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Convergence and asymmetries in the employment dynamics of the European regions

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ENRICO MARELLI

"Convergence and asymmetries in the employment dynamics of the European regions".

Abstract

In the European countries - particularly among the members of the European Economic and Monetary Union - a satisfactory degree of nominal convergence has been achieved. As to *real* trends, the *convergence* process has not been completed and, in some cases, not even started; the structural characteristics of labour markets, as well as their macroeconomic performance, are one significant example. The aim of this paper is to compare the long-run evolutions of employment and unemployment in the *European regions*. I made use of different databases (Eurostat's Regio, Oecd, Crenos), for the last two (and in some cases four) decades, and considered the five biggest countries: (West) Germany, France, the United Kingdom, Italy, Spain; the number of regions included is about 80.

The first result of my empirical research confirms that - in several European countries - the *unemployment rates* have been high and increasing over time, while the *employment rates* have been slowly decreasing. A second result is that the *dispersion* (of a *s-type*) in regional employment and unemployment varies in intensity from country to country, but it has been growing almost everywhere and it seems positively related to the mean (national) values; on the other hand, a convergence (of the *b-type*) has been found only in certain periods and considering specific subsets of countries. Finally, it seems that the average employment growth is negatively related to the cross-regional dispersion (in employment growth rates) and positively associated with the corresponding cross-country dispersion.

JEL classification: J32, O52, R11

Keywords: employment, growth, regional economies, regional disparities, EMU, shocks, economic structure.

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1. Introduction

The purpose of this paper is to examine the long-run behaviour of employment in the European regions. In the recently born European Economic and Monetary Union (EMU), two main problems are still waiting for an answer:

- once a satisfactory degree of *nominal convergence* has been achieved, how can we deal effectively with the problems of *real convergence*, and particularly with the huge unemployment and the other labour market problems, which characterise – on average – EMU's countries?
- will national and regional differences increase or decrease in the EMU context?

As we shall see in the next section, the two questions are strictly linked. I can anticipate that it is the presence of frictions or obstacles to the adjustment process, especially after asymmetric shocks and particularly in the labour markets, which can make persistent the disparities between regions and nations of the EMU's area. This type of theoretical considerations is discussed in Section 2.

A survey of previous empirical works on regional disparities in Europe is then presented in Section 3, by concentrating on the most recent literature about the empirical tests of the "optimum currency area" hypothesis, the differentiated answers to different types of shocks and the comparisons between the European situation and the US's case.

In the past, regional disparities in Europe have been studied by focusing on per-capita income, production or productivity. Thus, my original contribution is to analyse regional differentiation in terms of employment dynamics. In Section 4, I present a descriptive analysis on employment rates (total employment divided by working-age population) and employment growth rates, highlighting the asymmetries existing between the European regions and the (limited) convergence resulting from the data. I made use of Eurostat's Regio data set, for the period 1979-97, by limiting (at this stage) to the five biggest countries: (West) Germany, France, United Kingdom, Italy, Spain.

In Section 5, by making use of a different data set, prepared by OECD, I consider a longer period (1960-1996), at least for some countries. In this case, I have examined also the comparative behaviour of regional unemployment rates in the long run.

In section 6, from a descriptive analysis I try to move to a tentative explanation of the observed trends, by making use of a still different database (from Crenos). The countries are once more the five biggest European countries and the period is 1977-91. I have used different econometric methods, and particularly some panel-data regressions, in order to capture the heterogeneous behaviour of the European regions and the differentiated impact of various types of shocks: structural or aggregate shocks. The original result is the differentiated impact coming from the (inter)regional dispersion in employment growth rates compared to the (inter)national one.

Some conclusions, including some implications for European or national economic policies, are drawn in Section 7.

2. Regional disparities, labour market performance and the EMU

A huge unemployment still persists in many European countries, particularly the most central ones, and is probably the biggest problem that policymakers have still to solve as well

as a serious challenge to EMU. As a matter of fact, the existence of wide variations in labour market performances and, more specifically, in unemployment rates may undermine the success of EMU, which in turn may perpetuate, at least for a transitional period, such disparities. In the new policy regime, a shock may hurt some specific economies and cause a substantial damage, because of the absence of appropriate economic policy instruments (Eichengreen, 1993). In particular, within the new EMU's policy regime (Buti and Sapir, 1998), mention should be made for the lack or deficiency of:

- monetary and exchange-rate policies at the national level,
- fiscal policies, both at the national level - because of the restrictions implied by the *Pact for Stability and Growth* (as well as by the transition to fiscal harmonisation) and at the community one: in the latter case, it has been noted the deficit of a centralised (or at least centrally-coordinated) European fiscal policy or of a system of automatic fiscal transfers from the EU budget (also because its size is quite limited).

No matter if the shock is demand-side or supply-side, symmetric or asymmetric, there may be *different responses* in the divers countries (or regions), with more or less pronounced *real effects*. In the case of asymmetric shocks, production and employment may rise in certain economic systems and fall in some other economies. But even symmetric shocks may lead to differentiated responses, at least in terms of the intensity of the effects, due to the different economic structures.

The real effects comprise all the traditional effects on *real variables*: production, real income, employment and unemployment. However, in this research I am particularly interested in *labour market* evolutions. The theoretical reason is that most of the literature on monetary unions and optimum currency areas has drawn attention to the flexibility of wages and to the mobility of workers as possible adjustment mechanisms after a shock. But also on the empirical side, with more than 16 million people unemployed, the employment problem is still to be considered the absolute priority in the EU.¹

It is possible that the heterogeneous responses of the economic systems will be felt also at the *national* level, with some countries gaining and some others losing from shocks arriving in the monetary union. However, it is much more likely that divergent responses will be experienced *by regions*, particularly in view of the more marked specialisation of the economic systems at the regional level.

When we talk of *employment dynamics*², we should consider both *short-run cyclical* evolutions and in *long-run dynamics*. In the latter case, in order to explain the natural (or structural) rate of unemployment, the structural characteristics of the economic systems are of primary importance, as it is shown by the *neoclassical growth models* or the *endogenous growth models*³, on one side, and by the *development theories*, on the other side.⁴

¹ See the surveys by Bean (1994), Nickell and Layard (1998).

² In recent growth models, employment is connected to economic growth through different links (some of them are discussed in Nickell and Layard, 1998). It is just worth to mention that, in some models, high rates of growth are associated with high unemployment: for example, in the model of Aghion and Howitt (1994), a greater rate of growth leads to more innovation, wider labour reallocations and, at the end, higher unemployment.

³ The relevant structural parameters are, respectively, the rate of population growth, the saving rate, the depreciation of physical capital, and the rate of technical progress for the first class of models; the degree of returns to scale, the rate of investment in human capital, the degree of technological diffusion, and the type of linkages between sectors, according to the second type of models.

