and services. Briguglio (1997) states that peripherality gives rise to: high per unit transport costs, due to limited transport options and the fact that a small economy tends to require relatively small and fragmented cargoes; marginalization, as the small size of SIDS usually implies that they are often excluded from major sea and air transport routes; uncertainties of supply, in the form of time delays and unreliability in transport services; and high levels of stocks, as when transport is infrequent and/or irregular, enterprises in islands find it difficult to meet sudden changes in demand, unless they keep large stocks, implying additional cost of production, associated with tied-up capital, rent of warehousing and wages of storekeepers. It is argued that these disadvantages are more intense for islands that are archipelagic and dispersed over a wide area.

The identification of peripheral regions, whose accessibility and transport infrastructure systems are to be improved, is becoming of great political importance (Schurmann and Talaat, 2000). This is underlined by the European Commission's Cohesion Report

(1997) which emphasises that “regions should ensure that policy success is measurable, that results are regularly monitored, and that the public and political authorities are regularly informed of progress”. For measuring and monitoring the success of policies, the development of an easy-to-use peripherality indicator is indispensable (Shurmann and Talaat, 2000).

However, since there are numerous definitions and concepts of accessibility and peripherality, there consequently are several ways to develop and implement methodologies for an empirical assessment of it. A general definition is that "accessibility indicators describe the location of an area with respect to opportunities, activities or assets existing in other areas and in the area itself, where 'area' may be a region, a city or a corridor" (Wegener et al., 2002). They measure the benefits that accrue to households and firms in a given area in respect of the existence and use of the transport infrastructure and the available transport services relevant to that area.

Accessibility indictors can be classified by their specification of the destination and the impedance functions (Schürmann et al., 1997, Wegener et al, 2002). Accessibility indicators can be used to analyse peripherality in several ways: regions can be classified into central and peripheral regions, impacts of different policy measures such as transport investments can be evaluated, or impacts of accessibility on regional development can be analysed. Fundamentally, a peripherality indicator can be interpreted as an inverse function of accessibility, i.e. the higher the accessibility, the less peripheral a region is located and vice versa. The most common accessibility indicators are travel cost indicators, daily accessibility indicators and potential accessibility indicators.

Travel cost indicators measure the accumulated or average travel cost to a pre-defined set of destinations, for instance, the average travel time to all cities with more than 500,000 inhabitants. In its simplest form the indicator measures the travel cost to one destination only. For measures of peripherality based on travel cost indicators, see Lutter et al., 1993; Eckey and Horn, 1992; Lutter et al., 1992, Gutiérrez and Urbano, 1996; Chatelus and Ulied, 1995; and, INRETS, 1997.

Daily accessibility is based on the notion of a fixed budget for travel in which a destination has to be reached to be of interest. The indicator is derived from the example of a business traveller who wishes to travel to a certain place in order to conduct business there and who wants to be back home in the evening (Törnqvist, 1970). For studies of peripherality using the concept of daily accessibility, see Cederlund et al., 1991;Lutter et al., 1993; Chatelus and Ulied, 1995.

Potential accessibility is based on the assumption that the attraction of a destination increases with size and declines with distance, travel time or cost. Destination size is usually represented by population or economic indicators such as GDP or income. Shurmann, C, Talaat A. (2000) calculated an index of peripherality of the ‘potential’type (sometimes also called ‘gravity-model’ type). The purpose of this study is to undertake, for the fifteen member states of the European Union and the twelve candidate countries. The economic potential of a country or region is the total of destinations in all regions

weighted by a function of distance from the origin region. In effect, it is assumed that the potential for economic activity at any location is a function both of its proximity to other economic centres and of its economic size or 'mass'. The analogy with the law of gravity is explicit in that the influence of each economic centre on any other centre is assumed to be proportional to its volume of economic activity and inversely proportional to a function of the distance between them. The economic potential of a given location is found by summing the influence on it of all other centres in the system. Keeble et al. (1982; 1988) analysed the centrality of economic centres in Europe using a gravity potential with regional GDP as destination activity and identified the areas between London and northern Italy and between Paris and Berlin, as two central areas of high accessibility.

