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IN SEARCH OF A MEANINGFUL SET OF MACROREGIONS FOR THE "NEW EUROPE"

ABSTRACT: This paper aims at showing that the new enlargement of EU borders calls for a revision of the principal spatial paradigm that has been used to analyze European economic development processes up to now: the centre/periphery paradigm. More specifically, it is maintained that a new macrostructure must be identified for the EU economic space, on which to project development spatial strategies. The first part of the analysis consists of identifying a meaningful set of macroregions, which is tested through an analysis of regional productivity. By using GVA and employment data for 15 sectors in 1995 and 1999, we develop a Shift-and-Share analysis and separate structural and differential components of productivity differences between and within macroregions. Some explanatory variables of the differential components are introduced and tested through a regression analysis. The results support the idea that in the future European regional policies should be more concerned with the problem of identifying a significant European spatial structure and envisaging differentiated development strategies for its different macroregions.

1. Introduction

In recent years the centre-periphery paradigm, which Myrdal (1957) introduced in the 50's to analyze spatial adjustment in the course of economic development and Kaldor (1970) subsequently reelaborated in the context of the Verdoorn Law, has elicited renewed interest. Thanks to Krugman (1991) and its use of new concepts and tools acquired in the meantime by economic theory, the traditional paradigm has received new life and has achieved the dignity of a formal economic model.

Yet, on the applied European side the centre-periphery dichotomy has always enjoyed a wide appeal. In 1969 Clark, Wilson and Bradley (1969) were the first to stress the importance of a centre-periphery structure for western Europe and to show the dramatic change that the Treaty of Rome would have brought to the European spatial structure: a unique central region of high economic potential would have substituted the sequence of regions with high and low economic potential that had emerged in the past.

A new study along the same lines was produced in 1988 by Keeble, Offord, Walker (1988). In this case the group of countries considered was enlarged to take into account Greece, Spain and Portugal, which had joined the European Community in the 80's. Three types of regions were identified in this study: central, intermediate and peripheral regions, with central regions concentrated around the major industrial cities, like Hamburg, Düsseldorf, Amsterdam, Brussel, Paris and London, while the periphery included Greece, Spain, Portugal, Southern Italy, Southern France, Ireland and Scotland.

Again, new studies along the same lines were carried out to take into account the entrance of Finland, Sweeden and Austria in 1995 and of ten new members in 2004 (Copus 1999, Schürmann, Talaat 2001). Their results were introduced as a major explanatory factor of European regional disparities in the Second Report on Economic and Social Cohesion (European Commission 2001). Three types of regions were distinguished on the basis of the value of an index of accessibility calculated for each NUTS2 region: 1) central regions, which form a triangular bloc with vertices in North Yorkshire, France-Comtè and Hamburg; 2) peripheral regions, which are located in the North (Sweden and Finland), North-west (North of Scotland and Ireland), South (Portugal, Spain, Mediterranean islands, Southern Italy and Greece), East (candidate countries); 3) intermediate regions. The corresponding delimitation is presented in Figure 1.

Notwithstanding the popularity that the centre-periphery paradigm has enjoyed in integrated Europe since its foundation and its recent promotion to a stylized fact of economic development on the side of mainstream economics, in this paper we maintain the position that the time has come to abandon the simple mechanism of spatial adjustment that the centre-periphery dichotomy presupposes and to adopt a more articulated spatial structure, on which to project the new strategies of cohesion policies.

We may advocate some general arguments in support of our hypothesis. First of all, Krugman himself has shown that a centre-periphery structure is not always the final result of a process of economic integration. Transport costs and scale economies together with initial conditions may determine diffusion rather than concentration during the initial phase of integration. The existence of different poles of attraction in the integrating nations may contribute to this result. Moreover, in a dynamic setting, in which transport costs, economies of scale and the share of foot-loose activities in the aggregated economy are subject to change, polarizing factors may come to a stop.

A similar argument can be found in a recent work of Braunerhjelm, Faini, Norman, Ruane and Seabright (2000). In this case emphasis is put on the "right policies" that "can prevent polarization". The authors discuss the effects of increasing integration and globalization on the relocation of economic activity among European regions. Their conclusion is that three different scenarios are possible: 1) the Dispersion Outcome, which will see firms and industries agglomerate without bringing greater overall geographic concentration; 2) the Concentration Outcome, when, on the contrary, there will be substantial geographic concentration and depopulation of some regions; 3) the Regional Stagnation Outcome, which represents the most pessimistic scenario, with central regions, on the whole, growing and peripheral regions stagnating. Which of the three scenarios will finally prevail will depend on the factors' mobility and on the size of the agglomeration gains. But it will also fundamentally depend on the policies pursued at the European regional and central level.

