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## National And Spatial Factors In EU Regional Convergence.

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**NATIONAL AND SPATIAL FACTORS IN EU REGIONAL  
CONVERGENCE**

**ABSTRACT:** The first objective of this paper is to evaluate the main results reached in recent years in the rich literature that has flourished on the theme of European regional convergence, with the purpose of establishing whether a consolidated knowledge of the problem has been reached. The conclusion is that while some points have been clarified, others still remain confusing due to the different methods of analysis, periods of time, groups of countries and regional units that have been used. In the second part of the paper a new analysis of European regional convergence is proposed for the period 1975-1997. The focus is on the dispersion of regional incomes over time, which is analyzed through the Theil index of concentration for different groups of countries and periods of time. Theil index is subsequently decomposed in various ways: between countries versus within countries, productivity versus employment rate, between macro-areas versus within macro-areas. Some interesting results emerge, among which is the diminishing weight of national factors in the EU convergence process and the formation of an alternative spatial structure on which to project regional policy strategies.

## **1. Introduction**

Among the regional convergence studies that flourished in the economic literature during the 90s, the European Union dimension received increasing attention. Different motivations can be found for this upsurge in interest: the desire to try out some new tools of analysis; interest in knowing the effects of the Single Market Program on the question of European regional inequalities; the opportunity to establish the effectiveness of the Structural Funds Reform; and more.

It is easy to get lost in the attempt to follow this rich stream of studies. Different methods of analysis, periods of time, groups of countries and regional units have been used, and contrasting conclusions have been drawn. The aim of this study is, first, to clarify exactly where the debate on EU regional convergence stands, and subsequently to offer a new analysis of the problem. Accordingly, in section 2 we distinguish three different courses in European regional convergence studies and illustrate the results obtained by each of them. We conclude that there is still room to undertake a new study on the same topic. The choice of Theil index as the principal tool of our analysis is discussed in section 3, where we show the state and the movement of regional disparities for four groups of countries, EU9, EU12.1 (EU12 without German eastern Länder), EU12.2 (EU12 with German eastern Länder) and EU15, in different periods of time. The contribution of between-country and within-country components to total inequality is considered in section 4, while in section 5 we show the results obtained when between-country and within-country inequalities are again decomposed into productivity and employment rate shares. We compare national versus alternative aggregations of regions in section 6 with the purpose of checking whether national factors are going to be substituted by some purely European spatial factors as a result of the integration process. Finally we draw some conclusions in section 7.

## **2. European integration and regional convergence: what did we learn?**

Two waves can be distinguished in the study of regional convergence at the European Community, now EU, scale. The first one, which we will call traditional, is made up of regional scientists, uses tools typical of regional analysis and is mostly published in regional science literature. The book by Molle, van Holst and Smit (1980) can be considered the main reference in this line of research, while the articles by Suarez-Villa and Cuadrado Roura (1993) and Dunford (1995) are other important

contributions. The official position of the European Commission on the evolution of regional disparities, which has been presented periodically in the reports on the regions, substantially adopts this approach and arrives at similar conclusions.

A break-point in this line of research is represented by the comprehensive study of Barro and Sala-i-Martin, who in 1991 opened a new wave in convergence analysis, both at the international and interregional level. The origin and the tools of the new approach came from the macroeconomists, and more precisely from the field of economic growth. We must note at this point that the initiators of the new wave almost completely ignored the results reached by the traditional one, even though they sometimes drew on its data base<sup>1</sup>. On the other hand, they contributed substantially to revitalizing the field of regional convergence and were able to open a new trajectory of studies which complemented the first ones.

In this section of the paper we will attempt to present the main results reached in some of the numerous studies<sup>2</sup> that have been dedicated to the theme of European regional convergence in recent years with the purpose of establishing whether a consolidated knowledge of the phenomenon has been reached, and, if so, which one.

### *2.1 Traditional studies*

We will start with the study by Molle et al. (1980). The focus of this study is the analysis of a set of 76 programming regions in the Community of nine members between 1950, 1960 and 1970. In fact, three countries (UK, Ireland and Denmark) had not yet joined the community at the time, but the tendency to retrospectively analyze regional disparities independently of the date of admission of different member states will be a constant in European regional convergence studies.

A battery of different indicators of disparity were calculated with respect to both product per capita and product per employed worker. The results established a considerable decrease in disparity, most of which was achieved between 1950 and 1960. By analyzing the regional growth rates it was also shown that the tendency for disparity to decrease was very general: regions with a high initial GDP per capita verified low GDP per capita growth rates while, on the contrary, regions with low GDP per capita levels verified high GDP per capita growth rates.

Moreover, by means of Theil index of concentration it was demonstrated that the majority of total regional disparities in levels of GDP per capita was due to disparities

between the levels of GDP per capita of countries, amounting from 55 to 60 per cent as far as GDP/population was concerned, and from 57 to 60 per cent with regard to GDP per employed worker. On the basis of this last result the authors suggested that “policies to bring national averages into line with the EC average will do more to decrease disparities between regions than policies which aim at a better redistribution of economic resources across the territory of one country.” (Molle et al., 1980, p.160)

The line of research traced by Molle and associates was continued by other authors. New, more reliable data were made available in the meantime and between 1981 and 1985 three new members joined the Community. But certainly more important for regional convergence were the collapse of Bretton Woods international monetary system and the first oil-shock, which in the mid-70s opened a phase of structural adjustment for the European economies.