In the case of *short run* cyclical evolutions of employment and unemployment, I should mention, on the contrary, the role of aggregate demand shocks or also of supply-side shocks, such as asymmetric shocks that imply a shift in the labour allocation (e.g. between sectors or across regions). Aggregate demand shocks include, of course, the effects of standard macroeconomic policies. Also in this case, however, the *structure* of the economy is important, whatever the initial shock, in order to uncover the transmission (or propagation) mechanism of the disturbance and to understand the effects on the *real* economy. Of course, the final real effects will depend both on the behaviour of economic agents, given the economic structure (*market response*), and on the possible implementation of counteracting macroeconomic policies (*policy response*).

Asymmetric shocks, which for instance modify the sectoral structure of production (because of technical progress, change in tastes or modifications in the international division of labour), have been particularly studied. Two types of economic effects can be identified:

1. in terms of distributive issues, the “allocative” shocks imply that production and employment may increase, at least temporarily, in some sectors or regions and decrease in some other industries or territorial areas: this is the argument against currency areas to be built between heterogeneous countries;
2. moreover, even if we focus on aggregate (national or European) trends, the existence of rigidities in the labour market and of frictions in the adjustment mechanisms (including the degree of labour mobility) will cause a slow growth of employment also in the expanding sectors, thus aggregate employment will temporarily slow down: this was the famous Lilien’s theory of *sectoral shifts* (1982), that was also empirically tested.⁵

An example of an asymmetric shock is provided by a *sector-specific* shock. This shock, in turn, may become *country-specific* - or, even more presumably, *region-specific* (given the higher degree of openness and greater specialisation of regions) - because of the concentration of production and the operation of regional specialisation effects. We also know that regional scientists have traditionally emphasised the role of the external (localisation and agglomeration) economies; increasing returns to scale are one of the distinguishing features of the "new growth theory" and the "new trade theory. From this point of view, sustained by Krugman (1991), economic integration is likely to lead to increased specialisation, diverging economic structures, and contrasting growth rates: this will be the conceivable effect of EMU.⁶

Recent empirical work has been devoted, by many scholars, to assess the relative importance of symmetric vs. asymmetric shocks. In any case, according to what we have said before, the distinction symmetric vs. asymmetric is even less critical, if there are substantial differences in the economic *structure* (see Marelli, 1997). As a matter of fact, the same

⁴ Here, the relevant structural conditions are the sectoral mix of production and the labour force participation rate, together with many other characteristics: firms size, extension of the underground or informal economy, dualistic aspects of product and labour markets, immigration rates, levels of education, changes in the international division of labour, government policies, etc. (with the addition, in some studies, of extra-economic elements: social, cultural, religious, political).

⁵ Lilien found that the unemployment rate was (in the US case) positively correlated over time with a sectoral dispersion index (*sigma*), computed as follows: $s_i = [S_i N_{it}/N_t (\mathbf{D} \ln N_{it} - \mathbf{D} \ln N_t)^2]^{1/2}$ where: *i* identifies an individual sector, *N* is employment, **D** is the first difference operator and *ln* stands for logarithm.

⁶ “The penalty is that regional economies, being less diversified, are more subject to technology and demand shocks. This leads to a greater risk of severe region-specific recessions. It also leads, in the presence of high factor mobility, to large divergences in long-term growth rates” (Krugman, 1993, p. 247).

aggregate shock (due for instance to the international business cycle or to a common technological innovation) may produce divergent effects in different regions (or countries), in view of diversities in sectoral specialisations, nominal rigidities, labour mobility, structural policies and heterogeneous institutions; i.e., the divergent real effects may arise from the different propagation mechanisms or from an *asymmetric regional response* to an aggregate shock.

After having shown that even an aggregate (or symmetric) shock may bring about, given divergent economic structures⁷, heterogeneous effects in the different sectors or in the divers regions (or countries), one might ask: what is, more precisely, the meaning of *economic structure*? We can simply start from the theory of the *optimum currency areas*⁸ which identifies the following elements, including the alternative adjustment mechanisms:

- the nominal flexibility of the system (in terms of prices and wages);
- the international (and interregional) mobility of resources: capital (real or financial investments) and especially labour;
- the degree of openness of the economies and the sectoral composition of production (together with the diversification or concentration of industries);
- the institutional organisation of markets, especially of the labour market⁹;
- the fiscal structure (including the system of fiscal transfers), along with the implementation of industrial, regional, educational, and other structural policies.

In the EMU, in the absence of the traditional tools of economic policy (exchange-rate, monetary, and also fiscal), some reforms of product, labour and capital markets - perhaps together with an appropriate system of fiscal transfers - may be the only way to bend the economic structure in a way to minimise the negative effects of shocks and to avoid, in some countries and regions, a further rise in unemployment rates. Only in this case, can we speak of *real convergence*, in contrast with (or as a complement of) the concept of *nominal convergence* characterising the Maastricht Treaty and the Stability Pact.

In the long run, the real convergence implies the narrowing of the differences in the structural conditions of different countries, thus allowing the achievement of *similar steady states* in the process of growth (as maintained by the *conditional convergence* hypothesis in the economic growth literature). In the short run, the real convergence - that is reflected in *similar reactions* of real variables (production, employment, etc.) to economic shocks - facilitates the macroeconomic adjustment after (symmetric or asymmetric) shocks. If real convergence is missing and economic structures are divergent, the obvious consequence is that also the *policy responses* should be differentiated, by country or by region.

⁷ A recent empirical research on how macroeconomic shocks may be magnified by “imperfect” economic structures has been carried out by Blanchard and Wolfers (1999), with reference to 20 countries of the OECD area over four decades (starting from 1960).

⁸ The seminal work was by Mundell (1961), but it was Kenen (1969) who stressed the degree of industry or product diversification as a determinant of the symmetry of shocks; of course, a given industrial structure may make a certain area more vulnerable to asymmetric shocks. As to the more recent refinements, see Tavlas (1993).

⁹ This includes the system of industrial relations, the degree of corporativism and the centralisation in the process of wage setting, as well as the existing legislation concerning minimum wages and unemployment benefits.

3. Previous evidence on regional disparities and labour market problems in Europe

Among the various disaggregations of the economic structure, the *regional* one can be considered particularly notable.¹⁰ Also recent studies have shown that the unemployment problem has a relevant regional dimension. In many European countries, the dispersion in regional unemployment rates appears to be persistent (besides being correlated to the presence of long run productivity differentials).

In Europe, *interregional disparities* are much deeper than international ones. In the EU, the wealthiest region has an income per capita about 6 times higher than the poorest one, while the gap between the most developed and the least advanced country is only 2 or 3 times.¹¹ Over time, it seems that interregional disparities in per capita incomes have decreased from the '50s to the '70s, while the pattern has become less clear in the '80s (Sala-i-Martin, 1996).

More precisely, the *convergence process* in the '60s and early '70s (up to 1973) was stronger in the regions of the European Community (than in other European regions): here, convergence is of course to be meant as *b-convergence* and refers to all European regions (Barro and Sala-i-Martin, 1995). On the other hand, *within-countries* convergence - although present almost everywhere in this period - has been generally smaller in the Southern European regions. Moreover, also in the EU's convergence period (the '60s and '70s), the rate of convergence was not particularly high (2 per cent per year)¹², a speed unsatisfactory for many European regions, if one important objective of the EU is economic cohesion. In some other empirical studies, the speed of convergence has been estimated at lower levels; for example, at 1 per cent per annum for the period 1970-90, by Armstrong (1995).