A different outlook, which we consider useful in the same context, is that taken by K. Peschel (1992, 1998). This author turns her attention to the Scandinavian-Baltic region, which she expects will become a highly integrated and dynamic area of the new European Union. She recalls that periphery is not only a geographical but also an economic category and that different factors contribute to the integration of market economies, among which are similar models of social and political life, linguistic affinity, cultural and local envinronment. The ability of northern regions to create an

autonomous centre of growth supports the idea that polarization is not necessarily associated with integration and that different poles of attraction can emerge and survive outside the area with the maximum economic potential in central Europe.

In this paper, on the basis of the above reasoning, we propose a delimitation of the European Union economic space in six macroregions and contrast it with the traditional central, intermediate and peripheral regions delimitation adopted in the Second Report on Economic and Social Cohesion, in terms of such important factors of development as labour productivity, industrial structure, competitive performance and some of their determinants. More precisely, in section 2 we illustrate the data and the method of analysis used; in section 3 we show the inadequacy of the centre-periphery structure through an analysis of spatial productivity differences, separating structural and competitive components, both within and between macroareas; in section 4 we introduce our alternative delimitation in six macroregions and show how in this case the results of the analysis substantially improve; in section 5 we attempt to capture the role of some factors that can explain the different behaviour of the macroregions, such as human capital, infrastructure, agglomeration economies. Finally, in section 5, some general conclusions are drawn that are relevant for the formulation of future European regional policy.

2. Data and method of analysis

We have considered labour productivity as a key variable in our analysis . Notoriously, productivity is one important factor of spatial competition and the principal component of regional disparities in Europe. According to Esteban (1994) the difference in labour productivity explained about 2/3 of EU regional disparities of GDP per capita in 1989 and a similar percentage is found by Terrasi (2002) for the most recent years.

In order to understand what lies beneath the productivity differences among regions we must, first of all, identify the role played by two different factors: a) the industry mix of regions, where high and low productivity sectors are present with different weights, and b) the different endowment of competitive factors, which causes both high and low productivity sectors to be present with lower productivity in some regions and with higher productivity in others.

From the contribution of Lederbur and Moomaw (1983) till Esteban's recent one (Esteban, 2000), Shift-and-Share analysis was considered a powerful tool in separating the above-mentioned effects. Esteban (2000) applied this method to different sets of European regional data and was able to conclude that "region-specific productivity differentials account for virtually all interregional differences in aggregate productivity per worker" (Esteban, 2000, p.362).

In this study we part with Esteban's contribution, both as regards the data set used and the kind of decomposition of regional productivity adopted. As for the data, we make use of the data set collected by Cambridge Econometrics (Cambridge Econometrics and Ereco, 2002), which makes it possible to analyze GVA (in 1995 euro) and the number of persons employed in 15 sections of the new ESA95 accounting system at the level of NUTS2 regions, for all 15 EU countries since 1991. Actually, in our analysis the territorial units chosen are in some cases NUTS1 rather than NUTS2, as may be checked in Table A1 of the Annex, where we report the complete list of the 127 regions adopted . We must notice at this point that GVA per employed worker is not a perfect measure of labour productivity and that some problems of data comparisons in different countries and regions surely exist.

As for the method of decomposition, we have re-formulated the original decomposition suggested by Lederbur and Moomaw (1983) in order to isolate the role played by the macroregions and have come up with the following formula:

$$x_r - \bar{x} = \sum_i p_r^i \left(x_m^i - \bar{x}_m\right) + \sum_i p_r^i \left(x_r^i - x_m^i\right) + \sum_i p_m^i \left(x^i - \bar{x}\right) + \sum_i p_m^i \left(x_m^i - x^i\right) \quad (1)$$

where $x_r, \bar{x}, \bar{x}_m$ are total labour productivities in region ***r***, in Europe and in macroregion ***m***; x_m^i, x^i, x_r^i are labour productivities of sector ***i*** in macroregion ***m***, in Europe and in region ***r***; p_m^i, p_r^i are the shares of total employment in sector ***i*** in macroregion ***m*** and region ***r***.

According to formula (1) the productivity differences in each region from the European average can be decomposed into four parts, which correspond respectively to the contribution of the structural component to the productivity difference in each region from the average productivity of its macroarea (synthetically α), the contribution of the competitive component to the same differences (synthetically δ), the contribution of the structural component to the productivity differences in each macroarea from the

European average (synthetically γ) and the contribution of the differential component to the same differences (synthetically π).