The different accessibility types all have advantages and disadvantages. Travel time indicators and daily accessibility indicators are easy to understand and to communicate, though they lack a theoretical foundation. Potential accessibility is founded on sound behavioural principles but contains parameters that need to be calibrated while their values cannot be expressed in familiar units (Spiekermann and Neubauer, 2002). From the above three basic accessibility indicators, an almost unlimited variety of derivative indicators can be developed (cf. Ruppert, 1975). The most important ones are multimodal, intermodal and interoperable accessibility. For examples of accessibility indicators calculated for the EU territory, see Wegener et al. (2000).

This paper attempts to build on the approach adopted by Shurmann and Talaat (2000) to construct an index of peripherality which is simpler in nature and which uses latest available economic data. There from, the paper derives some conclusions regarding the relationships between peripherality and economic development.

Economic Peripherality

From a conceptual perspective, resources should be allocated in a manner such that equality in their productivity is achieved. This equality should apply across resources, across applications and by consequence, across spaces. The proof of this is conceptually simple. If there are differences in productivity levels, resources should be shifted away from less productive to more productive applications, until an optimal equality is achieved. Within a market context, this could take place through a process which can be likened to osmosis, with the higher rewards offered by the more productive sectors automatically attracting resources towards them.

It can however be contemplated that spatial factors could inhibit this process from taking place among different regions, thus leading to economic peripherality. Chief among these is the lack of mobility of factors of production. Resources may be irrevocably linked to a space, as in the case of natural resources within the land or other environmental dimensions. Resources may be immobile for other reasons, including geographical distances from markets, lack of transport means, insufficiently attractive production frameworks and a lack of information about potential productive uses in different spaces.

In the case of human capital, there could be cultural factors that inhibit an optimal flow of resources across spaces in search of more productive uses. Insufficient mobility of resources between regions can also be occasioned by inadequate government policies which adversely impinge on economic performance.

Similarly, there may be spatial constraints which inhibit the mobility of products and services. This may lead space to constrain their production, as it would be difficult for them to export, or to be deprived of access to products and services. Both these conditions would lead to economic underdevelopment and hence to a suboptimal allocation of resources due to economic peripherality.

On the basis of the foregoing discussion, one may be tempted to conclude that there are two kinds of peripherality, one that its attributable to natural causes, primarily tied to the location of natural resources, and another that is due to artificial causes, emanating out of insufficient human effort at enabling resource mobility. It is however to be pointed out that the phenomenon of "natural" peripherality is not applicable to the modern economy. While the location of natural resources would attract economic activity associated with their exploitation, the eventual adding of value to such resources until their delivery on the markets would attract activity away from the location of the natural resource to spaces that are more competitive in the processing and marketing of final products.

This said, it is however recognised that geographical location and conditions may impinge upon economic peripherality. Although these may be overcome through technological means, there would be additional costs involved in this process, which would lead to a loss of economic competitiveness. Such geographical issues may thus lead to a non-level playing field in markets, implying constraints to the mobility of resources and products.

The study of economic peripherality may thus be viewed to entail two dimensions. The first is the establishment of the extent of the phenomenon for any particular region. The second is the determination of the causes behind the phenomenon, leading to policy implications towards a better allocation of resources to overcome the problems of peripherality. From an analytical viewpoint, the establishment of the extent of the phenomenon would ideally be restricted to aspects that are inherent to a region and that would potentially lead to economic peripherality. Thus, artificial elements which would exacerbate or attenuate economic peripherality would be excluded from this phase of the study. These would be considered in detail at the second stage of the analysis, which focuses on policy approaches towards reducing the adverse effects of economic peripherality.

On the basis of the foregoing discussion, the concept of economic peripherality of a region is here defined to encompass the inherent spatial features of a region that would lead it to economic underperformance relative to other regions.