Two different studies reached very similar conclusions about the effects of this process of adjustment for European regional convergence. Both Suarez-Villa and Cuadrado Roura (1993) and M.Dunford (1995), by using a much richer data base than Molle for twelve member states, found that the process of European regional convergence had stopped at the end of the 1970s, giving way to a phase of divergence through the early 1980s. National factors were still recognized as playing an important role, but the process of adjustment at the interregional scale was considered more interesting. In fact, the economic crisis of the mid-1970s had determined a new map of inequality, with metropolitan areas regaining power, new growth areas appearing in Southern Germany, North-east Italy, Southern France and Mediterranean Spain, and old industrial regions declining.

## *2.2 Beta-convergence studies*

We shall now move to Barro and Sala-i-Martin's contribution (Barro, Sala-i-Martin, 1991). The purpose of these authors was much more general than testing for European regional convergence. Their interest was primarily in international convergence and in testing for the neo-classical model of growth. Growth theory was experiencing a revival at the time, when the new models of endogenous growth had been proposed by Romer (1986) and Lucas (1988). Testing for convergence was an indirect proof of validity for both models, inasmuch as the one predicted convergence and the other divergence among GDP per capita of different economies.

The link between the neo-classical growth model and the convergence analysis of Barro and Sala's study is made clear by the coefficient on which attention is focused: the so called beta-coefficient. In a neo-classical world the positive sign of this coefficient establishes whether a convergence process is in action or not, its magnitude represents the speed of the convergence process, and there exists an inverse relationship between the value of beta and that of the capital share in the aggregate production function.

Now then, the purpose of econometric analysis is not to estimate a simple relationship between the growth rate of different economies and the initial level of their GDP per capita, as regional scientists had been doing since Molle's study, but rather a more complicated relationship in which the steady-state per capita growth rate and the steady-state level of output per effective worker were important explanatory variables. It was in the process of these attempts that Barro and Sala met regional economies, which offered them a more friendly environment for their estimates, since regional data were more numerous and more reliable than international ones and all the exogenous factors more homogeneous within the same national economy. In this case it is acceptable to hypothesize that the steady-state values are the same for the different economies, and the convergence is called absolute. Otherwise, one has to condition the estimate of beta for the different steady-state values. In this case the convergence is called conditional.

Let us go back to European regional convergence. Barro and Sala applied their method of analysis to 73 regions of seven European countries over the periods 1950-60, 1960-70, 1970-80 and 1980-85. After conditioning for country effects and economic structure they obtained a stable estimate of the beta-coefficient and a value slightly below 2 per cent a year, which is very similar to that found for the US states and Japanese prefectures. These results are not in line with those of the traditional studies that we illustrated before, which distinguished some different phases of convergence and divergence for the same total period. But in our opinion the contribution of Barro and Sala's study to the analysis of European regional convergence is not so much in the particular results they obtained, but rather in the stream of studies that they were able to give rise to. Some of these adopted their method and were aimed at improving their results. Others criticized the new approach and tried to find alternative methods. We shall now review some interesting results obtained by the first group.

One important development of Barro-Sala's approach was that of Armstrong (1995a,1995b). This author improved the data base by introducing three new member

states, Greece, Portugal and Spain, for a total of 85 regions in the periods 1950-1970, 1970-1990 and 1975-1992. The sources of data were different for the three periods, but the results obtained within each period showed once more that a regional convergence process had been at work in Europe since 1950 and that it was strictly conditioned by systematic country-specific factors. Some new results were obtained, however. First, the convergence process emerged more slowly than in Barro-Sala's study, that is, under the rate of 2% per year. Second, the rate of convergence found was different depending on the periods of time considered, even after conditioning for country effects and economic structure. The fastest rate of convergence was verified in the 1950s and 1960s, while convergence appeared particularly low in the 1970s and 1980s. A fundamental question was then raised: why had the rate of convergence slowed in the 1970s and 1980s? Third, the attempt to verify the existence of regional convergence clubs within the EU was unsuccessful. The analysis was able to identify neither northern/southern nor central/peripheral convergence clubs notwithstanding the existence of member state clusters of regions with similar growth characteristics.

A role for spatial factors in European regional convergence was, on the contrary, verified by Neven and Gouyette (1995). By estimating the Barro-Sala convergence equation for two groups of European regions (NUTS II level), 43 southern and 98 northern, during the periods 1980-1985 and 1985-1989, these authors were able to conclude that the general tendency for regions to converge was concealing a difference between the two periods and the north and south of Europe. First, a strong instability of the convergence process was verified: whereas regions seemed to converge in the first part of the 1980s, poorer regions didn't seem to catch up in the second half. Second, a strong process of convergence (up to 4.4 per cent a year) was observed among southern regions in the first period, with northern regions at best constant. However, for the second period a strong process of convergence emerged in the north whereas southern regions at best stagnated. Since in the mid-eighties a major change in the trade policy regime had occurred, that is, the Single Market Programme (SMP), this result was interpreted as giving support to the prediction that southern regions might be hurt by the process of trade liberalization across Europe.

A different conclusion about the effects of the SMP was reached in a more comprehensive study carried out by Cambridge Econometrics (Fingleton, Lewney and Pinelli, 1996) for the European Commission (1996). In this case 169 NUTS 2 regions covering EU 12 (excluding the eastern Länder of Germany) were considered during two

different periods: 1975-1987 and 1987-93. The estimation of the beta-coefficient suggests that after 1987 the rate of convergence became faster and that the regions which were lagging behind (border regions, objective 1 and objective 2 regions, peripheral regions) improved their performance. In addition, the role of country-specific influences was highly significant in the first period, but insignificant in the second one. This result leads the authors to conclude that “with respect to regional convergence, it has become less important to which Member State the region belongs. After 1987, regional convergence appears to have become a feature of the community rather than a national characteristics” (European Commission, 1996, p.199). But how much of this change in performance is due to the new European regional policy started in 1988 with the reform of the Structural Funds and how much is due to pure SMP effects remains an open question.

