

## European Union Enlargement, European Spatial Development Perspective and Regional Policy: Lessons from Population Potentials

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**ABSTRACT:** This paper applies the concept of population potential to study the spatial structure of the European Economic Space-EU15 and its main changes with the enlargement to Central and Eastern European Countries. The analysis shows a reinforcement of the central areas and a widening and displacement to the East of the middle areas in the European spatial pattern. Moreover population potential allows us to highlight some policy guidelines for the European Spatial Development Perspective and for the future of the European Regional Policy.

**JEL classification:** A12, J11, N30, R23.

**Key words:** European Economic Space, EU enlargement, Population Potential, Market Potential, Spatial Planning.

### **La ampliación de la Unión Europea, la Perspectiva de Desarrollo Espacial Europeo y la Política Regional: lecciones a partir del potencial de población**

**RESUMEN:** En este trabajo se aplica el concepto del potencial de población al estudio de la estructura territorial del Espacio Económico Europeo (UE-15) y sus principales cambios a causa de la ampliación a los países del Centro y Este Europeo. El análisis muestra un reforzamiento de las áreas centrales y una ampliación y deslocalización a las zonas del Este de las áreas medias en el patrón espacial europeo. Además la idea de potencial de población permite destacar algunas orientaciones de política para la Perspectiva Europea de Ordenación del Territorio y para el futuro de la Política Regional Europea.

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## 1. Introducción

Economics has taken the concept of market potential from Physics, where it is used as a measure for electrical fields. It was first proposed by Stewart (1947, 1948, 1950), who presented three primary concepts based on Newtonian physics: demographic force, demographic energy and demographic potential. The market-potential function has a long history in urban economics, Harris (1954), Clark *et al.* (1969), Dicken and Lloyd (1977), Rich (1980), Keeble *et al.* (1982) focusing instead on the implication for the location of production. The first attempt to apply market potential to questions of location in a European context was that of Clark *et al.* (1969), who studied the effects of spatial integration on Europe through the analysis of changes in market potential caused by a reduction in trade barriers. The work of Clark *et al.* (1969) is updated and extended in the article by Keeble *et al.* (1982), who find that the areas most densely populated and located in the centre of Europe are those that reap the most benefit from integration (Holland, Belgium, Luxembourg, West Germany and the north of France).

More recently the market potential function was used in international economics for determining regional income gradients and cross-country distribution of income, Hummels (1995), Leamer (1997), Hanson (1998, 2000), Brakman *et al.* (2000), Overman *et al.* (2001), Roos (2001), Mion (2003), Redding and Venables (2001, 2004), López-Rodríguez and Faiña (2004, 2005).

In this paper we use a population potential function to approach long run values of market potential. We compute population potential values and plot potential maps, which allow us to represent geographically the main lines of force in terms of population distribution and consequently long run tendencies of location of the main economic activity in the area as well. Specifically, we obtain a plastic image of the distribution and territorial structure of the population, the largest centers of population and the spatial links between the main areas of influence and the activity taking place therein. In first instance, we analyse the spatial structure of the European Economic Space-EU15 (EEE-EU15), then we extend our computations to include the Central and Eastern European Countries and study the main changes in population potentials from the EEE enlargement. Finally we highlight some policy guidelines for the European Spatial Development Perspective and for the future of the European Regional Policy.

This paper updates and extends the work carried out by Keeble (1982) in several ways: First, we use the most recent data to compute our population potential values, second, we extend our analysis to take in the Central and Eastern European Countries and as a result we can evaluate the effects of enlargement on population potential values and third, we use our analysis to establish some policy guidelines concerning regional policy and the European Spatial Development Perspective.

The remaining part of the paper is structured as follows. In section 2 we introduce our population potential measure and describe the methodology we use to compute population potential values and plot potential maps. Section 3 analyses the effects of EEU Enlargement on Population Potentials and the changes in the spatial structure before and after the enlargement. Section 4 derives some implications for the European Spatial Development Perspective (ESDP) and for the European Regional Policy from population potential computations. Section 5 presents the main concluding remarks.

## 2. The formulation and significance of population potentials and potential maps

### 2.1. Definition and meaning of population potential and potential maps

The concept of population potential obeys the following expression (Harris, 1954):

$$MP_i = \sum_{j \neq i}^n \frac{M_j}{D_{ij}} \quad [1]$$

where  $MP_i$  is the population potential at any given point,  $i$ , in the space,  $M_j$  stands for the mass of population of every settlement (inhabited location),  $j$ , across the space,  $D_{ij}$  is a measure of the distance or transport costs between the points  $i$  and  $j$  and  $n$  is total number of settlements in the considered space.

Population potential at a given point may be regarded as a measure of the influence the whole population exerts on it weighted by the distance of people to that point. In computing it we consider that every person makes a contribution which is less the farther away he lives. As we move back from —country rural areas toward a great city there is a rise in potential because of the concentration of people there. Population potentials sum up the total influence of the whole structure of population settlements — weighed by the inverse of the relative distance —.