In order to fully appreciate the contribution of the four components α, β, γ, π introduced in formula (1) to the total variance of productivity among the 127 regions considered, we have also calculated the following formula:

$$\begin{aligned}\mathbf{var}(x_r) = \mathbf{var}(\alpha) + \mathbf{var}(\delta) + \mathbf{var}(\gamma) + \mathbf{var}(\pi) + 2[\mathbf{cov}(\alpha,\delta) + \mathbf{cov}(\alpha,\gamma) + \\ + \mathbf{cov}(\alpha,\pi) + \mathbf{cov}(\delta,\gamma) + \mathbf{cov}(\delta,\pi) + \mathbf{cov}(\gamma,\pi)]\end{aligned} \qquad \textbf{(2)}$$

where ***var***=variance and ***cov***=covariance.

In this way it is possible to evaluate the share of the variance of each component in the total variance of regional productivity. A high share for the variance of the structural component γ and/or of the competitive component π will indicate that the delimitation adopted is able to capture substantial productivity differences among macroareas.

3. The inadequacy of the centre-periphery structure

In Table 1 and Table 2 we present the results obtained by applying formulas (1) and (2) to the delimitation in central, intermediate and peripheral regions adopted in the Second Report on Economic and Social Cohesion and presented in Figure 1. We have considered two different years: 1995 and 1999.

The economic sectors considered are 15 sections of the ESA95 classification and are reported in Table A2 of the Annex. Lower productivity with respect to the aggregate EU average is found for the following sectors: Agriculture (0.65 of the average in 1999), Manufacture of textiles and textile products+ Manufacture of leather and leather products (0.54), Construction (0.75), Wholesale and retail trade etc. (0.70), Hotels and restaurants (0.60), Non-market services (0.84). As for higher productivity sectors: Mining and Energy (2.44), Fuels and Chemicals (1.69), Financial intermediation (1.67), Real estate, renting and business activities (1.50). The remaining sectors present levels of productivity between 1.07 and 1.24 of the average. The reported ratios always refer to 1999.

Table 1. Disaggregation of productivity differences from the European average, central, intermediate and peripheral macroregions, 1995 and 1999

Macroregions	Productivity %		Components				Productivity standardized by industrial structure	
			Structural		Competitive			
	1995	1999	1995	1999	1995	1999	1995	1999
Central	111.13	111.40	3.19	3.08	7.93	8.32	107.93	108.32
Intermediate	101.69	102.01	-0.93	-0.98	2.62	2.99	102.62	102.99
Peripheral	75.87	75.68	-4.57	-4.18	-19.56	-20.13	80.44	79.87
E.U. average	100	100	0	0	0	0	100	100
Stand. Dev. between macroregions	13.38	13.73	2.85	2.70	10.56	11.08	10.56	11.08
Total standard deviation	28.16	29.50						

Source: processed from Cambridge Econometrics and ERECO, 2001

Table 2. Shares of total productivity variance by component and macroregion, central, intermediate and peripheral macroregions, 1995 and 1999

Macroregions	Var(α)/var.tot.		Var(δ)/var.tot.		Var(γ)/var.tot.		Var(π)/var.tot.	
	1995	1999	1995	1999	1995	1999	1995	1999
Central	0.0057	0.0045	0.3790	0.3397				
Intermediate	0.0074	0.0072	0.2275	0.2508				
Peripheral	0.0122	0.0098	0.0952	0.1027				
Total	0.0253	0.0214	0.7017	0.6932	0.0113	0.0095	0.1388	0.1423