### *2.3 Criticisms of beta-convergence approach*

We turn now to the critics of Barro and Sala’s method. The most systematic and widespread criticisms have been made by D.Quah (1993, 1996b). This author has contended the significance of the beta-coefficient for the study of convergence among different economies. He has shown that a negative sign of the initial levels regression coefficient can be associated both with a growing and a diminishing dispersion of cross-section levels over time. This is not only a theoretical but a factual possibility since the data show recurrent instability in the growth path of different economies during the post-war period. As a result, no region can be considered representative or studied in isolation independently of others. Neither is sigma-coefficient considered a satisfying way to deal with this problem because it also refers to just one characteristic of the cross section distribution and can be associated with substantial intra-distribution dynamics.

According to Quah the only useful way of analyzing convergence is to study the dynamics of an entire distribution. To this end he proposes estimating either the ergodic distribution of a discretized Markov chain process, in which the states represent appropriate income groups, or the shape of the three-dimensional plot of a stochastic kernel, in the continuous case. The ergodic distribution gives the long term equilibrium proportions of economies (countries, regions, etc.) in each state, which remain constant over time. According to this method it is possible that substantial differences of per capita incomes among economies remain in the equilibrium position of the system, as



well as polarization into twin peaks of rich and poor, stratification and formation of convergence clubs.

Quah's approach has received considerable attention in recent times and has given rise to a new stream of regional convergence studies<sup>3</sup>. One of these can be found in the same contribution of Cambridge Econometrics that we mentioned above (Fingleton, Lewney and Pinelli, 1996)<sup>4</sup>. By applying the Markov chain approach to the same data base used for the estimation of beta-convergence, the authors found that for the period 1975-87 there was a slow convergence to a steady state. In this estimated final position most regions had a higher probability of being better off than in 1975, although a consistent number of poor regions would remain. For the 1987-93 period a much faster approach to a steady state was verified. In addition, the regional income distribution at equilibrium resulted much less polarized, with poor regions having been practically eliminated. The results of applying Quah's method appear, therefore, consistent with those obtained in the beta-convergence analysis presented in the same study.

A different criticism of Barro and Sala's approach has been made by Cheshire and Carbonaro (1995, 1996). In this case not only the economic and statistical foundations of the method are questioned, but attention is also directed to the neglect of spatial factors influencing regional growth. First of all, the authors discuss the relevance of regional delimitation for the analysis of regional convergence and propose adopting Functional Economic Areas (FURS), which consist of a city-core and its labor market sphere of influence. Secondly, they suggest looking for variables which reflect systematic spatial influences on the differential growth of city-regions.

Applying these ideas to European regional convergence, Cheshire and Carbonaro estimated a model of growth for GDP per capita of the EU's 118 largest FURS<sup>5</sup>, those with a core city of 200.000 or more and a total population of a third of a million or more, during the period 1979-90. Some explanatory variables were specifically introduced to test the effects of spatial factors. Among these are the change in economic potential resulting from European integration and the growth differential of neighbouring FURS between 1979-86 divided by distance. This last variable should capture the spatial adjustment process in the labour market in the form of alterations to commuting patterns.

The results of the estimation procedure showed the changing role of the economic potential during two different phases of European integration: 1960-1975 and 1979/82-1987/90. While in the first period city-regions grew faster the closer they were to the

“core”, that is, to the Benelux countries and north-western parts of Germany, for the latest period the greatest gains were obtained by areas previously considered “peripheral”. Also the spatial adjustment mechanism performed well, explaining why faster growing FURs were close to less rapidly growing ones. In addition, the coefficient of a variable introduced to identify localised knowledge spillover effects supported the idea that there are increasing returns to the concentration of human capital employed in R&D.

The original approach of Cheshire and Carbonaro has been recently combined with that of Quah by Magrini (1999) and Cheshire and Magrini (1999). Their results reveal the existence of a divergence process in patterns of regional growth over the period 1979-1993. Moreover, “the change in economic potential resulting from European integration tends to reinforce the divergence pattern both within the group of poorer regions and between this group and that of richer regions. This could be interpreted as lending support to the European Commission’s concerns about peripherality and, from a theoretical point of view, to the new economic geography literature.” (Cheshire and Magrini 1999, p.17)

At the end of this rapid excursus on EU regional convergence studies, what did we learn? Can we offer a definitive answer about the effects of European integration on regional convergence? Are we able to conclude in favor of either convergence or divergence? What do we know about the factors that determine regional convergence at the European scale? Even though it is not possible to give conclusive answers to all these questions, in our opinion a common wisdom on some relevant points has been reached.

First of all, it seems sufficiently clear that two different phases must be distinguished in the process of European regional convergence. The first one goes from the Treaty of Rome to the mid 70s. It is characterized by a greater homogeneity of the member states and a sustained, continuous rate of growth at the international level. In this period we have clear evidence of a regional convergence process, which, however, is gradually slowing down. National factors play a pre-eminent role, so that regional convergence is fundamentally determined by national convergence.