Population potential values are smoothly distributed across the space and the information they provide can be condensed and organized on potential maps showing the pattern of the spatial structure, i.e., they provide an overall view of the territorial structure of the population and human settlements within a given geographical space. In a similar way to the physical concept of gravitational field, the population potentials provide us with a macroscopic cartography which plots the influence exerted on every point in the space by all the population settlements. Population potentials can be represented in the so called potential maps showing the influence of the whole set of settlements for every location in the space. Potential maps can be thought of as a kind of topographic maps where hills and mountains would represent big urban agglomerations and metropolitan areas, whereas the different planes are classified according to the level of influence that the whole structure of settlements exerts on the different areas of the space according to their populations and distances.

## 2.2. Links between market access, population potentials and their meaning

Market access or market potential and population potential are strongly related and very similar concepts. They both are grounded on the physical theory of gravitational fields. However, the market access concept is usually measured by using income or gross domestic product (GDP) figures. In the case of Europe, these figures are not available at a very disaggregated level, the maximum disaggregated level to which they can be obtained are NUTS3 level. On the contrary, at the present time, the geographic information system of the European Commission (GISCO) offers a database of population distribution at the highly disaggregated level of population settlements with more than 10.000 inhabitants.

Computing market potentials with income figures implies to use aggregate regional macroeconomic data and assigning to the centroids or the capital cities of each region the total value of the aggregate. This means on the one hand a considerable lost of information with regard to the data on population settlements and on the other hand it distorts the levels of the different planes and contours in each regional area. By using population data, market access and population potential can be measured with considerable more spatial accuracy.

Population potentials can be understood like a measure of the demand potential that the whole population exerts over every location in the space. There is a natural link with the concept of demand cones due to LÖSCH, 1954. Population potentials at a given location represent an index of the aggregate market demand from the whole structure of population weighing the number of inhabitants by their distance to this location, i.e., the demand potential that the whole population exerts over every location in the space.

Demand depends not only on the amount of population but also on income and prices. However, population is a good proxy for the long run demand potential in economic integrated spaces, where there is a strong correlation between income levels and population potentials. This is the case in the former EU15 (see Faiña and López-Rodríguez, 2004; López-Rodríguez and Faiña, 2006)<sup>3</sup>.

With regard to the enlargement of the European Economic Space to CEECs, these countries had in the early nineties an important income and development gap due to their isolation in the former block of socialist economic systems. However, the consolidation of the market economy and the increasing links with the European Union led to an extraordinary increase in trade flows, foreign investment and an important reduction of production and development gaps levels with regard to Western countries. Assuming that this process will hold on in the medium term, once the economic space has been fully integrated, proxy market potential by using population figures is more stable and accurate than using very lower initial income figures which can be misleading for medium term analyses<sup>4</sup>.

<sup>3</sup> For other empirical studies using the market potential concept in relation with convergence see Maurseth (2001) and López-Bazo *et al.* (2004).

<sup>4</sup> Although most of the CEECs have experienced rapid transformations based on sustained growth rates, there are still some problems in the latest acceding countries such as Bulgaria and Rumania.

According to Keeble *et al.* (1982), the areas with a high market potential, given a distance, have access to more economic activity than those with a lower value and, thus, can be considered as enjoying a comparative advantage that perhaps also allows them higher economic development. A high relative accessibility in an area gives the firms located there important reductions in transport costs, both in goods markets (demand linkage) and in inputs markets (cost linkage) and it is easier for them both to access and transmit information. On the other hand, and for absolutely analogous reasons, firms located in more inaccessible or peripheral regions suffer from a comparative disadvantage. As Keeble *et al.* (1982) also state, if these differences in accessibility and in transport costs are important and affect the setting-up, development and competitiveness of firms, in the long run divergences may appear in the economic development between the areas with a more favourable (accessible) economic environment and those that do not enjoy such a situation.

The concept of market potential has been given a strong theoretical foundation within the models developed in the New Economic Geography (NEG) literature (see Krugman, 1991; Krugman and Venables, 1995; Fujita *et al.*, 1999). Within these models, market access has been implicitly defined as market potential. Recently, empirical research carried out in the NEG has employed gravitational equations to estimate market potentials (see Redding and Venables, 2004; Redding and Schott, 2003).

In the case of Europe there are neither interregional trade flows data nor regional price indices to estimate the power of distance in population potential computations. However the empirical results in studies carried out at international level (Redding and Venables, 2004) using both the theory-based measure and the alternative market potential function reach very similar results<sup>5</sup>.

### **2.3. Methodology of population potential computations**

In our paper we have computed the population potential values for the former European Economic Space-EU15 and for the enlarged European Economic Space-EU25 after the accession of the 8 new members and the 2 future acceding countries from the Central and Eastern European area.

The computations have been carried out using the spatial information provided by the GISCO database on population settlements with more than 10.000 inhabitants.

Grounded on this highly disaggregated data, our computations employ as an input the real location of every settlement of population across the space instead of the artificial procedure of assigning regional aggregate data to the centroids or capital cities of each region. These data give us the possibility of getting a much more accurate and detailed analyses of the spatial structures of the European Economic Space before and after the enlargement than the one that could be obtained by using regional aggregate data assigned to centroids or capital cities.