The Measurement of Economic Peripherality

The objective of this paper is to focus on the first of these two dimensions, namely the derivation of objective measures of peripherality of regions, with respect to the 247 regions within the EU. In practice, such an exercise meets a number of problems. Firstly, there is the difficulty of identifying differences in economic performance that are attributable to spatial issues, because such differences between regions may be due to a plethora of factors aside from spatial issues. Secondly, there is the issue of identifying core or cores of economic activity, relative to which the extent of peripherality of regions may be determined.

In practice, however, no one single region may be described as a core, because its economic activity would be still dependent upon trade and business relations with other regions. It is thus important to view a region to be itself both to some extent a core as well as periphery, with the measurement of the concept of economic peripherality being dependent upon which of these two effects in practice dominates for any particular region.

It should however be considered that the economic achievements of a region per se are indicative of its economic peripherality, as the latter is an indication of underperformance due to spatial factors. In other words, a good economic performance for a region is indicative of the fact that the particular region is more in the nature of a core rather than a periphery.

In order to encompass these considerations, an index of economic peripherality is here proposed that considers, for any region, the number of regions within the EU that exhibit a better economic performance and the geographical distances from such regions. This would be indicative of the extent to which economic peripherality is impinging upon a region and the extent to which spatial factors may be constraining any region from catching up, in economic terms, with more advanced ones. In practice, the economic peripherality for a region is derived by summing the distances from that region to economically more advanced regions within the EU.

It is important to note that the measure of peripherality for a region does not include an indication of the economic importance of that region. This is in contrast with the gravity model as proposed by Schurman and Talaat (2000) and reflects the fact that if peripherality is in itself a function of economic performance, then the testing of hypotheses concerning the relationship between economic performance and peripherality would be significantly biased.

For the purposes of this analysis, data is used from the Eurostat publication on regional statistics for 2006 (Eurostat, 2006). The data set used relates to 247 EU regions at NUTS 2 level, generally defined as having a population between 800,000 and 1.5 million persons (it should be noted that 8 EU Member States correspond to a region at NUTS2

level, these being Cyprus, Denmark, Estonia, Latvia, Lithuania, Luxembourg, Malta and Slovenia). The regions of Guadelope, Guyane, Martinique and Reunion, being altogether sui generic are excluded from this study. Table 1 below details the number of NUTS 2 regions for each of the 25 EU Member States, as considered in this study.

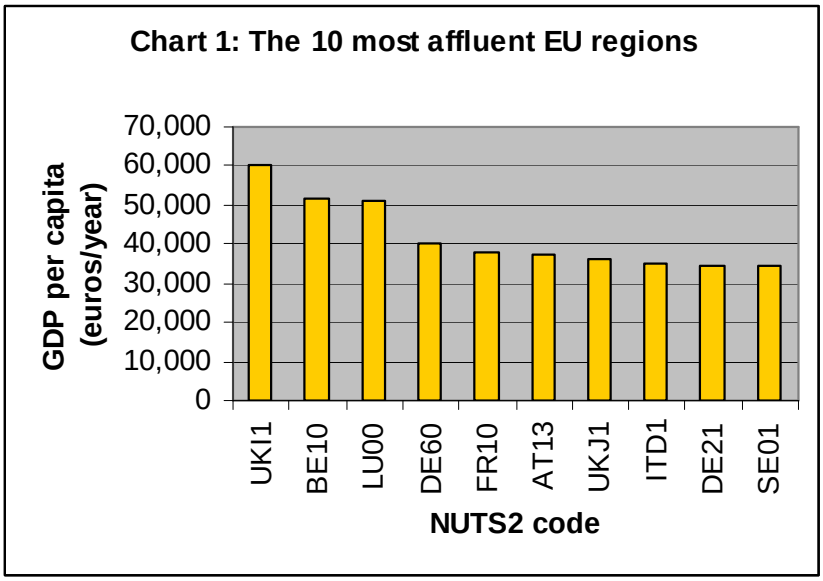
Table 1: NUTS 2 Regions in EU Member States