After the mid 70s many factors contributed to changing the general framework in which regional convergence was taking place: a new phase of the international economy, the appearance of a new technological paradigm, the entry of new state

members at a much lower level of development, the deepening of the integration process. As a consequence, the long term tendency to converge becomes difficult to recognize, while in the middle term phases of convergence clearly alternate with phases of divergence. This, more than the different methodologies employed to detect convergence is, in our opinion, the reason why we are confronted with studies producing different results. The correct delimitation of time periods becomes essential, as well as the availability of a long series of homogeneous data, in order to reach a definitive conclusion about European regional convergence after the mid 70s.

Another reason that can explain some controversial results is the delimitation adopted for the regional units. Here we must agree with Cheshire and Carbonaro that regional delimitation is not neutral to the analysis of convergence and that states, regions, and cities are not interchangeable units. We could add that different levels of regional delimitation may be jointly useful; while FURs pertain to a micro-territorial level, we might also be in need of a macro-territorial one. As integration proceeds and national factors lose explanatory power, some macro-spatial factors could replace them. But in this regard a straight core/periphery, north/south dichotomy could be overly simplistic. We are in need of a truly European regional delimitation on which to project the regional convergence process.

### **3. European regional convergence revisited.**

Notwithstanding the great number of studies that have been dedicated to the subject of European regional convergence in recent years, we think there is room to undertake another one along the following lines. First, it is now possible to analyze, through a homogeneous dataset, a period of almost 30 years starting from 1975.<sup>6</sup> We consider this a great opportunity to detect the long term tendencies set off after the change in the general conditions of convergence that was verified in the mid 70s.

Second, in analyzing regional convergence, we shall go back to the traditional tools of regional scientists, which have been abandoned in the more sophisticated analysis of macroeconomists. We think that the traditional tools are still useful and we follow Cheshire and Carbonaro's suggestion to separate the study of regional growth from that of regional convergence. We are in complete agreement with their idea that the actual pattern of the dispersion of regional incomes over time "is a valid dimension of equity

with which policy, at least in the EU, is specifically concerned” (Cheshire and Carbonaro 1995, p.109).

Third, we detect the existence of a trade-off between national convergence and regional convergence. This is an aspect that the recent literature has not emphasized, but it can be very important in view of the new enlargement of EU to some ex-socialist countries and of the readjustment of European regional policy strategies that will therefore become necessary. Finally, we propose a new identification of the macro-spatial factors that condition European regional convergence and we look for their changing role during the integration process.

Our adhesion to the tradition of regional scientists is reflected in the choice of Theil index of concentration as the principal tool used to verify regional convergence. Various authors (Batty 1974, 1976; Walsh and O’Kelly 1979) have shown the merits of this index for analyzing spatial distributions, among which are its weighting system and its decomposibility. We think that these characteristics are particularly useful for a regional context as heterogeneous as the NUTS adopted by Eurostat and for the development of a significant aggregation of the basic units. The index has been applied to the data of population, total GVA in 1985 Euro and total employment furnished by Cambridge Econometrics at the level of NUTS2 for different groups of EU countries during the period 1975-1997. We have made some adjustments of the NUT2 delimitation, and precisely: 1) NUTS1 rather than NUTS2 have been adopted for Belgium, Germany, Greece, Netherland, Austria and UK; 2) Denmark has been divided into three units following the Cambridge Econometrics data set; 3) Groningen has been eliminated from Netherland to avoid the distortion introduced by gas production in the record of its output; 4) Spanish Canarias and Ceuta y Melilla, French Departments d’Outre Mer, Portuguese Açores and Madeira, Finnish Ahvenanmaa have been eliminated from the analysis for their peculiar geographical position. In this way a total of 122 regional units has been obtained.

Figure 1 shows the values of Theil index  $(T)^7$  for four different sets of data corresponding to subsequent phases of the Community’s enlargement. We divide EU12 into two groups, EU12.1 without the German eastern Länder and EU12.2 with the German eastern Länder. In this way we are able to follow each group of countries from the year of entry till the end of the period considered, rather than retroactively as has been usually done. We feel this procedure is more appropriate if the principal interest lies, as in our case, in the effects of the integration process on regional convergence.

According to Figure 1 regional inequality at EU9 level remained practically constant during the whole period considered. Some phase of divergence and convergence can be distinguished, but the long term tendency is clearly in favor of a stationary situation. We could argue that the 9 countries that were already together in 1975 reached a long term equilibrium as far as regional inequality is concerned.

After 1985 Theil index was recalculated by adding three new members, Greece, Spain and Portugal. The effect of this entry for regional inequality is dramatic: the index more than doubles. But the tendency is now towards convergence for the remaining 12 years considered.

A new consistent increase of Theil index is registered after 1991 with the entrance of the German eastern Länder. In this case we notice a rapid decrease of the index during the next three years. Finally, the entrance of the last three members, Austria, Finland and Sweden, in 1995, has quite a neutral impact on regional inequality with the index going back to the level of EU12.1.

In conclusion, it seems that EU regional convergence in the period considered was fundamentally determined by the entry of the less developed countries (Spain, Portugal and Greece) and regions (German eastern Länder). The group of the most developed countries seems frozen at the level of regional inequality reached in the mid 70s.

#### **4. The contribution of between countries and within countries disparities to European regional convergence.**

One advantage offered by Theil index is its adaptability to different kinds of disaggregations. Following Molle and associates (1980) we first consider the disaggregation of total inequality in between-country and within-country components.<sup>8</sup> Figure 2 shows that in 1975 the role of between-country inequality is not the most important at the EU9 level; its contribution to total inequality is only 34% at the beginning of the period and falls to 19% at the end. On the contrary within-country inequality makes the greatest contribution and grows during the whole period, mostly after 1985. This suggests that in connection with the entry of the three new Mediterranean countries the problem of within-country inequality worsened at the EU9 level.