To create an operational ground to run the algorithm, we started by defining a net which is made of a grid,  $S$ , a large and manageable set of points covering the whole

<sup>5</sup> For other studies dealing with regional analysis that have used measures of market access see Hanson, 2005.

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space at regular intervals plus the set,  $P$ , of locations of populated settlements. In this way we have obtained a network,  $S \cup P$ , whose nodes (points of the grid plus population settlements) are used as a base for the computation of the population potentials across the space.

As a variable of mass ( $M_j$ ) we have taken the population of each settlement and we have computed the population potentials for the set of nodes in the network (points of the grid and the locations of the settlements). As a variable of distance we have used great circle distances between each node of the net to every location of the settlements.

The population potential values are computed by going through each node on the net and assigning to it the sum of its own population (if it is a settlement) plus the population of the remaining settlements divided by their distance to that node. Mathematically, the expression we use to compute population potential values for each node,  $i \in S \cup P$ , taking into account the influence of every population settlement,  $j \in S$ , is the following one:

$$MP_{i \in S \cup P} = \sum_{i \in S} \frac{P_{o_j}}{D_{i,j}} \quad D_{i,j} = 1 \text{ if } j = i \quad [2]$$

The computations were carried out at *Centro de Supercomputación de Galicia (CESGA)*<sup>6</sup>.

Once the population potentials have been computed, we have obtained the potential contours by joining the points with the same potential value. The maps of potential contours were plotted in ARC/INFO from ESRI by means of interpolation using the SPATIAL ANALYST extension.

The data have been obtained from the statistics information service of the European Commission (EUROSTAT) and its cartographic data from the Geographic Information System of the European Commission (GISCO 2000).

### 3. Spatial structure of the European Economic Space

#### 3.1. Potential maps in the European Economic Space-EU15

The European Economic Space (EEE) originally takes in the former EU15 plus two main countries Switzerland and Norway. As these countries belong to the single market it is more convenient and realistic to include them in the spatial analysis.

The potential maps provide us with a macroscopic cartographic showing the main patterns of the spatial structure through a continuum of smooth changes in the levels of potential contours. These maps have a clear similarity with the images obtained from the nightlight emissions in the European space<sup>7</sup>.

<sup>6</sup> We thank the assistance of Emilio Abad and Francisco Landeira from CESGA in the population potential computations.

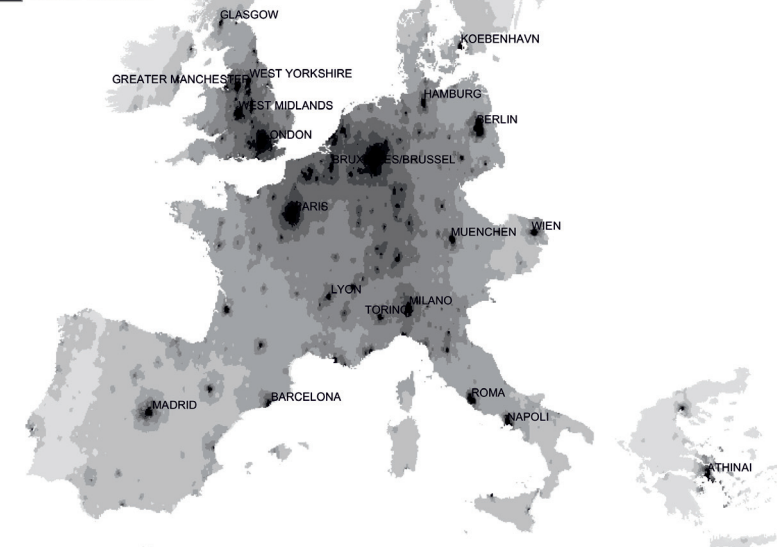
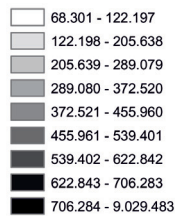
<sup>7</sup> C. D. Elvidge, K. E. Baugh, E. A. Kihn, H. W. Kroehl, E. R. Davis, «Mapping City Lights With Night-time Data From the DMSP Operational Linescan System», Photogrammetric Engineering and Remote Sensing, June 1997, Volume 63, pages 727-734.

Map 1 reveals the spatial structure of the EEE-EU15. The main feature of EEE-EU15 is a big central area and a marked relationship center-periphery. This big central area-*the core*-, the so-called «the Golden triangle» for the public opinion or the Northwestern Metropolitan area in a more technical way used in the European Spatial Development Perspective (ESDP), is located among the three large central conurbations of London, Paris and Köln-Düsseldorf-Rhur Valley, which have contour-lines with population potential values greater than 660.000 inh/Km.

Connected with *the core*, there is a *central corridor* which extends towards the South through the Rhin River to Frankfurt, Strasbourg and continues to Switzerland (Zurich, Bern, Lausanne and Geneva). Close to this area, the northern part of Italy (Turin and Milan) has also high population potentials, and have been interpreted as the South end of the so called *blue banana*.