According to many researchers (see, for example, Tondl, 1997; Canova and Marcet, 1995), at the end of the '70s, the speed of convergence decelerated in the Community's regions and, in the '80s, regional convergence either disappeared or was substituted by *club* convergence (Fagerberg and Verspagen, 1996). From a spatial perspective, the southern regions of Europe have converged in the early '80s, while the north of Europe has shown a better performance in the second part of the '80s (Neven and Gouyette, 1995). Disaggregating in terms of "economic centrality", it has also been discovered (Rombaldoni, 1998) that in the period 1981-94 the highest speed of convergence (about 10 per cent) has been experienced by the "intermediate" and "inner peripheral" EU regions, while a lower speed of convergence (3 per cent) has been exhibited by the two extreme group of regions, the "central" and the "outer peripheral" ones (the latter, however, have been recovering since 1988, probably because of the increased EU's spending on structural funds after 1988). In some researches (Paci, 1996), convergence between European regions has been found in the '80s too, but only in terms of *productivity* levels (still at a reduced pace also in this case), rather than on the basis of per capita incomes.

Nowadays, the process of economic and monetary integration itself, although presumably promoting a faster pace of growth for Europe as a whole in the long run, may produce uneven spatial effects and, at least temporarily, increase the existing disparities

¹⁰ For this section, I have extended my previous research (Marelli, 1997, 1998).

¹¹ See also Paci (1997).

¹² A similar value for the rate of convergence was obtained by Barro and Sala-i-Martin, in many researches carried out in the early '90s, for both the US states and the EU regions (Sala-i-Martin, 1996). The first important empirical work in the case of the US was the one by Blanchard and Katz (1992).

(Abraham and Van Rompuy, 1995). The risk is that, due to the inadequacy of appropriate compensating measures, the process of economic and monetary integration may conflict with the EU's goal of *economic and social cohesion*, especially in the presence of substantial structural differences between the European regions (as I have stressed in the previous section).

The *structural* characteristics of European regions have been investigated by many researchers, sometimes by contrasting the European situation with the US one. This comparison, which is different from the confrontation between the two areas in terms of their capacity to create new jobs (the latter is the object of the studies on the *euroclerosis*, the flexibility of the labour markets, the tax burden, etc.)¹³, is made in order to infer some conclusions about the EMU project. They have examined, in particular, the degree of similarity¹⁴ and the speed of adjustment after shocks.

Some researches, by analysing the *output correlations* of EU countries with the leading country (Germany), have not only confirmed the generally lower correlations compared with the US case, but have also identified a *core* (comprising Germany, France, Benelux, Denmark) in Europe, a result apparently congruous with the arguments advanced some years ago for a "two-speed monetary union". I must however add that, according to recent empirical evidence, the most dynamic European countries seem to be, on the contrary, the peripheral ones (e.g., Ireland, Spain, Portugal).

Moreover, also in the past, some studies devoted to the European Monetary System's experience (see, for example, Artis and Zhang, 1999) have found that the business cycles of the EMS countries have become more synchronised, probably because of increased international trade, openness of financial markets and growing capital flows. EMU, from this point of view, will probably lead to a further synchronisation, thus contrasting - to some extent - the negative effects stressed by Krugman (mentioned in the previous section) caused by an increasing degree of specialisation.

In some other researches, the *low mobility* of European workers has been analysed; emphasis has been placed on the cultural, linguistic and normative obstacles that prevent a free movement of people and workers *across* countries (although a low mobility also *within* countries characterises most of European labour markets). In any case, labour mobility's response to unemployment is not significant in Europe - differently from the US - and so cannot be considered a reliable adjustment mechanism after asymmetric shocks (Bayoumi and Eichengreen, 1993; Bentivogli and Pagano, 1998); it should be added that labour mobility is, at any rate, an efficient adjustment mechanism only when permanent shocks occur.

According to recent OECD data (presented in Nickell and Layard, 1998) the percentage of population changing region each year ranges, in the period 1980-87, from minimum values of 0.4 in Spain and 0.6 in Italy to high values of 2.9 in the US and 3.7 in Sweden. Some studies have also suggested that it is likely that international labour mobility across EU countries will remain weak, even in the EMU framework, at least for many years to come.

¹³ The impact of different types of "rigidities" in the European labour markets (in comparison with the US case) upon the unemployment levels and trends has been recently discussed by Nickell (1997).

¹⁴ Decressin and Fatàs (1995) found that, on average, about 20 per cent (50 per cent if national dummy variables are included) of the annual changes in employment of the EU regions is explained by European employment growth, while in the US the common component accounts for 60 per cent of the variance.

The investigation of the structural characteristics has been related, in many researches, to the typology of the shocks: symmetric or asymmetric, persistent or transitory, regional national or global. In some explorations (Fatàs, 1997), it has been shown that both regional and EU-wide shocks may be more important than national shocks.

Furthermore, it seems that region-specific shocks are more important and *less symmetric* in Europe than in the US (Decressin and Fatàs, 1995).¹⁵ It is true that, both in Europe and in the US, there seems to be - after a region-specific shock - a small adjustment of wages and a rise in unemployment, but the lower degree of interregional labour mobility in Europe risks to induce permanent effects on the unemployment rates (Abraham, 1996; Heylen et al., 1995). If the latter effects are, in reality, not much more persistent, it is thanks to a *different adjustment* mechanism: the change in labour force *participation rates* (migration appears to play a certain role only in the medium run). Hence, regional employment levels permanently change everywhere after a shock, but following a variation of regional populations in the US and of employment rates in Europe (or, in some regions, through a change in the extension of the hidden economy).

4. Employment dynamics in the European regions (1979-97, Regio database)

In this section, I carry out a descriptive analysis of employment dynamics in the European regions, by using the Regio data set of Eurostat. I have selected five countries (Germany, France, the United Kingdom, Italy, Spain) and 78 regions, corresponding to NUTS-1 level regions in the case of Germany¹⁶ and the UK, and to NUTS-2 level regions for Italy, France and Spain (the full list of regions is in Table 1). The period under investigation is 1979-97.

As a measure of labour market performance, I prefer to start with an international comparison of *employment rates* and *employment growth rates*, which should capture employment dynamics both in the short run (cyclical variations) and in the long run (permanent trends), rather than focusing on the more commonly used “unemployment rates” (as a matter of fact, the latter are strictly dependent on the various definitions and institutional settings, which change markedly from country to country and also over time).

From the long-run perspective, employment rates reflect not only the capacity of the system to provide an occupation to human resources (willing to work), i.e. a measure of the macroeconomic performance, but also the level of social and cultural development (I could just mention the issue of women participation to work). It would be interesting to compare the evolutions of employment rates, both between countries and also across the regions of the same country. Since it is well-known that the initial situation was much differentiated *between* and *within* countries, a second question is whether there has been, over time, a convergence process?