Belgium	11
Czech Republic	8
Denmark	1
Germany	41
Greece	13
Spain	19
France	22
Ireland	2
Italy	21
Estonia	1
Cyprus	1
Luxembourg	1
Latvia	1
Lithuania	1
Hungary	7
Malta	1
Netherlands	12
Austria	9
Poland	16
Portugal	7
Slovenia	1
Slovakia	4
Finland	5
Sweden	8
United Kingdom	37
EU 25	250

Source: Eurostat (2006)

The peripherality index for each of these regions is derived on the basis of the average distance of each of these regions from the most effluent regions in the EU, as measured by per capita annual GDP levels for 2004. Chart 1 below shows the 10 most affluent regions in the EU in terms of the per capita GDP. It is noted that the first three regions, namely London, Brussels and Luxembourg, have significantly higher per capita GDP levels compared to the rest of the most affluent regions, whose per capita annual GDP averages 33,615 euros with a coefficient of variation of 5.4%. Furthermore, it is noted that the second and third regions, namely Brussels and Luxembourg, a very similar not only in terms of per capita annual GDP, which stands at around 51,000 euros, but also in terms of geographical location, the distance between them being less than 200km. For these reasons, this study considers the core as being made up of the regions of London and Brussels, which are roughly 300km apart. It is also interesting to note that the top

five regions in terms of per capita GDP in the EU encompass an quadrilateral area whose vertices are London, Luxembourg, Berlin and Paris and at the centre of which is Brussels. This area is roughly 2% that of the size of the entire EU.



Source: Eurostat (2006)

Peripherality is thus measured as the average distance of each region for the two most affluent regions in the EU, namely London and Brussels. These average distances are subsequently standardised in a manner that the region with the smallest distance from the core are given a value of zero while those further away from the core are given a value of 1. The peripherality index results, ranked by the value of the results are given in Table 2.

Table 2 indicates that, in view of the method of the construction of the index, the least peripheral regions are in Belgium, Netherlands and the United Kingdom. The most peripheral regions tend to be in the Mediterranean sea, namely in Cyprus, Greece and Malta. The Table also indicates that regions within countries tend to have relatively high dispersions in their peripherality, especially in the case of France, Italy and Spain.

It is of course recognised that distance from a presumed core is an imperfect and indeed incomplete indicator of peripherality. Other considerations could be included in the computation of the index, including insularity and topographical characteristics of regions. It is however proposed that the consideration of such issues would require subjective approaches for the numerical incorporation of these characteristics into the index. Distance, on the other hand, is an indicator which can be objectively assessed. A further consideration in this regard is the fact that other peripherality characteristics maybe strongly positively correlated with distance from the core, as appears to be in the case of insularity.

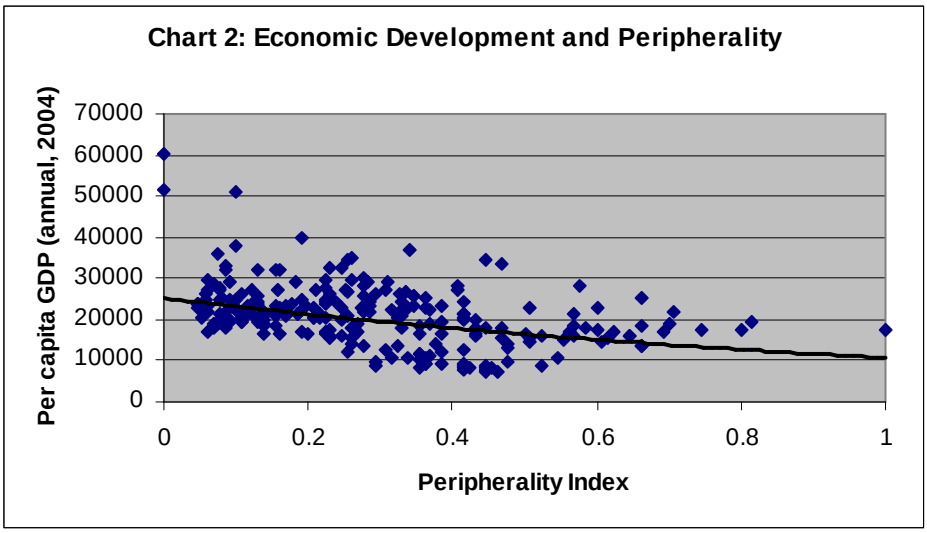
Table 2: Peripherality of EU Regions (ranked by value of Peripherality Index)