Map 1: Spatial Structure of European Economic Space-EU15

Thousands of inhabitants per Km.



Source: Own elaboration based on GISCO data





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However its volume is extraordinary lower than the big central triangle in the Northwest of Europe (London-Paris-Rhur Valley) showing a clear imbalance between the two poles, the golden triangle –*the core*– in the North and the South end. Enclosing *the core* and *the central corridor* there is an envelope area that will be defined as *the central belt*. It takes in a large central portion of the European space with population potentials higher than 455.000 inhabitants per km.

The widest part of the European territory is taken in by a spacious plane of medium-high population potentials, *the middle belt*. *The middle belt* is a concentric envelope with medium-high potentials (between 372.000 and 455.000) which encloses *the central belt* and extends it mainly to the South and the East. It takes in from the North of England to the Dover-Calais channel towards Marseille and the Rhone valley, the North of Italy and moving to the North along the line Munich, Berlin and Hamburg to finally connect to Benelux. However, most areas surrounding Berlin are rather in *the middle periphery* giving this city a certain frontier feature.

Surrounding *the middle belt* it can be distinguished successive concentric envelopes of peripheral areas with decreasing levels of potentials across three main steps:

1) the first step is a peripheral one –*the middle periphery*– which includes rather peripheral areas with population potentials between 289.000 and 372.000 inhabitants per km, 2) the second step –*the outer periphery*– is made of the most peripheral European areas with population potentials lower than 289.000 inhabitants per km, and finally 3) *the outermost periphery* covers the overseas territories and islands far away from the European space.

*The middle periphery* takes in a large strip in France from the line lying Southwest of the Normandy-Marseille axis. It also includes the Spanish areas in the Southwest and Southeast of Pyrenees (Cantabria, Vasque Country, Navarra and Catalonia), the central part of Italy, Austria and part of Eastern Germany connecting with Denmark and the areas in the Baltic Straits (Copenhagen, Malmoe, Gothenburg and Oslo).

One striking feature of the highly centralized spatial structure in EEE is the existence of a clearly marked Atlantic periphery. The gradients of population potentials from *the middle belt* decrease smoothly towards the South, the East and the North (even though they reach very low values in the extreme northern latitudes). However population potential gradients show a strong slope in the West. They fall very rapidly when we move towards the West in Wales, Ireland and even the Southwest of England and the French Bretagne. In the West neighborhood of the core, *the middle periphery* becomes reduced to a narrow strip.

There is a clear Atlantic peripheral area whose outer regions are located in the Western part of the Iberian Peninsula (Galicia and Portugal)<sup>8</sup> that close in the South the Atlantic part of the outer periphery.

*The outer periphery* covers also the major part of Spain reaching greater population potentials in the neighborhoods of big cities, the metropolitan area of Madrid and the coastal axis in Valencia.

<sup>8</sup> There are areas with not so low potential in the metropolitan area of Lisbon and in the coastal axis North of Portugal and Galicia.



There is also a Mediterranean outer periphery that takes in South of Italy, the Mediterranean Islands (Sicily, Corse, Cerdinia and Balearic islands) and Greece. In the East there exist also a rather outer peripheral gap towards Wien. In the North *the outer periphery* covers most of the Scandinavian countries with the exception of the coastal strip in the Baltic straits.

### 3.2. The enlarged European Economic Space (EEE-EU25)

Map 2 illustrates the territorial structure of the EEE-EU25 and was plotted in the same way of map 1 but including the 10 Central and Eastern European countries which have recently acceded to the EU or are going to accede in the next future.

The expansion in the size of the area produces a generalized increase in population potential values. The new map of population potentials for the EEE-EU25 reinforces the spatial structure pattern of the EEE-EU15 and also confirms the definition and the compactness of the main areas in the European territory. However, with the new computations there is a pattern of higher increase in population potentials and a displacement of the gravity center of Europe towards the East.

The core-periphery structure of the European space is kept in the EEE-EU25. However its central parts appear more robust and wider.

There is no relevant change in the role play by *the core*. *The central belt* becomes consolidated and more compact in the sense that the disconnection with the Italian part is now much less pronounce because of the increase in the population potential values in the central areas of France, Switzerland, North of Italy and the Eastern part of Germany.