Fig. 1 gives a first answer in the case of four countries.¹⁷ For all years from 1979 to 1997, the UK and Germany had employment rates above the European average, which is close

¹⁵Also a recent study by Bayoumi and Prasad (1997) has shown that industry- and region-specific shocks are more important than common shocks in the explanation of disaggregated output growth in Italy.

¹⁶ Because of the limited number of observations, Eastern länders have been excluded.

¹⁷ In this case, Spain has been excluded because some data of the Regio data set are available only since 1986.

to 50 per cent: by about 5 percentage points in the case of the UK and by 2-3 percentages points for Germany; France's rates have been almost perfectly equivalent to the European average, while Italy was below it (by more than 5 points).

The European average has been somehow decreasing in the two decades, reflecting both the French and the German evolutions (in the latter case limited to the '90s), but especially the Italian one: employment rates in Italy have been more or less steady in the '80s and significantly falling in the '90s. Only in the U.K. are the employment rates greater now than two decades ago, although we can uncover (from Fig. 1.D) two inverted-U cycles (the highest values have been reached in the final years of each decade).

The national averages conceal, however, a significant intra-national variation *across regions*. In addition to the well-known low values, which characterise many Mediterranean regions of Italy and Spain, it is apparent the great interregional dispersion within many other countries: not only Italy and Spain, but also France and Germany. It is also commonly accepted that employment rates have decreased in many countries, in the last two decades, in the male component, while increasing in the female one. Moreover, the low values for the employment rates in some countries and regions may be related to the extension of the black economy or the informal sector.

As a first approximation to a dispersion measure, Fig. 1 also shows the *min.* and *max.* regional values of employment rates for each country. The lowest dispersion can be found in the United Kingdom and the highest one in Italy: this phenomenon is not new at all, since it reflects the famous *dualistic* aspects of the Italian economy. Probably less known is the recent widening of interregional variations of employment rates in Italy. While the highest regional value is around (or even above) the European average – and this is true in general for regions located in Northern Italy – the lowest values (corresponding to Southern regions) have reached some record low values between 30 and 35 per cent.

A more complete dispersion measure, following the so-called *s-convergence* approach of the economic-growth literature, it is the standard deviation (s.d.) of regional employment rates; it is shown, for the same countries (including Spain from 1986) and for the aggregates (EU4 and EU5), in Fig. 3. Again, aside from the U.K., and to a lesser extent Germany, the interregional dispersions have increased everywhere: the highest increase has been recorded in Italy.

As to the *employment growth rates* (Fig. 2), they have been much more stable over time in France and Germany (except in the latter country the period around 1990-92) than in Italy or the U.K.: the latter country exhibits not only growth rates greater than in the other countries, but the largest cyclical variations. The *min.-max.* range is wide not only in Italy, but also in France and (in some years) in Germany.

By examining now the 78 regions¹⁸ altogether, employment growth in the second (1986-97) sub-period does not seem related to employment growth in the first (1979-86) sub-period (see the scatter diagram in Fig. 4.A). On the contrary, the final (1997) employment rate is positively associated with the initial (1979) employment rate (Fig. 4.B), denoting persistence (the correlation coefficient, *R*, is equal to 0.823).

The picture, drawn so far, is one of persisting interregional and international differentiation, with a substantial lack of convergence. I can now add, however, a different analysis, along the lines of the *b-convergence* approach: the aim is not to derive precise

¹⁸ The regions are 60 when Spain is excluded.

quantitative estimates of the relevant parameters (e.g. the speed of convergence), but rather to show how such an approach can be extended to variables (like employment growth) different from income or productivity, as well as to stress how the results can change, according to the period and to the subset of countries which is chosen.

If we consider the full period 1979-97, Fig. 5.A shows a positive relationship between employment growth and the *initial* employment rate (in 1979), thus indicating a small *divergence* (R is equal to 0.268). Even if we take a different explanatory variable (Fig. 5.B), such as the *initial* per-capita gross domestic product (in 1980)¹⁹, a moderate positive relationship seems to occur ($R=0.169$): the initially rich regions have been able to raise more, in the last two decades, their employment.

By limiting now my analysis to the first sub-period (1979-86), when Spain is excluded from the analysis Fig. 5.C and Fig. 5.D show that the previous positive relationships become negative (with $R=-0.255$ and $R=-0.104$ respectively for the two explanatory variables): for this sub-period, a limited *convergence* seems to emerge from the data. It is the strong positive relationship obtained for the subsequent sub-period (1986-97), both in terms of initial employment rates (Fig. 6.B) and per-capita GDP (Fig. 6.D), pointing at a strong *divergence* ($R=0.494$ and $R=0.331$ respectively), which contributes to produce the (above mentioned) results for the full period.

But, again, if for the recent sub-period (1986-97) I include also the Spanish regions, the previous *divergence* is converted into a (quite limited) *convergence* in the case of employment rates (Fig. 6.A) or a lack of any association in the case of per-capita GDP (Fig. 6.C). This shows how the results are sensitive to the subset of countries included and to the period of investigation!

5. Regional unemployment in a long run perspective (1960-96, OECD database)

A more extended sample, as to the time interval (which for some countries goes back to 1960) and also the number of regions (which are now 81), is provided by the OECD database.²⁰ Of course, the results in terms of employment growth cannot be significantly different from the ones of the previous section. Hence, I have decided to focus in this section on the (more familiar) unemployment rates. I have analysed again the five countries of Section 4, but because of space limitations, I consider here some diagrams relative to three countries.

Fig. 7 presents, first of all, the average national *unemployment rates* for the three countries: Germany (7.A), the United Kingdom (7.B), and Italy (7.C); the period is 1965-96 for the U.K. and 1960-96 for the two remaining countries. In addition to the mean unemployment rates, also the data corresponding to the 1st and 3rd quartiles of the regional distribution (in each single country) are reported. Finally, the interregional standard deviations (s.d.) are also shown (on the right scale of the diagrams).

We can see that the mean rates have increased in all three countries from the mid-70's to the mid-'80s, then they decreased in the U.K. (especially at the end of the '80s), stayed

¹⁹ The first year for which Regio's data were available; per capita GDP is measured in purchasing power parities.

²⁰ See OECD, "Time-Series Statistics of Employment and Unemployment for Regions Within OECD Countries", 1990. The original data set ended in 1989 (see Epifani, 1999); I thank P. Epifani for having extended it (with the help of national statistics) to 1996 and given the data to me.

more or less unchanged in Germany (with a momentary fall around 1990-92), while increased a bit more in Italy.

The distance from 1st and 3rd quartiles is most evident in Italy (and is increasing over time), it was large in the U.K. around the mid-'80s (while in the most recent years is almost nil), and in Germany becomes appreciable only in the last ten years (even excluding the Eastern länders). The lowest values of the (interregional) s.d. can be found in the U.K. (decreasing since 1986) and the highest ones (now five times the British values) in Italy. In Germany, they were in the past extremely low, but at the end of the '80s they surpassed the British values.

The most important and interesting fact to notice is the positive association between the means and the s.d.'s: when national unemployment rates increase, also the dispersion across the regional unemployment rates rises. This is true in all countries, even in France and Spain (here not considered).