Source: processed from Cambridge Econometrics and ERECO, 2001

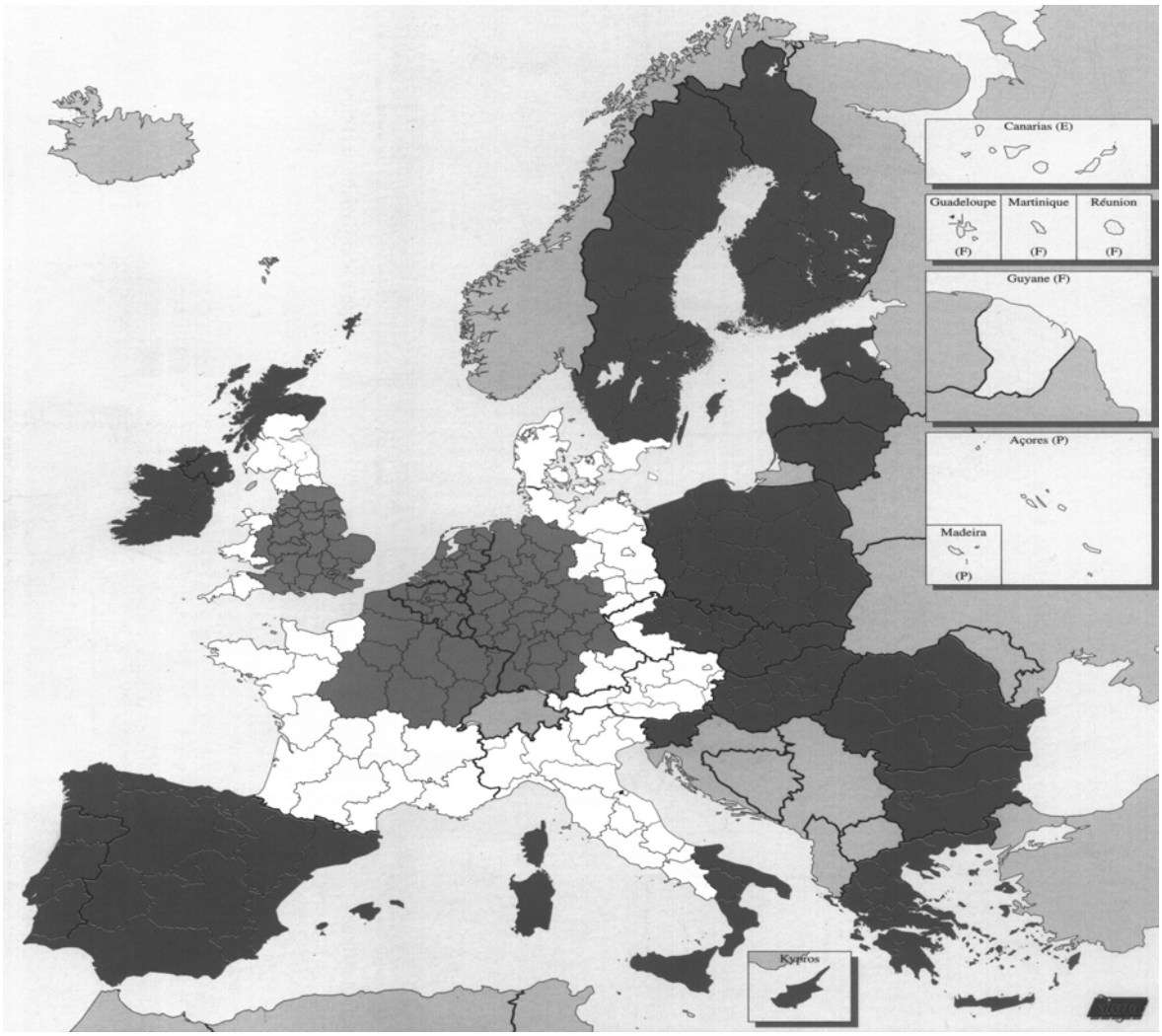

Figure 1. Central, intermediate and peripheral regions

Source: European Commission, 2001

The first two columns of Table 1 show that productivity in the central regions is about 11% higher than the European average, while it is approximately equal to the average in the intermediate regions and about 25% lower in the peripheral regions. We also notice that the structural component is positive in the central regions and consistently negative in the peripheral regions, but the majority of productivity differences is absorbed by the competitive component. The last two columns of Table 1 show the values of productivity in the macroregions standardized by industrial structure, i.e. by subtracting the structural component from total productivity.

The relevance of the centre-periphery delimitation in capturing the productivity differential among the 127 regional units considered does not appear to be very great. Actually, Table 2 shows that γ absorbs only about 1% of total variance and π about 14%. Most of the variance (about 70%) is absorbed by δ, i.e. by the competitive component within the macroareas. For these reasons we propose looking for an alternative spatial structure. In the following section we will show that by adopting a more articulated delimitation in European macroregions it is possible to substantially improve the above results and better capture the competitive factors underlying regional productivity.

4. An alternative spatial structure

Our delimitation considers six different macroregions, which are in part derived from Figure 1. We still have a central macroregion, but from the triangular bloc of Figure 1 we have subtracted the British NUTS2 regions, which were attributed to an area formed by all of Great Britain and Ireland, while we added four German eastern länder. Actually, British regional units perform quite badly in terms of productivity levels and considerably lower than the European average. This is not a new phenomenon and a rich literature exists that tries to explain this anomaly (Hirmis, 2002). Surely, some problems with statistical data comparisons may also exist and for all these reasons we consider it appropriate to separate British regional units together with Irish ones, between which strong geographical and cultural links exist. As for the German eastern länder we expect them to become fully integrated with the other German central regions in the near future. In Table A1 of the Annex it is possible to find the precise definition of both macroregions.