Some more light can be shed on this aspect by looking at Figure 3, where the shares of France, Italy, UK and Germany, with respect to within-country inequality,

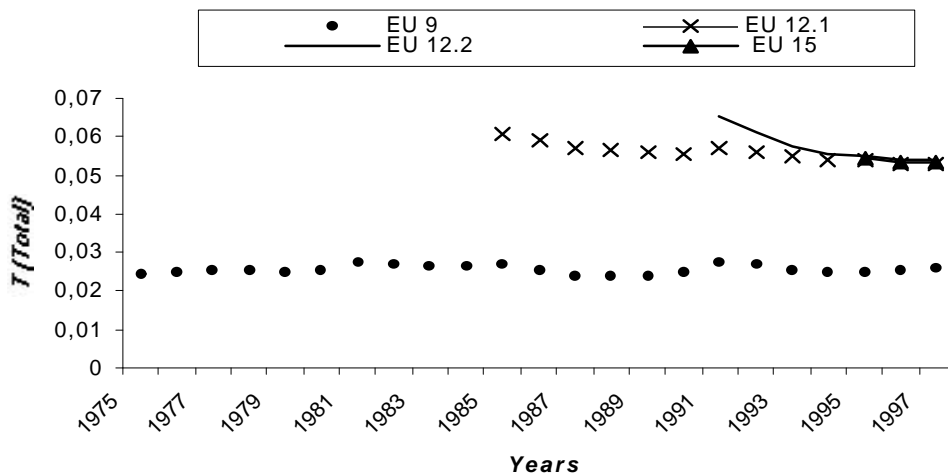


Fig.1. Theil coefficient, total inequality between European regions

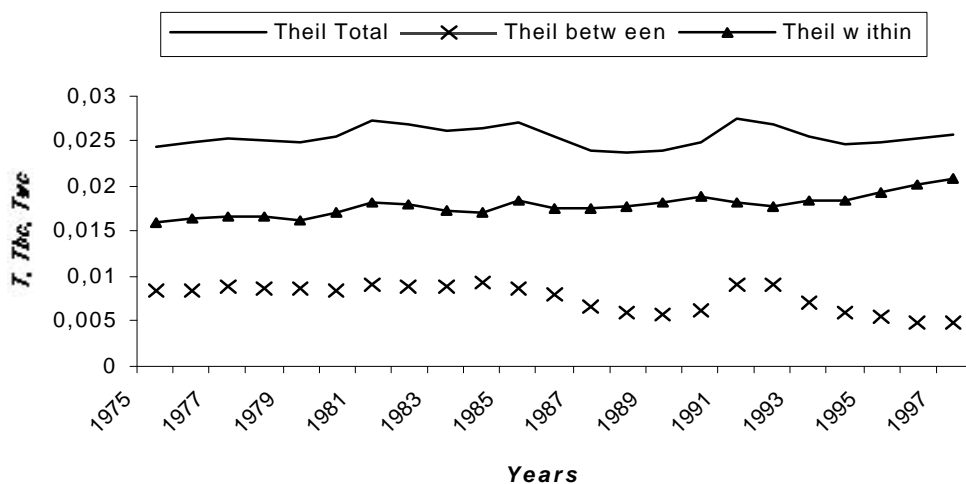


Fig.2. Theil coefficient, total (T), between-country (Tbc), within-country (Twc), EU9

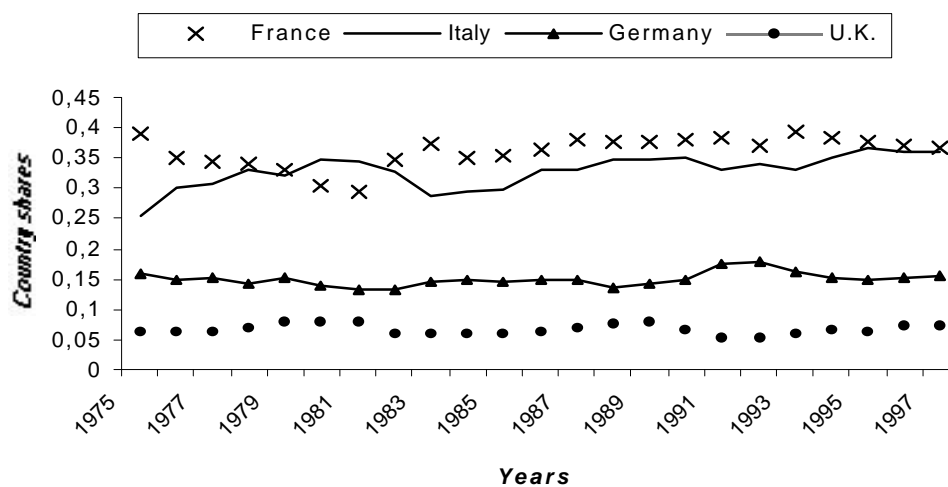


Fig.3. Theil coefficient, country shares of within-country inequality, EU9

have been reported. The most interesting results are those obtained for France and Italy, which absorb the most relevant shares. There is clear evidence of a worsening of the Italian position, whose share grows from 25% in 1975 to 36% in 1997. The entry of the new countries seems to have hurt the weakest southern regions of Italy. But France, too, verifies the growth of its share in connection with the new enlargement.

Going to the same decomposition at the EU12.1 level, we see in Figure 4 that the greatest share is now absorbed by the between-country component, which covers 70% of total inequality in 1985 and 61% in 1997. At this level, too, we notice some trade-off between the two shares, with countries converging and regions within countries diverging. The greatest shares are still those of Italy and France, as we can see in Figure 5.