In order to assess the evolutions in each single region of the three countries, Fig. 8 depicts the average unemployment rates in three sub-periods²¹:

1. from the '60s to the mid-'70s (the exact intervals for the three countries are the following: 1960-72 Germany, 1965-76 the U.K., 1960-76 Italy),
2. from the mid '70s to the mid-'80s (1973-85, 1976-86, 1977-86 for the three countries),
3. from the mid '80s to the mid-'90s (1986-96, 1987-96, 1986-96 respectively).

We can observe that the increase over time of the unemployment rates in Germany has not been homogeneous, but it has affected certain regions (like the Berlin area) more than others. The U.K. is the only country (out of five, of the full sample) where the unemployment rates in almost all regions have decreased from the 2nd to the 3rd period; however, even there certain regional differences can be detected.

The case of Italy is the most astonishing. The rise of unemployment has been continuous from period to period in the Mezzogiorno's regions (the ones represented in the north-eastern side of the diagram). On the contrary, in all regions of Northern Italy and in many regions of Central Italy, the increase in unemployment can hardly be noticed. The asymmetrical behaviour of unemployment in the Italian regions is the clearest evidence of *divergence* in regional labour market performances.

As a way of conclusion, in order to stress once more the previously commented relationship between the mean unemployment rates and their interregional dispersion, I present Fig. 9, which includes all five countries for the three periods (two in the case of France and Spain).²² The absolutely high and robust (over time and across countries) correlation between the two variables need no further comment.²³

6. A tentative explanation: structural shocks and labour reallocation at the regional and national levels (1977-91, Crenos database)

²¹ The break coincides with some discontinuities (different from country to country) in the original data.

²² The original data, and hence the 2nd sub-period of my classification, start around the mid-'70s.

²³ The correlation coefficient between the mean values (for each country and period included in Fig. 9) and their corresponding dispersion measures is equal to 0.785. Epifani (1999) obtains a similarly high correlation between national values and interregional s.d.; his theoretical model, based on "new trade" theories, shows that European unemployment may be generated by the interaction of globalisation, increased specialisation and labour market imperfections.

I illustrate in this section a new analysis on employment growth in the EU regions, by focusing once more on the five biggest countries of the EU and by considering 81 regions (more or less coincident with the previous ones), in the last two decades. I make use of a different data set, the one provided by Crenos²⁴ and I try to derive some tentative explanations by means of econometric methods.²⁵

I have used time-series, cross- section, and panel-data regressions, in order to capture the heterogeneous behaviour of European regions and the differentiated impact of various types of shocks: structural or aggregate shocks.

As to *time-series analysis*, a first important result is that there seems to be a counter-cyclical behaviour of the interregional dispersion index (SREU, as computed for all regions of the five countries with the formula in footnote [6], but the same applies to other types of dispersion indices); moreover, an inverse relationship between such dispersion index and the average (national) employment growth rates seems to hold. Perhaps, besides *Lilien's effect*, an asymmetry of the following type is working: while in the high-growth periods employment expansion is more homogenous between regions, in downturns employment decline affects some regions more profoundly than others.²⁶

To give a more complete explanation of Lilien's hypothesis, extended to the regional case, suppose that a shock hits positively the labour market in some specific regions and negatively in some other regions (e.g. because of a change in the structure of consumption/production or in the international division of labour): this is reflected in an increase in the SREU index. Because of the short-run rigidities and frictions, including the scarce mobility of the labour force, even the favoured regions cannot fully exploit the effects of the asymmetric shock: hence, aggregate employment growth will be adversely affected.

A different type of explanation of labour reallocations, more microeconomic oriented, is provided by the studies of Davis, Haltiwanger and other researchers (see, for example, Davis, Haltiwanger and Schuh, 1996). As the authors recognise, important job reallocation activities characterise not only the "flexible and fluid" US labour market, but many other economies as well, including many European countries (see also Contini et al., 1995). The main empirical result – in the US case - is that, during recessions, only a small part of the jump in job destructions can be attributed to cyclical fluctuations in demand and supply of labour; a great part of their change is instead due to labour reallocations between sectors, activities, and production units. Some other empirical results of this sort of research are the following:

- reallocation within sectors is equally important as that between sectors;
- firms prefer to make large and infrequent reductions of their labour forces (probably because of nonlinear adjustment practices);
- the restructuring operations are concentrated in the first period after the shock;

²⁴ Centro Ricerche Economiche Nord Sud, Università degli Studi di Cagliari (see Paci, 1997). Differently from Regio's data bank, Crenos classification includes regions with an acceptable degree of economic homogeneity and also some sort of administrative and policy power; moreover it represents more evenly the Northern and Southern European regions.

²⁵ This description is taken from Marelli (1998).

²⁶ This may also be related to an asymmetric behaviour of wages, that are downward sticky (because of unions or minimum wages) for negative shocks and upward flexible for positive shocks. For instance, a nationwide wage floor, which is binding for the less productive regions, may generate aggregate effects after idiosyncratic shocks: an inequality-increasing shock to productivity may raise both the average unemployment and the dispersion of unemployment rates across regions. See Pench, Sestito and Frontini (1999).

- cyclical downturns are times of unusually intense restructuring in the economy, with increased flows into and out of unemployment, and aggregate shocks play an initial (sometimes minor) role;
- idiosyncratic factors (e.g. related to industry, region, wages, employer size and age, capital and energy intensity) are important in the determination of gross job creation, while aggregate shocks are the dominant source of fluctuations in destruction flows (as well as in average employment growth);
- job destructions are strongly counter-cyclical while job creations are moderately pro-cyclical.²⁷

The latter result implies that the intensity of job reallocations is counter-cyclical; this outcome corresponds to Lilien's result of a counter-cyclical dispersion index between (sectoral) employment growth rates. But a question remains unanswered: is the recession the cause of intensified reallocations or, viceversa, is the increased dispersion of employment growth rates the origin of the recessions, and of the consequent rise in unemployment (as claimed by Lilien)? (Loungani, 1996). From this point of view, my time-series results deserve some further scrutiny.

Turning now to my *cross-section* approach (Marelli, 1998), I shift the attention to some long-run determinants of the employment dynamics²⁸, and I focus on two *structural indicators* at the regional level:

- the first one is the *employment rate*, i.e. total employment divided by working-age population, which is a quite significant ratio, because it comprises information concerning labour supply (labour force participation) and labour demand (unemployment rates);
- the second structural indicator that I have used is an *index of specialisation*, computed on the basis of three macro-sectors (agriculture, industry, and the services)²⁹.

The (SER) index shows a clear fall in the final year (1991), both in Spain and in Italy, the two countries where many regions exhibited, at the beginning of the period, the highest values of the index; but the fall in the degree of specialisation (at least according to my level of disaggregation) is a more general phenomenon, common to all European regions.