Another northern macroregion follows, which is formed by the remaining northern peripheral regions of Figure 1, all of Denmark, the region of Stockholm and two German regions (Macklenburg and Schleswig-Holstein). Our intention is that this area should correspond to the Scandinavian-Baltic macroregion. The remaing three macroregions are formed respectively by the intermediate and peripheral southern regions of Figure 1. The last ones have been divided in two parts, the first of which embraces Spain and Portugal and the second Corse, Southern Italy and Greece.

In this way we think we have obtained a more meaningful delimitation, which takes into account both the geographical position of the macroregions and their internal consistency. A proof comes from Tables 3 and 4, in which we report the results of the analysis of labour productivity according to formulas (1) and (2).

Table 3. Disaggregation of productivity differences from the European average, six macroregions, 1995 and 1999

Macroregions	Productivity %		Components				Productivity standardized by industrial structure	
			Structural		Competitive			
	1995	1999	1995	1999	1995	1999	1995	1999
Central	120.98	122.02	2.55	2.64	18.42	19.38	118.42	119.38
Scand.-Baltic	109.46	111.94	0.71	1.40	8.75	10.54	108.75	110.54
UK and Ireland	68.99	70.21	2.26	1.78	-33.27	-31.57	66.72	68.43
Intermediate	113.57	114.83	-1.04	-0.95	14.61	15.78	114.61	115.78
East Southern Periphery	78.88	73.26	-9.02	-7.98	-12.10	-18.76	87.90	81.24
West Southern periphery	67.02	65.26	-4.90	-5.32	-28.08	-29.42	71.92	70.58
E.U. average	100	100	0	0	0	0	100	100
Stand. dev. between macroregions	23.05	24.14	3.22	3.12	21.81	22.49	21.81	22.49
Total standard deviation	28.16	29.50						

Source: processed from Cambridge Econometrics and ERECO, 2001

In Table 3 we see that the productivity level in central regions has now increased to about 122%, while both the Scandinavian-Baltic regions and the intermediate regions verify productivity levels consistently higher than the European average. On the other hand, UK and Ireland and the Southern peripheral regions verify productivity levels which are much lower than the European average.

As for the structural component, its role is relevant only in the peripheral regions, where it appears with a negative sign. We can conclude that also in the case of our delimitation most of productivity differences are absorbed by the competitive component.

The greater significance of the new delimitation adopted is evident in Table 4, where the share of total variance covered by π amounts to 0.61 in 1995 and 0.58 in 1999, leaving a share of 0.21 and 0.23 to the competitive component within the macroregions (δ). As it was expected, the shares of the structural components, α and γ, appear irrelevant.

Table 4. Shares of total productivity variance by component and macroregion, six macroregions, 1995 and 1999

Macroregions	Var(α)/var.tot.		Var(δ)/var.tot.		Var(γ)/var.tot.		Var(π)/var.tot.	
	1995	1999	1995	1999	1995	1999	1995	1999
Central	0.014	0.010	0.110	0.096				
Scand.-Baltic	0.002	0.002	0.008	0.011				
UK and Ireland	0.001	0.001	0.016	0.022				
Intermediate	0.007	0.007	0.040	0.070				
East/South per.	0.004	0.002	0.020	0.015				
West/South per.	0.003	0.003	0.021	0.020				
Total	0.031	0.025	0.215	0.234	0.015	0.012	0.612	0.582

Source: processed from Cambridge Econometrics and ERECO, 2001

5. What lies beneath?

In this section we will attempt to explore the role of some local factors, such as human capital, infrastructure and polarization effects, in determining the total competitive component (comprehensive of δ and π) of regional productivity differences (PROD). The lack of capital data at the level of regional and sectoral disaggregation adopted in this study, does not allow us to verify the role of this important determinant of labour productivity, as well. Nevertheless, we think we have at least partially eliminated this problem through the standardization of productivity with respect to the industrial mix.