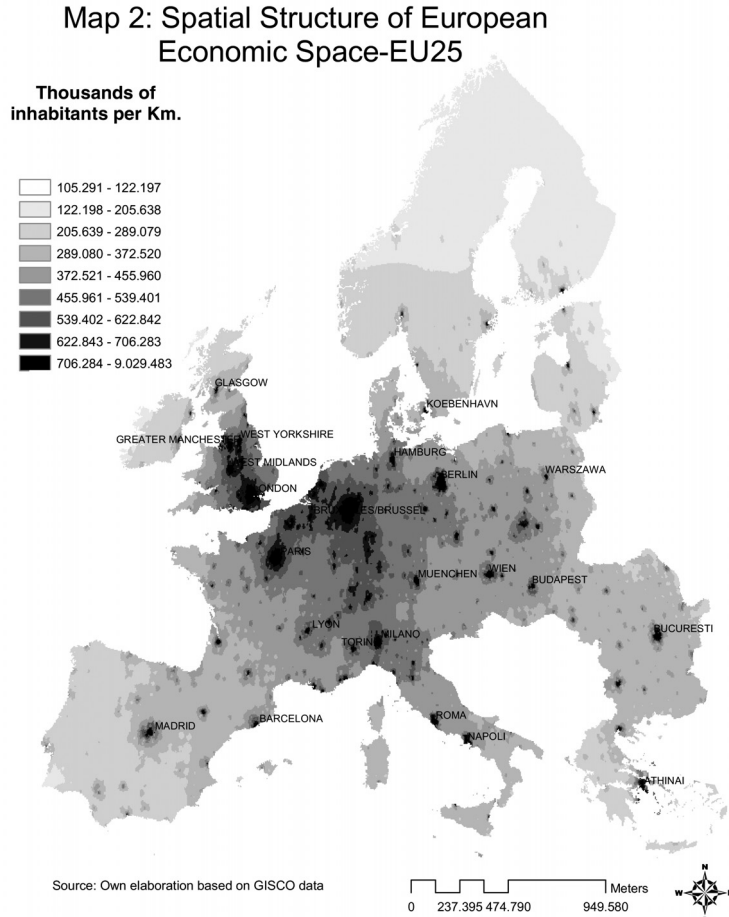
The most remarkable feature in the EEE-EU25 is the considerable expansion and compactness of *the middle belt* which moves far towards the East taking in clearly Austria, Check Republic, Slovakia, Hungary and a major part of Poland delimited by the Warsaw-Budapest axis in the East and Warsaw-Gdansk in the North.

Most areas in Austria and Eastern Germany are now clearly located within *the central belt* and lost their frontier features with *the middle periphery* in the former EEE-EU15.

In the North, *the middle belt* is extended and consolidated over the Southern part of Sweden and Denmark. In the South, Slovenia is clearly placed in a middle-central position and the central part of Italy is enclosed in the new *middle belt* area. In the Southwest, *the middle belt* is extended through the Provence connecting to Barcelona and the coastal part of Catalonia. It extends towards the West through the line Rousillon-Poiteau.

Most of the Eastern border of the EEE-EU25 is clearly placed in *the middle periphery*. It takes in the Eastern part of Poland and Slovakia and Rumania and Bulgaria.

An important part of the old Mediterranean periphery is now placed in the contour of *the middle periphery*. This is the case of the mainland in North and East of Greece, Italian Messogiorno, the central Mediterranean Islands and the Northeast part of Spain, along the line Murcia-Madrid-Cantabria.



*The outer periphery*, is now reduced and to a great extent its marginal position is reinforced. This is the case of the Atlantic areas and the South of Spain covering the west façade of *the outer periphery*. Its other parts are the Southwest part of Greece, the Greek Islands and the Nordic and Baltic countries.

The main reasons for these changes are on the one hand the generalized increase in the population potentials and on the other hand the displacement to the East in the relative increases of potentials due to the enlargement of the EEE to the CEECs.

Although the enlargement of the European Economic Space to the Central and Eastern European Countries is a complex question, it is very interesting to see as a sample the variation of population potentials for several cities on different locations when we enlarge the size of the space from the EEE-EU15 to EEE-EU25.

This is shown in table 1 which offers the percentage changes in the potentials before and after the enlargement for a set of cities moving from the West to the East along different lines South-North. The first two columns of the table offer the indexes of latitude and longitude taking as a reference point the city of Brussels whose indi-

ces are set equal to zero. The third column offers the percentage changes in the potentials after the enlargement to CEECs.

**Table 1.** Population Potential Changes after the Enlargement

<i>Cities</i>	<i>Index of Coordinates over Brussels</i>		<i>Population potential change</i>
	<i>West-Est</i>	<i>South North</i>	
Lisbon	379	-362	5,9%
Porto	348	-284	5,9%
Vigo	343	-247	5,9%
A Coruña	328	-211	5,9%
Madrid	229	-333	6,2%
Bilbao	195	-240	6,2%
Valencia	146	-377	6,7%
London	92	32	5,8%
Barcelona	75	-318	6,8%
París	49	-64	7,0%
Brussels	0	0	6,9%
Amsterdam	-15	51	6,8%
Milano	-104	-187	9,1%
Hamburg	-120	90	10,8%
Roma	-188	-308	11,5%
Munich	-159	-94	12,2%
Copenhagen	-169	164	13,8%
Berlin	-192	57	16,3%
Dresde	-202	8	17,8%
Venece	-214	-178	11,9%
Stockholm	-257	296	16,8%
Viena	-266	-85	22,3%
Helsinki	-369	346	18,3%

The Most Western areas in Europe, Galicia and Portugal, have a very little increase in their population potentials that are around 6%. Madrid, Bilbao, Barcelona and Valencia have increased in their population potentials in the interval 6-7%, the same as central cities such as Paris, Brussels and Amsterdam.