The results of cross-section analysis (where GDP growth and the regional dispersion index are also added) seem to show that employment growth tends to be negatively associated with initial employment rates; moreover, *structural convergence* and diversification in production (i.e. a reduction in the index of specialisation) look as important forces sustaining employment growth in the European regions.³⁰

²⁷ This means “that recessions are a time of ‘cleansing’, when outdated or unprofitable techniques and products are pruned out of the productive system” (Caballero and Hammour, 1994, p. 1365); this is associated to the schumpeterian idea of “creative destruction”. Some other theoretical works on the topic include Mortensen and Pissarides (1994), Caballero, Engel and Haltiwanger (1997).

²⁸ As an example of structural determinants, the recent work by Pianta and Vivarelli (1999) explains the poor European performance in terms of employment, vs. the US and Japan, on the basis of structural (the sectoral composition of industry) and technological factors.

²⁹ The index is the following: $SER = S_i^{1/2} - s_i^{*1/2}$ where s_i is the share of sector i out of total regional employment and s_i^* is the corresponding share in the reference country, in my case the EU5 average (its numerical value is between 0 and 2). The same index has been used also by Krugman (1993, p. 250), who has shown in this way that European nations are less specialised than US regions.

³⁰ The existence of “convergence clubs” among the European regions, based on regional specialisation, has been found in a recent research by Giannetti (1998). A recent research by OECD (1999) confirms the

Finally, I present here, in more detail, some further results of a new type of analysis, a *panel data* estimation with fixed effects. I have considered (Marelli, 1998), for all 81 regions of the sample, three time intervals (1977-81, 1982-86, 1987-90), thus obtaining 243 observations; I have used the *generalised least squares* (GLS), with cross section weights, as estimation method. The results are presented in Table 2.

In specification [1], employment growth in the European regions (DOR) has been regressed on total employment growth in the EU (DOEU), obtaining a significant and positive coefficient. The second explanatory variable (DYR) represents real GDP growth in each single European region: its coefficient is positive and significant too.

Given that Lilien's dispersion index captures the most relevant episodes of labour reallocations, originally across sectors³¹, here I have applied it, first of all, to interregional dispersion. In fact, the third explanatory variable (SR) is the dispersion index computed between the regions belonging to the same country: the estimated coefficient turns out to be negative and significant. Thus, the cross-regional dispersion seems to have a negative impact on employment growth (as already found in the time-series analysis): this is the *Lilien's effect*. To explain the meaning, consider the following situation: a supply-side shock hits a certain economic system but it affects principally some regions *within a given country*, thus increasing the cross-regional dispersion (SR); then, according to our results, this is likely to have a negative effect on average employment growth.

In equation [2], I have added also the variable SXEU, namely the cross-country dispersion index (its numerical value is the same for all the 81 regions). Its estimated coefficient turned out to be positive and significant³², accrediting what I have called the *laggard effect*: in this case, the frictions and rigidities are limited to the regions in the lagging countries and a supply-side shock may hurt primarily some countries, thus increasing the cross-national dispersion (SXEU), without inducing negative effects on average employment growth.

³³

Finally, in equation [3], I have added two new explanatory variables: they are the structural variables already introduced in the cross-section analysis. Both variables, the change

decreasing specialisation of the European regions, especially since the mid-'80s; on the other hand, if we use output (instead of employment) and if we compute the specialisation index across countries (instead of regions) an increasing specialisation pattern seems to emerge.

³¹ See my previous research, devoted to a sectoral disaggregation, presented in Marelli (1999).

³² The different sign of the correlation between SXEU and DOR, in comparison with the previously commented association between SR and DOR, if we agree with the interpretation of Pench, Sestito and Frontini (1999), is due to the fact that a common wage floor is present within countries but not between countries.

³³ An example of supply-side shocks leading to *laggard's effects* is a change in the terms of trade or in real exchange rates (this was experienced by many European countries in the '80s) which leads to a change in the (relative) competitive position of the different European countries but affects in a similar way all the regions of the same country; of course, in the case of a fall in competitiveness, the effects are more pronounced in the (lagging) countries exhibiting the strongest frictions and rigidities. An example of supply-side shocks causing *Lilien's effects* is provided by a shift of demand from more traditional goods towards "new" goods like electronic production, an industry normally located in specific regions of each single country: if there are frictions and rigidities in all regions (including restrictions to labour mobility), then a deceleration in employment growth may be realised even in the more dynamic regions specialised in electronic production, and so by aggregate employment.

in the employment rate (DTR) and the change in the specialisation index (DSER), turned out to be positive and significant.³⁴

Thus, considering the differentiated impact of rigidities and frictions to labour market adjustments, including restrictions to labour mobility, it seems that high growth rates in aggregate employment may correspond either to an increase or to a reduction in the employment growth dispersion index, according to whether it is computed across regions or countries.

To recapitulate, a negative correlation, signalling the presence of *Lilien's effects* (by which aggregate employment growth is adversely affected by labour reallocations), has been discovered in the EU5 area if we consider the *cross-regional* dispersion. A positive correlation between aggregate employment growth and the *sigma* dispersion index, corresponding to what I have called the *laggard effect* (by which the supply-side shocks harm principally the less developed areas), has been found in the case of the *cross-national* dispersion. In the latter case, shocks and disturbances (either symmetric or asymmetric) - also in the forthcoming EMU - are likely to hurt primarily the lagging countries, or at least the countries most affected by the rigidities and frictions. In the former case, it is the average employment dynamics as well as the aggregate European employment growth that are also influenced by such rigidities.

7. Conclusions

In this research, I have used different data sets and various methods of analysis to examine the long-run behaviour of employment and unemployment in the regions of the five biggest countries of the EU. Despite the simplicity (in some cases) of the analytical tools, I have obtained some firm results, which can be summarised as follows:

1. in Europe we have had high and increasing unemployment rates (the only exception to the growing trend, in my sample, is the UK since the mid-'80s)³⁵;
2. also the employment rates have been slowly decreasing (in Italy more than in other countries, because of the Mezzogiorno's worsening situation);
3. in most countries, a considerable dispersion in regional employment and unemployment rates has been found;
4. such as dispersion (of a *s-type*) has been increasing over time almost everywhere;
5. across all European regions of our set, a convergence (of the *b-type*) of employment has been found only in certain periods and considering specific set of countries;
6. a substantially high correlation between mean (national) unemployment rates and their interregional dispersion (s.d.) seems rather robust;
7. cross-region and cross-country dispersion in employment growth may have different impacts on average employment growth in Europe;
8. regional employment growth is, in any case, highly correlated also with EU's aggregate employment growth and with GDP growth.

³⁴ As to the other explanatory variables included in the same equation, aside from a modification in the numerical values of the estimated coefficients (but not in the signs), we can notice that only the DOEU variable is no longer significant.

³⁵ If we focus on the last five years and consider also the small European countries, some of them have shown a decreasing trend in unemployment, such as the Netherlands, Ireland, Portugal, Spain. However, this more positive trend can be detected also in some group of regions, like Northern Italy. This is an example to show the importance of a regional disaggregation of the analysis.