Region	Periph. Index	Region	Periph. Index	Region	Periph. Index	Region	Periph. Index	Region	Periph. Index
UKI1	0.00	DEC0	0.12	ITC2	0.22	ES13	0.32	PL12	0.43
BE10	0.00	UKD2	0.12	AT34	0.22	CZ06	0.32	SE01	0.45
BE25	0.05	UKD3	0.12	DE27	0.22	ES21	0.33	ITF2	0.45
BE23	0.05	NL13	0.12	UKM2	0.22	SE0A	0.33	HU33	0.45
BE31	0.05	NL11	0.13	FR71	0.22	AT22	0.33	SK04	0.45
UKI2	0.05	UKL2	0.13	UKN0	0.22	AT12	0.33	PL34	0.45
UKJ4	0.05	UKE2	0.13	DEE2	0.22	ES12	0.33	PL32	0.45
BE24	0.06	UKE4	0.13	DEE3	0.22	ES22	0.34	HU32	0.45
NL34	0.06	DE94	0.13	IE02	0.23	SE09	0.34	PL31	0.46
BE21	0.06	FR41	0.13	DK00	0.23	PL41	0.34	FI20	0.47
UKJ2	0.06	DEA3	0.13	DED3	0.23	AT13	0.34	ES62	0.47
UKH1	0.06	DEB1	0.14	DED1	0.23	ITE1	0.35	ITF3	0.47
UKH3	0.06	DEB3	0.14	DEE1	0.23	ES51	0.35	ES43	0.48
BE32	0.06	FR24	0.14	DE23	0.24	ES23	0.35	PT16	0.48
UKH2	0.07	DEA5	0.14	UKM1	0.25	AT11	0.35	LT00	0.48
FR30	0.07	UKD4	0.14	DE22	0.25	SI00	0.35	ITF5	0.50
BE35	0.07	UKD1	0.14	IE01	0.25	CZ07	0.35	SE07	0.51
UKJ1	0.07	UKK4	0.14	DE80	0.25	CZ08	0.35	ITF4	0.51
NL33	0.08	UKD5	0.14	AT33	0.25	PL63	0.35	PT18	0.51
NL41	0.08	UKL1	0.14	DE21	0.25	PL52	0.35	ES61	0.52
UKJ3	0.08	DE71	0.15	ITC1	0.25	SK01	0.36	LV00	0.52
BE22	0.08	FR42	0.15	DE30	0.25	ES24	0.36	EE00	0.55
FR22	0.08	DEA4	0.15	CZ04	0.25	SK02	0.36	ITF6	0.55
UKF2	0.08	DE72	0.15	ITD1	0.26	PL11	0.36	PT15	0.56
NL31	0.08	FR26	0.15	ITC4	0.26	PL61	0.36	FI19	0.57
NL32	0.08	UKC1	0.15	UKM4	0.26	ITE2	0.37	ES63	0.57
FR23	0.08	DE12	0.16	DED2	0.26	FR83	0.37	ITG1	0.57
BE33	0.08	DE50	0.16	DE41	0.26	PL22	0.37	FI18	0.58
BE34	0.08	DE73	0.16	CZ02	0.26	HU22	0.38	ES64	0.58
UKK1	0.09	UKK3	0.16	FR81	0.27	ITE3	0.38	SE08	0.60
NL42	0.09	DE13	0.17	DE42	0.27	ES41	0.38	GR13	0.60
UKF3	0.09	DE92	0.17	PT17	0.27	ES11	0.38	GR21	0.61
NL23	0.09	FR51	0.17	CZ01	0.28	HU21	0.38	MT00	0.62
LU00	0.10	FR52	0.17	ITD2	0.28	SK03	0.38	GR12	0.62
FR10	0.10	DE26	0.18	ITC3	0.28	ES30	0.41	GR22	0.65
UKG3	0.10	DE11	0.18	FR82	0.28	ITE4	0.41	GR14	0.65
DEA2	0.10	UKC2	0.18	FR62	0.28	ES53	0.42	GR24	0.66
NL22	0.10	FR43	0.18	CZ03	0.28	SE06	0.42	FI13	0.66
UKG1	0.10	DE60	0.19	AT32	0.28	SE02	0.42	GR23	0.66
UKF1	0.10	DE14	0.19	AT31	0.28	HU10	0.42	GR11	0.66
DEA1	0.11	DE91	0.19	SE04	0.28	ITF1	0.42	GR25	0.69
FR21	0.11	DE93	0.19	FR61	0.28	PT11	0.42	GR30	0.70
UKE1	0.11	UKM3	0.20	ITD3	0.29	HU23	0.42	FI1A	0.71
UKK2	0.11	DEG0	0.20	PL42	0.29	PL21	0.42	GR41	0.75
UKG2	0.11	DE24	0.21	PL43	0.29	PL62	0.42	GR43	0.80
FR25	0.11	FR53	0.21	ITD4	0.31	PL33	0.42	GR42	0.82
DEB2	0.11	FR63	0.21	CZ05	0.31	HU31	0.42	CY00	1.00
UKE3	0.11	DE25	0.21	ITD5	0.31	ES52	0.43		
NL21	0.12	DEF0	0.22	AT21	0.32	ITG2	0.43		
NL12	0.12	FR72	0.22	PL51	0.32	ES42	0.43		