We have introduced three variables in order to capture the relative advantages of different regions in terms of human capital: a) the percentage of population aged between 25 and 59 years with third level education (HIGH); b) the percentage of total employment in knowledge-intensive sectors (KIS); c) the percentage of total employment in high-tech manufacturing (HTM). All variables refer to the year 1999 and can be found in the last Regional Statistical Yearbook of Eurostat (EUROSTAT, 2002). While the first variable makes human capital depend on the educational attainment of the population, the last two variables consider human capital incorporated in the competence of employed persons in high-tech manufacturing and service sectors. This idea was suggested to us by the growth literature, where it has been maintained that the level of education is not always an appropriate indicator of the human capital actually used in the production of different goods (Lodde, 2000).

It is more difficult to find a satisfactory variable to measure the availability of economic infrastructure at the level of NUTS2 regions for all EU15 countries. A recent study (Ecoter 1998) has produced an index of infrastructure for NUTS2 regions of five main countries of western Europe: France, Germany, Italy, Spain and United Kingdom and we have tried to introduce it in the corresponding units of our original sample. The results were absolutely unsatisfactory and for this reason we will not present them. In any case, they served to reinforce our idea that it is necessary to consider the whole European space in order to find significant results. The only infrastructure indicator that we were able to find at the level of EU15 refers to a simple kind of transport infrastructure: density of motorways, which we measured either in terms of squared Km, inhabitants, employed persons or total VA. The best results in the regression equation that we are going to present were obtained with the density of motorways per

employed person (KMEMPL). The data can be found in the same Regional Statistical Yearbook that we cited previously (Eurostat, 2002).

The next explanatory variable that we consider is intended to capture the polarization effects activated by the centre of agglomeration of economic activities in each macroregion. For the central macroregion we located the centre in the following units: BE1, BE2, BE3, DE9, DEA, LU, NL1, NL2, NL3, NL4. These absorbed 37% of total VA of the area in 1999. Similarly we located the centre of the Scandinavian-Baltic macroregion in units DK, DEF, SE04, with 43% of total VA and that of UK and Ireland in units UKH, UKI, UKJ with 39% of total VA. For the intermediate macroregion we located two centers of attraction: the first, in the North, is made up of FR1, FR23, FR24; the second, in the South, is made up of IT32, IT2, IT4. Together these two centers absorbed 44% of the total area VA. Finally, for the southern peripheral regions we were unable to locate a real center of agglomeration and this was substituted by some points of attraction, like Madrid and Barcellona for the Spanish regions, Milano for the Italian ones and Lisboa for Portugal. We refer to Table A1 for the complete list of regions.

Once that the loci of agglomeration of each macroarea have been selected, the variable introduced in the regression is the distance in Km from the central point of each regional unit to the central point of the relevant agglomeration (DIST). For the islands this distance is multiplied by 2.

Finally, four dummy variables were introduced to capture the peculiarity of each macroregion with respect to the central one: SCAND for the Scandinavian-Baltic regions, UKIRE for the British and Irish regions, INTER for the intermediate regions and PERIPH for both southern peripheral regions. Different factors may determine their results, such as geographical position, historical and cultural roots, institutional framework, various omitted economic variables and so on.

All variables refer to the year 1999 and have been used to estimate the following regression equation by Ordinary Least Squares:

$$PROD = a + b_1 HIGH + b_2 KIS + b_3 HTM + b_4 KMEMPL + b_5 DIST + b_6 INTER + b_7 SCAND + b_8 UKIRE + b_9 PERIPH \quad (3)$$

The total number of observations is 111, because data on high tech manufacturing was not available for the following regional units: FI2, SE07, SE08, IT12, ES43, FR83, GR1, GR2, GR3, GR4, PT14, PT15, which therefore were left out. The results of the

estimation procedure are presented in Table 6, while in Table 5 we report the matrix of correlation coefficients between each couple of the independent variables introduced in the regression.

Table 5. Correlation coefficients between indipendent variables of equation (3)

	Inter	Periph	High	Kis	Htm	Scand	Ukire	Kmempl	Dist
Inter	1.00								
Periph	-0.30	1.00							
High	-0.49	-0.22	1.00						
Kis	-0.17	-0.56	0.64	1.00					
Htm	-0.00	-0.33	0.10	0.03	1.00				
Scand	-0.22	-0.20	0.42	0.41	0.02	1.00			
Ukire	-0.22	-0.20	0.26	0.29	0.08	-0.14	1.00		
Kmempl	0.04	0.24	-0.18	-0.37	-0.08	-0.11	-0.39	1.00	
Dist	-0.16	0.12	0.02	0.02	-0.18	0.29	-0.08	-0.15	1.00

Table 6. Regression coefficients of equation (3), t-values and regression statistics, 1999