Coming now to the policy implications of my research, the last mentioned result confirms that some appropriate *aggregate demand policies* are still important, also with reference to employment growth.³⁶ Of course, a new type of aggregate demand management, which recognises the role of the European central bank and the other EU institutions, is needed. In any case, both the EU and the national governments should support aggregate demand, e.g. through appropriate incentives to private investments or the implementation of public investments (infrastructure, telecommunications, R & D, education, etc.)³⁷

However, it is usually recognised that a great part of European unemployment is structural. Also my analysis shows the importance of *structural policies*, in order to make more flexible the labour market, to increase the mobility of workers, to ease labour reallocations (between sectors, regions and countries). This will lead, according to my empirical results, to an increase in aggregate employment growth. Moreover, according to the theories on optimum currency areas (see Section 2), these policies will reduce the real effects coming from negative shocks. Other relevant structural policies may include the following: reforms of product markets, innovative industrial and regional policies, provision of advanced services to firms (especially new firms), measures for human capital formation and retraining, incentives to hiring new employees³⁸, etc.

Since the existing economic structures, together with the relevant institutions and regulations, are still different across the European countries, even in the EMU's area, structural policies – undertaken either by the EU institutions or by the national governments – should be differentiated, by country and region. In fact, the prevailing view in Europe is that structural policies should not be centralised, but should rather follow the "subsidiarity principle". This was traditionally the aim of *regional policies*, but it should become the typical operational method of other structural policies, such as *labour-market policies*. Only if this *real convergence* of economic structures will be achieved, will the EMU setting and its nominal convergence conditions produce optimal economic and social outcomes.

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³⁶ The fact that employment growth may be influenced by aggregate demand conditions can be based on this simple thought: in the '90s, the average rate of GDP growth in the EU has been around half the US growth rate and has reached the lowest value in Europe, among all post-war decades; in some countries, like Italy, the rate of growth has been slightly above 1 per cent per annum.

³⁷ A "two-handed" approach, based on aggregate demand and on structural policies (as suggested in the mid-'80s by Blanchard and other famous economists), has been recently supported, among others, by Modigliani et al. (1998).

³⁸ The link between employment growth and the level of taxation (especially taxes on labour) is stressed by Daveri and Tabellini (1997).

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Table 1 – Countries and regions in the EU5 data set

CODE	COUNTRY / REGION	CODE	COUNTRY / REGION
	DE BR DEUTSCHLAND	39	IT33 FRIULI-VENEZIA GIULIA
1	DE1 BADEN-WURTTENBERG	40	IT4 EMILIA-ROMAGNA
2	DE2 BAYERN	41	IT51 TOSCANA
3	DE5 BREMEN	42	IT152 UMBRIA
4	DE6 HAMBURG	43	IT153 MARCHE
5	DE7 HESSEN	44	IT6 LAZIO
6	DE9 NIEDERSACHSEN	45	IT71 ABRUZZO
7	DEa NORDRHEIN-WESTFALEN	46	IT72 MOLISE
8	DEb RHEINLAND-PFALZ	47	IT8 CAMPANIA
9	DEc SAARLAND	48	IT91 PUGLIA
10	DEf SCHLESWIG-HOLSTEIN	49	IT92 BASILICATA
	FR FRANCE	50	IT93 CALABRIA
11	FR1 ILE DE FRANCE	51	ITa SICILIA
12	FR21 CHAMPAGNE-ARDENNE	52	ITb SARDEGNA
13	FR22 PICARDIE		UK UNITED KINGDOM
14	FR23 HAUTE-NORMANDIE	53	UKe YORKSHIRE HUMBERSIDE
15	FR24 CENTRE	54	UKf EAST MIDLANDS
16	FR25 BASSE-NORMANDIE	55	UKg WEST MIDLANDS
17	FR26 BOURGOGNE	56	UKh1 EAST ANGLIA
18	FR3 NORD-PAS-DE-CALAIS	57	UKk SOUTH WEST
19	FR41 LORRAINE	58	UKm1 WALES
20	FR42 ALSACE	59	UKm4 SCOTLAND
21	FR43 FRANCHE-COMTE	60	NORTHERN IRELAND
22	FR51 PAYS DE LA LOIRE		ES ESPANA
23	FR52 BRETAGNE	61	ES11 GALICIA
24	FR53 POITOU-CHARENTES	62	ES12 ASTURIAS
25	FR61 AQUITAINE	63	ES13 CANTABRIA
26	FR62 MIDI-PYRENEES	64	ES21 PAIS VASCO
27	FR63 LIMOUSIN	65	ES22 NAVARRA
28	FR71 RHONE-ALPES	66	ES23 RIOJA
29	FR72 AUVERGNE	67	ES24 ARAGON
30	FR81 LANGUEDOC-ROUSSILLON	68	ES3 MADRID
31	FR82 PROVENCE-ALPES-COTES D'AZ.	69	ES41 CASTILLA-LEON
32	FR83 CORSE	70	ES42 CASTILLA-LA MANCHA
	IT ITALIA	71	ES43 EXTREMADURA
33	IT11 PIEMONTE	72	ES51 CATALUNA
34	IT12 VALLE D'AOSTA	73	ES52 COMUNIDAD VALENCIANA
35	IT13 LIGURIA	74	ES53 BALEARES
36	IT2 LOMBARDIA	75	ES61 ANDALUCIA
37	IT31 TRENTO-ALTO ADIGE	76	ES62 MURCIA
38	IT32 VENETO	77	ES63 CEUTA Y MELILLA

Table 2 - Regressions of employment growth – Pooled data

	[1]	[2]	[3]
DOEU	0.520 (11.48)	0.442 (9.13)	
DYR	0.551 (18.50)	0.601 (20.77)	0.111 (10.85)
SR	-228.5 (7.99)	-198.7 (7.87)	-37.97 (2.97)
SXEU		974.8 (2.99)	1044.4 (13.9)
DTR			2.252 (111.0)
DSER			0.052 (3.72)
n. obs.	243	243	243
Adj. R2	0.958	0.976	0.996
F-stat.	2838.16	3377.4	16158.7

Pooled data estimation: 81 regions and 3 time periods (1977-81, 1982-86, 1987-90). Dependent variable: DOR (logarithmic difference of regional employment). Explanatory variables: DOEU (logarithmic difference of EU5 employment), DYR (logarithmic difference of regional real GDP), SR (dispersion index computed between the regions of each single country), SXEU (dispersion index computed between the 5 countries); DTR (change in the employment rate in the region), DSER (change in the specialisation index vs. EU5); t-statistics in parentheses.