Finally, for the last three years considered we report in Table 1 and Table 2 the results of the same decomposition at the EU15 level, with German eastern Länder included. The share of between-country inequality fell to about 54%, while the contribution of Germany became the greatest with a share of about 30% of within-country inequality.

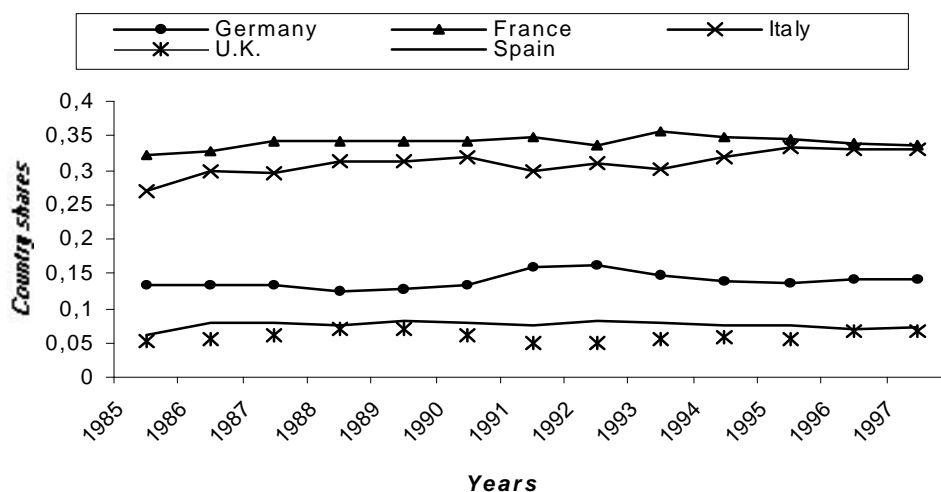
What we are able to conclude from this kind of analysis is that the environment in which regional convergence has taken place at the EU level has continuously changed since 1975. First, the new general economic scenery of the mid 70s seems to have interrupted the process of regional convergence at the EU9 level. Subsequently, the entry of three new Mediterranean countries and the start of the Single Market Program seem to have hurt the weakest regions of the 9 old members. Finally, the absorption of the German Länder has altered the position of each country with respect to total inequality. In these turbulent conditions it becomes impossible to recognize a general tendency either to converge or diverge.

## **5. The contribution of productivity and employment rate to between country and within-country disparities.**

Theil index can also be decomposed into a productivity component and an employment component.<sup>9</sup> By combining this type of decomposition with that of the preceding section, we obtained the contribution of productivity and employment rate to the between-country and within-country disparities. In Figure 6 and Figure 7 we present the results for EU12.1 in the period 1985-1997, which are very similar to those



**Fig.4.** Theil coefficient, total (T), between-country (Tbc), within-country (Twc), EU12.1



**Fig.5.** Theil coefficient, country shares of within-country inequality, EU12.1

**Table 1.** Theil coefficient: total, between- and within-country, EU15, 1995-1997

Years	Total	Between-country	Betw./Total	Within-country	With./Tot.
1995	0.0543	0.0307	0.57	0.0236	0.43
1996	0.0534	0.0296	0.55	0.0238	0.45
1997	0.0531	0.0290	0.54	0.0242	0.46

**Table 2.** Country shares of within-country inequality, EU15, 1995-1997

Years	Belgium	Germany	France	Italy	UK	Spain
1995	0.02	0.34	0.25	0.25	0.04	0.06
1996	0.02	0.32	0.26	0.25	0.05	0.05
1997	0.02	0.32	0.26	0.25	0.05	0.05



obtained for the other sets of data considered in section 4. We observe that productivity absorbs the greatest share of between-country inequality while the rate of employment absorbs the greatest share of within-country disparity. In addition, productivity disparities remain almost stationary both between countries and within countries in the period considered, while employment rate disparities decrease between countries and increase within countries.

These results suggest that a policy whose objective is to reduce regional inequalities at the EU level should follow two different strategies, one aimed at reducing productivity disparities among less and more developed countries and the other one aimed at reducing employment rate disparities within both less and more developed countries.

## **6. Spatial versus national factors in European regional convergence.**

In section 2 we noticed that EU regional convergence studies have often introduced spatial factors in terms of either a core/periphery or north/south dichotomy. The results have not been concordant, depending on the periods and on the analytical tools adopted. We decided to reconsider these hypotheses, with the aim of establishing whether a meaningful macro-spatial structure exists in Europe and whether it is gaining relevance with respect to the national one. This is exactly what should happen in a more integrated Europe in which national borders will become less important and regions will directly interact with each other.

A core/periphery structure is, generally, identified by making use of the concept of economic potential. A well-known application of this concept to the European Community of twelve member states is that of Keeble, Offord and Walker (1988). Recently, a new study was carried out for the Community of 15 members by Copus (1999)<sup>10</sup>.