Peripherality and Economic Development

An important hypothesis to be assessed in this study is whether peripherality has an influence on economic development. In the case this exercise, the objective is to assess whether increasing distance of a region from the core in general implies lower levels of per capita GDP. It is important to stress at the outset that the fact that the core is here defined in terms of the regions with the highest per capita GDP does not invalidate the undertaking of tests towards this hypothesis. This is because the definition of the core in this manner does not preclude from regional per capita GDP following a variety of relationships with respect to distance from the core as defined here.

This hypothesis can be assessed, at the level of the formation of stylised facts, on the basis of Chart 2 below. The Chart indicates a negative relationship between economic development and peripherality, leading to the conclusion that increasing distance from the core in general, inhibits the production of GDP.



It is of course recognised that this is a partial analysis of the plethora of factors that could influence per capita GDP in regions. It does however give credibility to the notion that peripherality could be leading to asymmetries in competitiveness and economic opportunities which in turn create inequalities in income levels. This *per se* could be viewed to be a socially suboptimal outcome which would merit policy intervention.

Conclusion

Territorial cohesion is, together with economic and social cohesion, one of the main aims of the EU - as stated in the draft Constitution (Article 3) and in the 3rd Cohesion Report unveiled by the EU Commission in February 2004. According to this report, the objective of territorial cohesion is, *"to help achieve a more balanced development by reducing existing disparities, preventing territorial imbalances and by making both sectoral policies which have a spatial impact and regional policy more coherent. The concern is also to improve territorial integration and encourage cooperation between regions"* (European Commission, 2004, 27). Among the aspects of territorial imbalances relating to peripherality mentioned in the 3rd Cohesion Report are areas *constrained by their geographical features such as islands, sparsely populated areas in the far north, and certain mountain areas,* where accessibility is listed as one of the issues (together with population ageing and decline): *"All of these regions, in whichever part of the EU they are located, have common problems of accessibility and of remoteness from major markets which tends to add to both travel and transportation costs and constrains their economic development"* (European Commission, 2004, 33).