On the contrary, the increase in the population potentials are very important in cities located more to the East such as Hamburg, Milano, Rome, achieving values around 11%. In the range 12-13% are Venice, Munich and Copenhagen. The Eastern cities of Germany, Berlin and Dresde, reach values in the range of 16-17%, the same as Stockholm. The most important increases are in Wien and Helsinki reaching values over 22% in the former and 16% in the latter which is located very to the North.

## 4. SPATIAL STRUCTURE AND REGIONAL POLICY

### 4.1. The European Spatial Development Perspective (ESDP)

The European Spatial Development Perspective (ESDP) is a framework for the coordination of the sectoral policies and the actions between the different levels of

government (communitarian, national, regional, local, etc.). The aim is to work for a more balanced competitiveness of the European territory and for a sustainable development, by strengthening economic and social cohesion, preserving and managing natural resources and keeping the cultural heritage. The ESDP is the framework for linking together this triangle of fundamental goals of European policies. It «provides the possibility of widening the horizon beyond purely sectoral policy measures, to focus on the overall situation of the European territory and also take into account the development opportunities which arise for individual regions» (page 7 of the report agreed at the Informal Council of Ministers responsible for Spatial Planning, *ESDP European Spatial Development Perspective, Towards Balanced and Sustainable Development of the Territory of the European Union*, European Commission, 1999).

In the context of an open and competitive economy, immersed in the trends of globalisation and change towards new lines of progress based on the new technique-economic paradigm of the information society, the knowledge and the innovation, it is necessary to reinforce the factors of regional competitiveness and highlight not only the concepts of regions whose development is lagging behind, but also a wide range of criteria that ensure a good level of competitiveness. Such factors are, territorial accessibility and transport, research and innovation, education and vocational training, productive structure and so on.

In a general way these new dimensions and criteria could be introduced through the ESDP whose guidelines are focus on searching a polycentric development spread in an harmonic and balanced way all over the European territory. However, this wide range of dimensions and criteria entails a great deal of risk because of dispersion and enlargement in the areas that can be assisted. All of this can damage the effectiveness that the European Regional Policy has achieved because of its concentration, in the personal and financial sphere, on the regions whose development is lagging behind.

An important point to be remarked is the strong concentration in the spatial structure of EEE. There is not a natural tendency to spread population and economic potentials on patterns of balanced spatial development. This means that new efforts in the context of the ESDP must be carried on to reinforce the initial measures that have been design to cope with spatial unbalances. Regional problems involved by changes in population, globalisation, location of economic activities, technological development and information society, transport, telecommunications, energy and the effects of the sectoral policies of the European Union must be analysed taking into account the emerging trends and the driving forces of the medium and long term patterns of spatial development.

This kind of approach has been started in the somehow experimental branches of INTERREG programmes, such as the old INTERREG II C and ERDF Pilot Actions and the new INTERREG III B and C where different spatial areas have been selected as new cooperation frameworks to conduct spatial analysis and new ways to implement policy measures.

## 4.2. Population Potential and the European Spatial Development Perspective (ESDP)

One of the main challenges for the ESDP is to achieve its goals under a cooperation framework even less developed than the so called open method of coordination, the one used for the European Employment and Lisbon Strategies. These problems are worsened in the countries of the enlargement. Special circumstances in the Accession Countries make more difficult to solve problems like clarify how the investments will be implemented by the public sector, avoid or reduced foreseeable conflicts between the different policy fields and so on<sup>9</sup>. This makes the spatial coordination to play a greater role in the Accession Countries than in the former Member States. This concern is specially important in issues referring to the planning and the implementation of Trans-European Transport Networks (TEN-T) and the cross-border and trans-national cooperation in spatial development.

As it was shown in the previous session of the paper, the long run pattern of the European Spatial Structure is clearly defined over each main areas, the core, the central belt, the middle belt and the different peripheries. At the same time there is a single market and to a great extent also a single European Economic Space. However, the attributions and competences on spatial planning are still mainly placed at the Member States level.

Spatial planning and infrastructure networks are not public goods at the European Level but to a great extent they can be considered as partially rival and competitive goods among the different Member States in a way such many times Central Government priorities and interests are incompatible or in conflict. This situation can jeopardize the efficient work of the open method of coordination. This is a clear flaw of the Institutional System of the European Economic Space, a single space lacking one coordinated body of decision for spatial planning. Even the studies on spatial planning at the European level have not been much developed and the availability of reliable and homogenous sources of information is still a prerequisite for European spatial analysis. It has been shown that the NUTS divisions do not provide a general appropriate grounds for spatial analysis. A great effort has been done by the different working groups on the elaboration of the Study Programme on European Spatial Planning (SPESP) report (Nordregio report, 2000). As far as the spatial analysis contained in the SPESP report the working group on Geographical position has computed accessibility measures (see SPESP-report, part I and II). They had to work with data at the NUTS 3 level but they have computed accessibility from different points of view (distance to the center of gravity, accessibility to population by road and rail, accessibility to GDP by air, Travel time accessibility for heavy trucks and a generalized accessibility of large basins of activities). The work carried out in this paper complements and extends these works computing accessibility to population in the EEE-EU15 and in the EEE-EU25. Moreover it employs a disaggregated data set based on population settlements.