In our view a straight core/periphery structure is too simple to include all the macro-spatial factors that condition regional convergence at the EU scale. On this point we refer to Peschel (1981), who suggested that the distance variable reflects the influence of the past on the contemporary spatial pattern of production and trade, more than transportation and communication costs. In other words, distance could be interpreted as a proxy for the influence of historical, cultural and linguistic affinity. In this line of reasoning a similar value of the economic potential could have very different

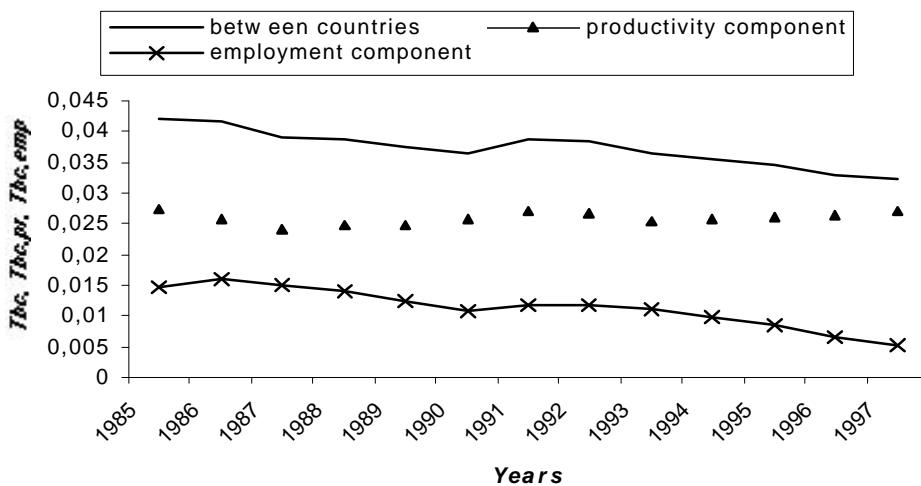


Fig.6. Theil index, between-country (Tbc), productivity (Tbc,pr) and rate of employment (Tbc,emp) component, EU 12.1

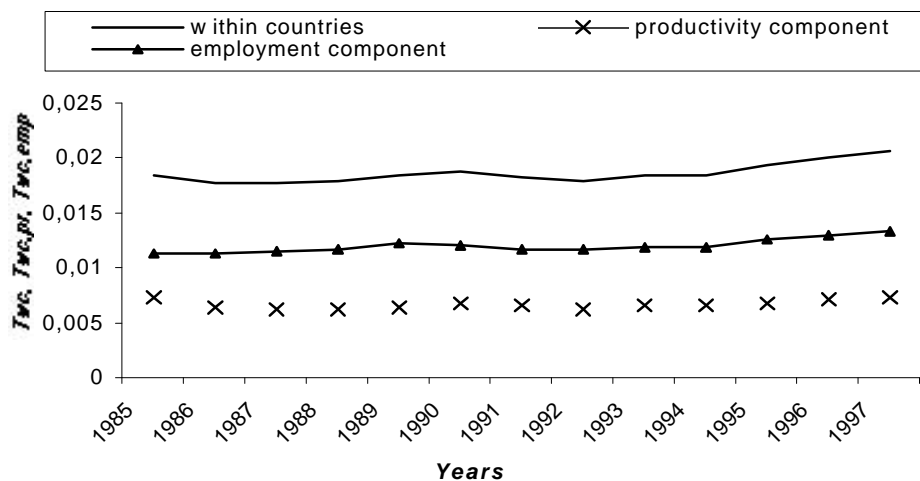


Fig.7. Theil index, within-country (Twc), productivity (Twc,pr) and rate of employment (Twc,emp) component, EU 12.1

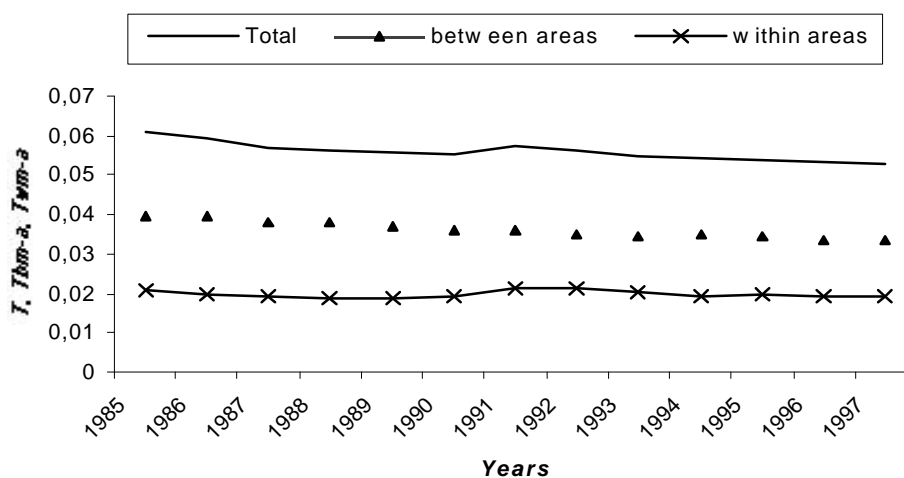


Fig.8. Theil index, total (T), between-macro-areas (Tbm-a), within macro-areas (Twm-a), EU12.1

impacts in Ireland, Scandinavia or Sicily. Following this line of reasoning, we tried to combine the peripherality of regions in terms of economic potential with their cultural and historical background, which we thought could be reflected in the northern/southern location. In some way we are putting together the core/periphery, north/south dichotomies analyzed in previous studies.

In Figure 8 we present the results obtained for five macro areas of EU12.1 in the period 1985-1997. Following Keeble and associates (1988) our regions were first classified in central, intermediate and peripheral; subsequently, the peripheral were divided into two groups: the northern peripheral and the southern peripheral. Figure 8 shows that the between-area component covers the greatest share of total inequality going from 65% in 1985 to 63% in 1997. Comparing this share with that of the between-country component during the same period reported in Figure 3, we find that the last one has been losing weight, going from 69% in 1985 to about 61% at the end of the period.