Peripherality can be alleviated by peripheral regions focusing on aspects where they are competitive notwithstanding this handicap so that they can maintain long-term sustainable production. However, supporting policy measures are necessary, both on the national and the European levels, such as i*nfrastructural investments and regional policies.*

“Overcoming peripherality has implications for the economic and social well-being of regions since often these areas find it difficult to attract investment, to maintain a diversified economic base, to maintain current levels of (young) population, and to provide and maintain adequate levels of service provision” (White et al., 2000).

Distance, isolation and dispersed settlement patterns exacerbate the social and economic problems faced in many areas. But improvements to transport and accessibility, new advances in information technology, the promotion of sustainable development, and the importance of generating social and community inclusion can all be beneficial to peripheral regions. Thus, improvements in accessibility has positive implications for regional (economic) development.

Towards these concepts, this paper provides a simple method of measuring peripherality and of gauging the possible inter-relationships between peripherality and economic development. It is shown in there is a core of regions in the EU with more advanced economic development, and that there is evidence in support of the hypothesis that the more peripheral regions, as measured in terms of distances from the core, tend to register a lower level of economic development.

References

Briguglio L. (2002) *The Economic Vulnerability of Small Island Developing States* in Sustainable Development for Island Socities: Taiwan and the World. Edited by Hsin-Huang, Michael Hsiao, Chao-Han Liu, and Huei-Min Tsai.

Eurostat (2006). *Regions: Statistical Yearbook 2006. Data 2000-2004.* Luxembourg.

Shurmann, C, Talaat A. (2000). *Towards a European Peripherality Index.* Final Report. Report for the General Directorate XVI Regional Policy of the European Commission.

Spiekermann, K. and Aalbu, H., (2004). *Nordic Peripherality in Europe*. Nordregio Working Paper 2004:2, Sweden.

White, S.D., Tewdwr-Jones, M. and Alden, J. (2000) *Peripherality and Spatial Planning*. Research Report for DETR. HMSO

Appendix 1: Regions, Peripherality and Per Capita GDP

Regions	Average Distance from two most affluent EU regions (100kms)	Annual GDP per capita (euros, 2004)
AT11	23	18420
AT12	22	21045
AT13	22	37158
AT21	21	22192
AT22	22	22352
AT31	19	24530
AT32	18	28973
AT33	16	27002
AT34	15	27691
BE10	0	51658
BE21	4	29788
BE22	5	21435
BE23	3	22907
BE24	4	26312
BE25	3	24012
BE31	3	23937
BE32	4	16860
BE33	6	19008
BE34	6	17868
BE35	5	17899
CY00	65	17377
CZ01	18	30052
CZ02	17	13959
CZ03	18	13485
CZ04	17	12170

CZ05	20	12817
CZ06	21	13466
CZ07	23	11828
CZ08	23	11603
DE11	12	28975
DE12	10	27297
DE13	11	23487
DE14	13	24605
DE21	17	34334
DE22	16	23033
DE23	16	24293
DE24	14	22867
DE25	14	27433
DE26	12	23847
DE27	15	24627
DE30	17	20862
DE41	17	15690
DE42	18	17140
DE50	11	31909
DE60	13	40011
DE71	10	32251
DE72	10	21286
DE73	11	23086
DE80	16	15979
DE91	13	22339
DE92	11	22489
DE93	13	17182
DE94	9	20180
DEA1	7	26187
DEA2	7	24583
DEA3	9	19451

DEA4	10	22191
DEA5	9	21398
DEB1	9	19673
DEB2	7	19488
DEB3	9	22000
DEC0	8	21468
DED1	15	16265
DED2	17	18038
DED3	15	17720
DEE1	15	15413
DEE2	15	16864
DEE3	15	16405
DEF0	14	21369
DEG0	13	16359
DK00	15	26315
EE00	36	10489
ES11	25	16658
ES12	22	18052
ES13	21	20494
ES21	21	26240
ES22	22	26756
ES23	23	23318
ES24	24	22609
ES30	27	28013
ES41	25	19618
ES42	28	16537
ES43	31	13871
ES51	23	25541
ES52	28	19960
ES53	27	24260
ES61	34	16107