<sup>9</sup> For studies dealing with the enlargement of EU, see Avery y Cameron (1998) y Grabbe y Hughes (1998). An specific study on the impact of the enlargement on cohesion, see Weise *et al.* (2001).

The EEE spatial pattern obtained from our analysis fits relatively well with the previous studies on geographical position and with the accessibility maps based on time travel accessibility to population in the old EU15 (see map 12, pag 70 of ESDP 2000<sup>10</sup>). There is a remarkable gap of infrastructures in the CEECs that could affect initial values of time travel and drive to misleading structural patterns. For this reason, it has been considered that the analysis of accessibility in terms of population potentials have a more stable and robust character to draw medium and long run tendencies with respect to the enlarged EEE-EU25.

The present tendencies in spatial studies for well developed areas support the idea that distance must be redefined in terms of network connectivity and network density. However, as far as a big space with different development levels is concern, geographical position and population potentials in the traditional way are a very useful tool to draw first conclusions about the long run spatial patterns. In this way, potential maps can be used to derive some policy guidelines on the one hand on the links between TEN-T and the spatial structure and on the other hand for the establishment of territorial subspaces for interregional and cooperation objectives in European Regional Policy.

The enlargement to CEECs means first of all a strong consolidation of the central belt of the European Spatial Structure and a widening of the middle belt up to the Warsaw-Budapest axis. Congestion in the connecting infrastructures in the core and specially in its connection with the central corridor is an increasingly important problem which still remains unsolved and without a tractable solution<sup>11</sup>. The proposals of the White paper on Transport Policy to cope with this problem are rather difficult to implement. In particular, the alternative of developing «motorways of the sea» to provide a way around bottlenecks, such as in the Alps or the Pyrenees, is a very interesting one and certainly deserves to be considered as a trans-European network and receive support. However, given the large and compact structure of the central and middle belt areas, placing the main parts of the spatial structure in the real core of the European continent will mean a very difficult task to substitute traffics and commercial flows to these alternative transport modes.

A great part of CEECs territory enjoys a competitive advantage from their relative central location in Europe's continent. The computations of population potentials for the EEE-EU25 show that most of these countries are relatively central in terms of spatial structure and population potentials because there are placed on the middle belt. The need to connect the axis and corridors from Gdansk to Budapest and the Balkans through Check Republic, Slovakia and Austria can have some difficulties in their cross-border connections among the different countries involved in the projects (23 priority axes and project of the TEN-T). Similar problems can take place in the South corridor connecting the North of Italy with Budapest through Slovenia (6 priority axes and project of the TEN-T).

<sup>10</sup> See also Copus (1997, 199) and Schürmann and Talaat (2000) for peripherality indeces based on travel times as a measure of distance.

<sup>11</sup> See the White paper on *European transport policy for 2010 :time to decide* (European Commission, 2001), and the *Trans-European Transport Network. Ten-T Priority Axes and Projec, 2005* (European Commission, 2005).



In the Northeast peripheral areas they will appear harder coordination problems especially to connect the middle periphery along the East border of Poland and the outer periphery in the Baltic, especially The Baltic axes Warsaw-Kaunas-Riga-Tallin-Helsinki (27 priority axes and project of the TEN-T). It is difficult to see enough interest to enter into the priorities of the Polish government investing in the Polish part of this rail axes. TEN-T projects are funding by the European Union with rates considerable lower than the ones usually agreed in the Structural Funds for the same kind of projects. It is hard to believe that the Polish authorities are going to give up some of his main priorities to employ a significant share of their own resources to implement European priorities which at best can be ranked as second order priorities from the Nation's point of view.

CEECs in the past -and to a some extend still in the present- they can be considered as peripheral countries because the iron curtain and central planning economy has isolated them. This can be still the case of Rumania and Bulgaria, where most of their territories are placed in the middle periphery. However, most of the new Member States are located in a largest area which is enclosed in the middle belt according to the spatial structure obtained from the population potentials (see map 2). This area has been added with a good criteria within the a big cooperation area in the INTERREG II C call Central European, Adriatic, Danubian and South-Eastern European Space (CADSES). However they will be a rather narrow strip of border landlocked regions in the Eastern frontier that will probably need special policy measures.

The enlargement will have an important impact in the Western peripheral areas. The main case is the Atlantic and Mediterranean periphery, especially affecting the links between the Iberian and the European Networks through the French-Spanish border. This is a very important problem because in order to compete among the different transport modes it is indispensable to have access to the full network. In the Spanish and Portuguese case TEN-T projects are of crucial importance. This is the very urgent case of the links over the French border of the West (Basque Country-Aquitaine) and East (Catalonia-Rousillon) axes of the high speed railway axes of Southwest Europe (3 priority axes and project of the TEN-T).

In the same way, the axes Sines-Algeciras-Madrid-Paris (16 priority axes and project of the TEN-T) linking through the Pyrenees Portuguese and Spanish freight railways system with the European network is a crucial and decisive project that could alleviate the concentration of the cargo transport from the main ports in the North sea to other parts in Southern central Europe.