We repeated the same type of decomposition for EU15, using Copus' (1999) recent study as a basis for the initial delimitation of regions in central, intermediate and peripheral. Then, we divided the peripheral regions into northern and southern ones. The results are reported in Table 3 for the only three years for which data are available. Again we find that the between-area inequality reaches the greatest share of total inequality (60%). Going back to Table 1 we can see that the between-country share was about 54% in the same period.

**Table 3.** Theil coefficient: total, between- and within macro-areas, EU15, 1995-1997

Years	Total	Between-areas	Betw./Total	Within-areas	With./Total
1995	0.0543	0.0321	0.59	0.0222	0.41
1996	0.0534	0.0316	0.59	0.0218	0.41
1997	0.0531	0.0318	0.60	0.0213	0.40

From our point of view, these results lend some support to the hypothesis that a delimitation of European macro-areas on the basis of peripherality and northern/southern location has gained weight in comparison to the national one and could usefully substitute countries both in regional convergence studies and as a basis for delineating regional policy strategies.

## 7. Conclusions

This study has examined once more the widely treated issue of regional convergence in the EU territory. Some special traits distinguish our approach. We have considered regional convergence in the new phase of development begun in Europe in 1975 up until 1997. The length of the period considered has made it possible to put regional convergence in the appropriate framework, which is essentially long-term in nature. In the choice of the methodological approach we have reposed the traditional tools of regional scientists rather than experimenting with the new tools introduced by macroeconomists. In this way we are able to show that the results obtained with the old simple techniques are very similar to those reached by the most sophisticated ones. In addition, we are able to introduce some neglected aspects, such as the problem of weighting the contribution of different regions and that of finding a coherent European spatial structure.

Our principal conclusion is that the process of European convergence has been a very discontinuous one, due to the continuing change in the surrounding environment in which convergence has taken place. Each entry of new members has changed the conditions of regional convergence for the old ones and hurt some of their weakest regions. This has been the case of the Italian “Mezzogiorno”, which is still waiting after 45 years of European integration to solve its serious problems. These could become the effects of the new entry of ex-socialist countries in the near future. It follows that European regional policy should follow differentiated strategies for the weak regions of old and new member states. For the first group attention should be directed towards preventing national convergence at the expense of regional divergence, while for the second group instruments must be found to protect the regions most hurt by the competition of the new members.

Finally, we think we have brought some evidence in favour of gradually diminishing relevance of the national factors in the European regional convergence process and the formation of an alternative macro-spatial structure. It is our conviction that more work should be done and more effort spent in this direction in the future.

## Notes

<sup>1</sup> Barro and Sala-i-Martin (1991) used Molle, van Holst and Smit's (1980) data for 1950, 1960 and 1970 without making any comment on the methodology and the results obtained in their study.

<sup>2</sup> It is not our intention to carry out an exhaustive review of the rich literature on this theme, but to draw attention to those studies which in our view have reached the most interesting results.

<sup>3</sup> Quah himself has applied his method to European regional convergence in two different studies (Quah 1996a; European Commission 1999). His main results are the great stability and persistence in the regional income distributions during the period 1980-1989 and the importance of spatial spillovers from physically adjacent regions.

<sup>4</sup> Fingleton has subsequently extended the same analysis in two different studies (Fingleton 1997, 1999).

<sup>5</sup> A total of 122 largest FURS was obtained for EU12, but 4, those of Greece and Portugal, had to be excluded because of lack of data.

<sup>6</sup> We refer to the dataset collected by Cambridge Econometrics. The principal source of this is the REGIO database of Eurostat, which has been extended, completed, updated and verified from the regional consultant network within the European Economic Research and Advisory Consortium (Fingleton, Lewney, Pinelli 1996, pp.123-125). We gratefully acknowledge Cambridge Econometrics for giving us access to this dataset.

<sup>7</sup> Theil index was calculated according to the following formula:

$$T = \sum_r y_r \log(y_r / x_r) \quad (1)$$

where  $T$  is total inequality among regions,  $y_r$  and  $x_r$  are regional shares of European GVA and population respectively. A dual form also exists, in which the role of population shares and GVA shares are interchanged, but in our case it seems more appropriate to weight the contribution of each region to inequality by its economic rather than by its demographic strength.

<sup>8</sup> The following formulas were calculated:

$$T = T_{bc} + T_{wc} \quad (2)$$

$$T_{bc} = \sum_c Y_c \log(Y_c / X_c) \quad (3)$$

$$T_{wc} = \sum_c Y_c \left[ \sum_r (y_r / Y_c) \log(y_r / Y_c / x_r / X_c) \right] \quad (4)$$

where  $T$  is total inequality,  $T_{bc}$  is between-country inequality,  $T_{wc}$  is within-country inequality,  $y_r$  and  $x_r$  are regional shares of European GVA and population respectively, and  $Y_c$  and  $X_c$  are the same shares for countries.

<sup>9</sup> The following formulas apply:

$$T = T_{pr} + T_{emp} \quad (5)$$

$$T_{pr} = \sum_r y_r \log(y_r / n_r) \quad (6)$$

$$T_{emp} = \sum_r y_r \log(n_r / x_r) \quad (7)$$

where  $T$  is total inequality,  $T_{pr}$  is the share of total inequality due to regional differences in labor productivity,  $T_{emp}$  is the share due to regional differences in employment rate (=ratio of employed to resident population),  $y_r$ ,  $n_r$  and  $x_r$  are the shares of European GVA, employment and population of region  $r$ .

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