Variable	Cofficient	t-value	Regression statistics
Constant	66.06	6.20***	R^2=0.76
HIGH	-0.15	-3.07***	F=34.96***
KIS	0.56	6.43***	Observations=111
HTM	0.08	2.45**	
KMEMPL	0.005	0.29	
DIST	0.005	1.65	
INTER	-4.39	-1.17	
SCAND	-17.27	-3.86***	
UKIRE	-53.44	-12.34***	
PERIPH	-24.94	-5.65****	

*,**,*** significant at 0,05, 0,01, 0,005

It should be noticed that some of the explanatory variables introduced performed the hypothesized effect. These are KIS and HTM with a positive significant coefficient and KMEMPL, with a positive coefficient, which however is not significant (t-

probability = 0.77). Among the dummy variables PERIPH, UKIRE and SCAND are negatively significant with respect to the central ones chosen as benchmarks, confirming the presence of unidentified macrospatial factors. Contrary to what we expected, the intermediate regions do not significantly differ from the central ones.

Two variables came out with an unexpected sign. The first one is HIGH, which reveals once more that it is inappropiate to identify human capital with the educational attainment of the population. Two factors may be responsible for this result: a) the incentive to enroll in third level education in regions with high unemployment rates; b) the different quality of schools and universities in backward and advanced regions.

As for the second variable, which is DIST, we see a positive sign of its coefficient with a significance level of 10%. This result seems to suggest that distance from the agglomeration center within the same macroarea is an advantage rather than a disadvantage for regional productivity. Again, different factors may be considered in interpreting this result, such as the presence of congestion costs in proximity to the agglomeration center.

On the whole, equation (3) can explain 76% of the interregional variability, which may be considered a satisfactory result for spatial series at the European level, like the used ones. The F-test confirms the highly significant level reached by the whole regression.

6. Conclusions

This study must be considered a tentative proposal to discover a macrospatial structure on which to project the problems of regional development and policy in the new EU. Even though there are numerous drawbacks with respect to the sectoral and regional delimitation adopted and the explanatory variables introduced in the regression analysis, some interesting results have nonetheless emerged. First of all, as in similar previous studies, the competitive component of Shift-and-Share analysis has been able to absorb the majority (82%) of the productivitiy differences from the EU average of the 127 regional units selected. This result confirms once more the importance of local competitive factors with respect to structural ones and the appropriateness of policies directed at removing the deficit of these factors, such as human capital and infrastructure.

The second interesting result regards the capability of our delimitation in six macroregions to absorb a consistent share of the competitive component (about 60%).

According to this result we were led to interpret the different competitiveness of the regions as the effect of two processes, one of which operates at the level of macroregions and the other one within each macroregion. In both cases the regional delimitation should be improved in order to better capture the economic spatial processes at work. Consider, in particular, the NUTS2 regional units of the Eurostat classification, which were assumed as the basis of our analysis and which cannot be considered coherent and comparable regional units. An *ad hoc* delimitation centred on European spatial processes rather than on the national institutional framework should be envisaged.

Finally, we were able to point out the role of some regional factors of competitiveness through the estimation of a regression equation. Our analysis showed that in the European case the educational attainment of the population is not a useful variable in verifying the role of human capital, as this seems principally incorporated in people actually working in high tech sectors. Contrary to what we expected, the distance from the center seems to determine the higher productivity of some regions within each macroarea. The presence of some general endogenous non-identified spatial factors has been verified, which act positively in central and intermediate regions and negatively in the Scandinavian-Baltic and southern peripheral macroregions, while UK-IRE performed particularly badly.

On the basis of these results we think that the future European regional policy should take into consideration the different general scenery that each macroregion is part of in the reallocation of production on the threshold of the new enlargement. The new entrants will surely be at a much lower level of development and strong efforts must be made to sustain their approach to the European average. But the competitiveness of the weakest regions of the Union until now must also be carefully protected. We must realize that the new entrants also have some advantages with respect to these regions, among which their proximity to some of the strongest high tech areas of the Union and their appeal for the decentralization of investment and production in these areas.