Besides these strategic projects, the widening of the middle belt through the South up to Barcelona and its connections with the middle periphery over the Northeast part of Spain gives support to a reinforcement of their main networks connectivity.

Special attention and new policy measures must be addressed to reinforce the position of the Atlantic space (and particularly its most peripheral areas) to face the relative displacement and marginalization effect that will be caused by the reinforcement and the expansion to the East of the Central and Middle belts of the EEE-EU25.

In the Northwest of the Iberian peninsula, there is a euroregion, *Galicia-Norte de Portugal* (see map 1 where can be clearly seen is spatial configuration)<sup>12</sup>. This space has considerable benefit from the unification of the single market and measures deepening the degree of integration in this euroregion would be still of great interest to increase the size of regional markets to a dimension comparable to Ireland or Switzerland to ground the main forces of endogenous growth in this peripheral area.

The Atlantic periphery, covering the area of Andalucía, Portugal, Galicia and other regions in Western part of Spain can be integrated with other regions, Aquitaine, Poiteau, Bretagne, Southwest England, Wales, Western Ireland and North-Western Scotland defining a regional policy space, the so called Atlantic Space and has been selected as a cross-border and interregional area for cooperation of regional and local authorities in the framework of the last INTERREG programmes.

Other peripheral areas like the Northern periphery and low density areas in Sweden and Finland will also deserve special attention but the enlargement will be more beneficial for these areas due to their Eastern location.

## 5. CONCLUSIONS

This paper uses the concept of population potential to analyze several issues: First the spatial structure of EEE-EU15, second, the spatial structure of EEE-EU25 and as a result we study the main changes in population potentials and its implications after the enlargement of the European Economic Space and third we analyze the importance of population potential computations for the European Spatial Development Perspective (ESDP) and for the European Regional policy.

The analysis carried out in the paper highlights the important effects enlargement will cause on the different parts of the spatial structure of the European Economic Space (EEE). First, the enlargement reinforce the spatial structure pattern of the EEE and also confirms the definition and compactness of the main areas in the European Territory. The core-periphery structure of EEE is kept in the EEE-EU25. EU enlargement will not alleviate the strong agglomeration in the real core of the EEE, on the contrary, the centrality of its central parts will be reinforced. The central belt is consolidated and expanded by means of a generalized increased in the population potentials.

Second, perhaps the most remarkable feature in the EEE-EU25 is the big expansion of the large area with medium-high population potential values, the middle belt, up to the Warsaw-Budapest axes which is due to a displacement of the gravity center of EEE and a relative higher increase in potentials towards the East. At the same time there is also an expansion of the middle belt towards the South covering the central part of Italy and some regions in the Southeast of France up to Catalonia in Spain.

Third, these changes in the population potentials will increase the need of TEN-T and Transport Policy. However, there is no a clear coordinated body of decision to

<sup>12</sup> It could also be clearly perceived in map 2 by using a finer interval classification of population potentials

solve the problems and to implement the agreed priorities on this field. Congestion in the infrastructures in the central belt will not in any significant way be alleviated. The need to connect axes and corridors along the middle belt and the Eastern middle periphery will face with the problems of incompatibilities and conflicts among the different national government priorities and the European ones lacking a convenient system of incentives in the present financial framework of Structural Funds and TEN-T funding. This also applies to the TEN-T priorities connecting the Iberian Peninsula with the European Networks on both sides and across the Pyrenees.

Fourth, the outer periphery is reduced and to a great extent its marginal position is reinforced. A remarkable fact is the case of the Atlantic outer periphery which is very close to the core and the central belt and it is characterized by a rapid fall in the potential values, reducing in the West the middle periphery to a very narrow strip. This problem must be faced by developing new measures in the context of future European Regional Policy and within the European Spatial Development Perspective. The Atlantic periphery needs to be reinforced with new policy measures to cope with peripherality and atomized urban structures in order to compensate the outlying location and to encourage a polycentric and more balanced development with the improvement of the efficiency of small and medium size agglomerations in the framework of urban networks in these areas of Europe as it is stated in the ESDP.

The redefinition of new regional areas and economic subspaces to encourage new ways of regional cooperation, specially to design new alternative policy measures to cope with specific problems across border regions in the different areas within the INTERREG and Trans-national Cooperation Programmes must be boosted<sup>13</sup>. The experiences in the definition of these subspaces for cooperation fits quite well with the main areas defined by the potential maps in the EEE-EU25 and this is the case of the new cooperation space like the Central European, Adriatic, Danubian and South Eastern European Space (CADSES). They will be border regions and outer periphery strips in the Eastern frontier that will probably need special policy measures. Other outer peripheral areas like the Northern periphery and low density areas in Sweden and Finland will also deserve special attention, but the enlargement will be clearly beneficial for these areas.

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<sup>13</sup> See section 4.3 Transnational Co-operation between the Member States and table 1, Structures for the Application of Transnational Operational Programmes for Spatial Development

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