ES62	31	17883
ES63	37	18651
ES64	38	18102
FI13	43	18281
FI18	38	28222
FI19	37	21593
FI1A	46	22015
FI20	31	33542
FR10	7	37687
FR21	7	21964
FR22	5	19753
FR23	6	21930
FR24	9	21738
FR25	7	20162
FR26	10	21049
FR30	5	19117
FR41	9	20005
FR42	10	23311
FR43	12	21354
FR51	11	22219
FR52	11	21013
FR53	14	20418
FR61	19	22045
FR62	18	21696
FR63	14	20408
FR71	15	24055
FR72	14	20242
FR81	18	19127
FR82	18	22727
FR83	24	19013
GR11	43	13560

GR12	41	17110
GR13	39	17557
GR14	42	15912
GR21	40	14439
GR22	42	16218
GR23	43	13628
GR24	43	25159
GR25	45	16839
GR30	46	18840
GR41	49	17647
GR42	53	19461
GR43	52	17712
HU10	27	20627
HU21	25	12027
HU22	25	14012
HU23	27	9243
HU31	28	8287
HU32	30	8476
HU33	29	8768
IE01	16	20102
IE02	15	32446
ITC1	17	26522
ITC2	15	29588
ITC3	18	25924
ITC4	17	29864
ITD1	17	34791
ITD2	18	28202
ITD3	19	26413
ITD4	20	27195
ITD5	20	29059
ITE1	23	25650

ITE2	24	22453
ITE3	25	23529
ITE4	27	27017
ITF1	27	19730
ITF2	29	18142
ITF3	31	15677
ITF4	33	15576
ITF5	33	16295
ITF6	36	14898
ITG1	37	15888
ITG2	28	18133
LT00	31	9846
LU00	7	50844
LV00	34	8882
MT00	40	15797
NL11	9	32244
NL12	8	21830
NL13	8	21427
NL21	8	23441
NL22	7	22942
NL23	6	19439
NL31	6	33148
NL32	6	32032
NL33	5	27824
NL34	4	24706
NL41	5	27169
NL42	6	24585
PL11	24	9427
PL12	28	15833
PL21	27	8781
PL22	24	11131

PL31	30	7211
PL32	29	7217
PL33	27	7978
PL34	29	7752
PL41	22	10711
PL42	19	9691
PL43	19	8833
PL51	21	10471
PL52	23	8112
PL61	24	9159
PL62	27	8048
PL63	23	10058
PT11	27	12477
PT15	37	17106
PT16	31	13336
PT17	18	22670
PT18	33	14440
SE01	29	34331
SE02	27	21342
SE04	19	23283
SE06	27	21621
SE07	33	22938
SE08	39	22737
SE09	22	22659
SE0A	22	24294
SI00	23	16527
SK01	24	25190
SK02	24	10611
SK03	25	9400
SK04	29	8430
UKC1	10	18264

UKC2	12	21499
UKD1	9	19970
UKD2	8	27143
UKD3	8	23691
UKD4	9	21041
UKD5	9	18550
UKE1	7	21408
UKE2	9	24099
UKE3	7	19426
UKE4	9	23878
UKF1	7	22267
UKF2	5	25236
UKF3	6	19815
UKG1	7	22467
UKG2	7	20250
UKG3	7	24637
UKH1	4	23211
UKH2	5	28615
UKH3	4	21776
UKI1	0	60342
UKI2	3	23584
UKJ1	5	35894
UKJ2	4	27217
UKJ3	5	24881
UKJ4	4	20348
UKK1	6	29032
UKK2	7	20714
UKK3	11	16477
UKK4	9	18785
UKL1	9	16474
UKL2	9	25898

UKM1	16	32683
UKM2	15	24483
UKM3	13	23262
UKM4	17	18090
UKN0	15	20179