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Annex

Table A1. Regions and macroregions

NUTS	Name	NUTS	Name	NUTS	Name
Central regions		NL1-11	Noord Nederland	UKF	East Midlands
BE1	Bruxelles	NL2	Oost Nederland	UKG	West Midlands
BE2	Vlaams Gewest	NL3	West Nederland	UKH	Eastern
BE3	Region Wallone	NL4	Zuid Nederland	UKI	London
DE1	Hovedstadsreg.	***Scand.-Baltic regions***		UKJ	South East
DE23/7	Bayern (North)	FI13	Itä-Suomi	UKK	South West
DE3	Berlin	FI14	Väli-Suomi	UKL	Wales
DE4	Brandenburg	FI15	Pohjois-Suomi	UKM2+3	Scotland (North)
DE5	Bremen	FI16	Uusimaa	UKM1+4	Scotland (South)
DE6	Hamburg	FI17	Etelä-Suomi	UKN	Northern Ireland
DE7	Hessen	FI2	Ahvenanmaa	IE01	Border, M.,W.
DE9	Niedersachen	SE01	Stockholm	IE02	Southern and E.
DEA	Nordrheun W.	SE02	Östra Mellansv.	***Intermediate regions***	
DEB	Rheinland P.	SE04	Sydsverige	DE21+22	Bayern (South)
DEC	Saarland	SE06	Norra Mellansv	FR23	Haute Normandi
DED	Sachsen	SE07	Mellersta Norrl.	FR25	Basse Normandie
DEE	Sachsen Anhalt	SE08	Övre Norrland	FR51	Pays de la Loire
DEG	Thueringen	SE09	Småland Med Ö.	FR52	Bretagne
FR1	Ile de France	SE0A	Västsverige	FR53	Poitou Charentes
FR21	Champagne Ard.	DK01	Hovedstadreg.	FR61	Aquitaine
FR22	Picardie	DK02	Ost for Storebael	FR62	Midi Pyrenees
FR24	Centre	DK03	Vest for Storebae	FR63	Limousin
FR26	Bourgogne	DE8	Mecklenburg	FR71	Rhone Alpes
FR3	Nord Pas de Cal.	DEF	Schleswig Holst.	FR72	Auvergne
FR41	Lorraine	***Unit. Kingdom and Ireland***		FR81	Languedoc Rous.
FR42	Alsace	UKC	North East	FR82	Provence Alpes
FR43	Franche Comte	UKD	North West	IT11	Piemonte
LU	Luxembourg	UKE	Yorkshire and H.	IT12	Valle d'Aosta

NUTS	Name	NUTS	Name	NUTS	Name
IT13	Liguria	***West Southern periphery***		PT11	Norte
IT2	Lombardia	ES11	Galicia	PT12	Centro
IT31	Trentino A.A.	ES12	Asturias	PT13	Lisboa e Vale
IT32	Veneto	ES13	Cantabria	PT14	Alentejo
IT33	Friuli V.G.	ES21	Pais Vasco	PT15	Algarve
IT4	Emilia-Romagna	ES22	Navarra	***East Southern periphery***	
IT51	Toscana	ES23	La Rioja	FR83	Corse
IT52	Umbria	ES24	Aragon	IT8	Campania
IT53	Marche	ES3	Madrid	IT91	Puglia
IT6	Lazio	ES41	Castilla Leon	IT92	Basilicata
IT71	Abruzzi	ES42	Castilla-la Man	IT93	Calabria
IT72	Molise	ES43	Extremadura	ITA	Sicilia
AT1	Ostösterreich	ES51	Cataluna	ITB	Sardegna
AT2	Südösterreich	ES52	C.Valenciana	GR1	Voreia Ellada
AT3	Westösterreich	ES53	Islas Baleares	GR2	Kentriki Ellada
		ES61	Andalucia	GR3	Attiki
		ES62	Murcia	GR4	Nisia Aigaiou, C.

Table A2. ESA95 Sections

Sector definitions	**Codes**
Agriculture, hunting, forestry and fishing	A+B
Mining and quarrying+Electricity, gas and water supply	C+E
Manufacture of food products, bevarages and tobacco	DA
Manufacture of of textiles and textile products+	DB+DC
Manufacture of leather and leather products	
Manufacture of coke, refined petroleum products and nuclear fuel+	DF+DG+DH
Manufacture of chemicals, chemical products and man-made fibres+	
Manufacture of plastic and rubber products	
Manufacture of electrical and optical equipment	DL
Manufacture of transport equipment	DM
Other manufacturing (Manufacture of wood and wood products+ DD+DE+DN+DI+DJ+DK	
Manufacture of pulp, paper and paper products; publishing and printing+	
Manufacture of other non-metallic mineral products+	
Manufacture of basic metals and fabricated metal products+	
Manufacture of machinery and equipment n.e.c.+ Manufacturing n.e.c.)	
Construction	F
Wholesale and retail trade; repair of motor vehicles, motorcycles and	G
Personal and household goods	
Hotels and restaurants	H
Transport, storage and communication	I
Financial intermediation	J
Real estate, renting and business activities	K
Non market services	L+M+N+O+P