Source: Marelli (1998)

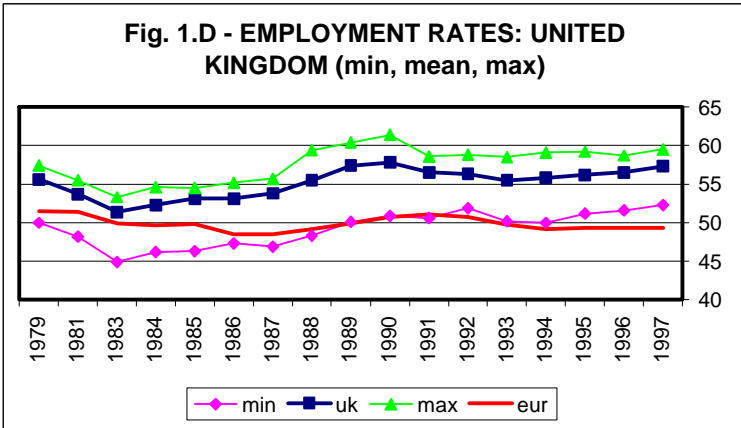
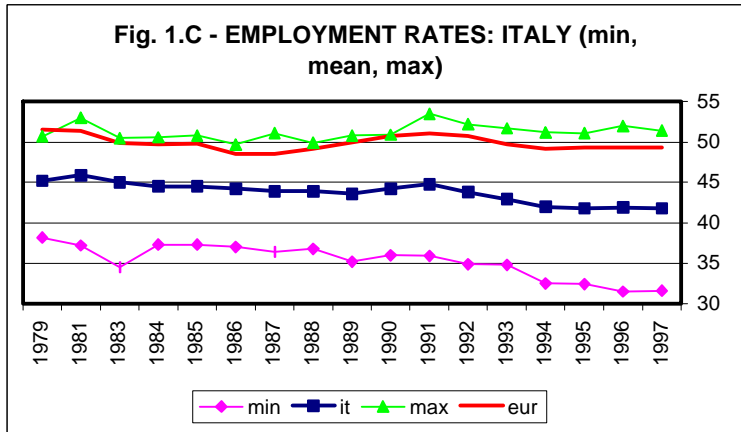
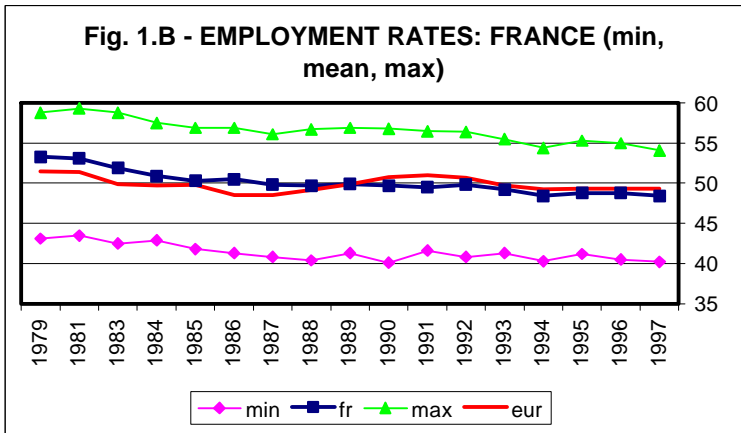
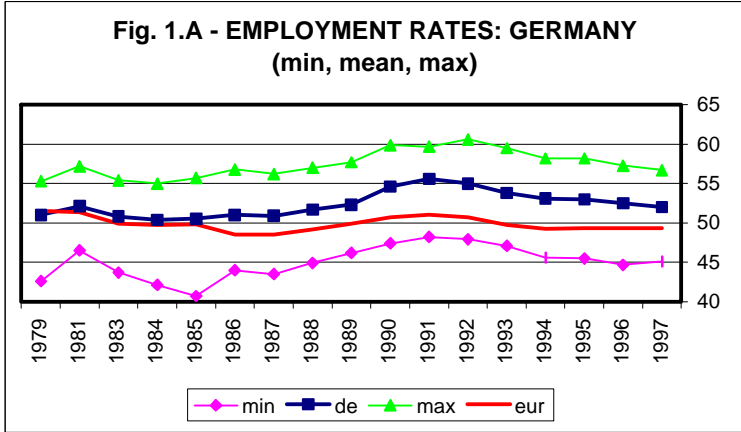


Fig. 2.A - EMPLOYMENT GROWTH: GERMANY
(min, mean, max)

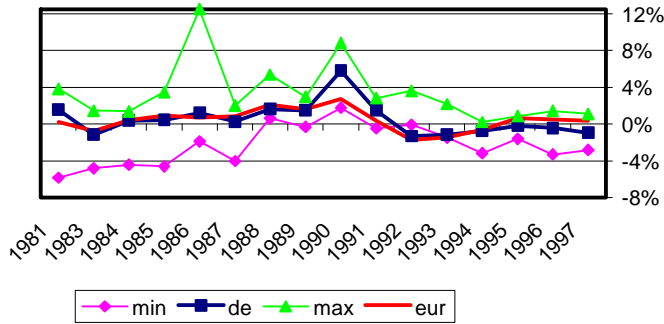


Fig. 2.B - EMPLOYMENT GROWTH: FRANCE
(min, mean, max)

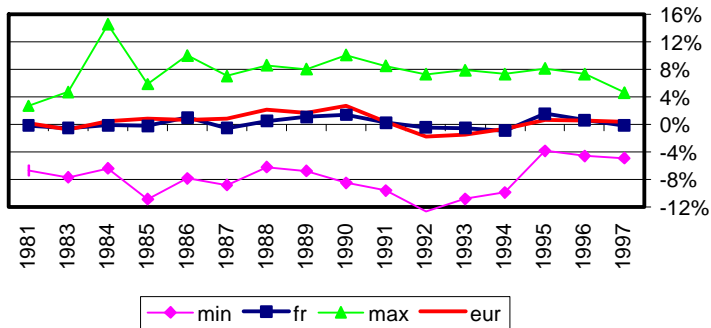


Fig. 2.C - EMPLOYMENT GROWTH: ITALY
(min, mean, max)

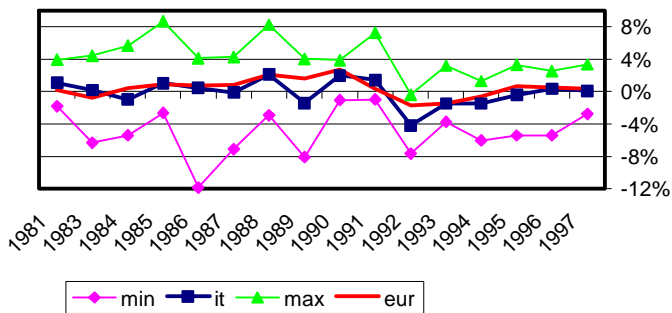


Fig. 2.D - EMPLOYMENT GROWTH: UNITED KINGDOM
(min, mean, max)

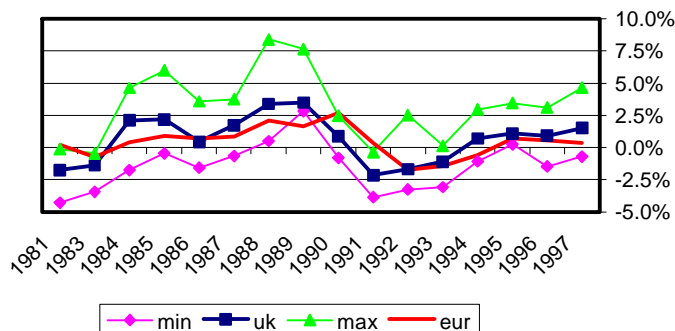


Fig. 3 - EMPLOYMENT RATES: Interregional dispersion

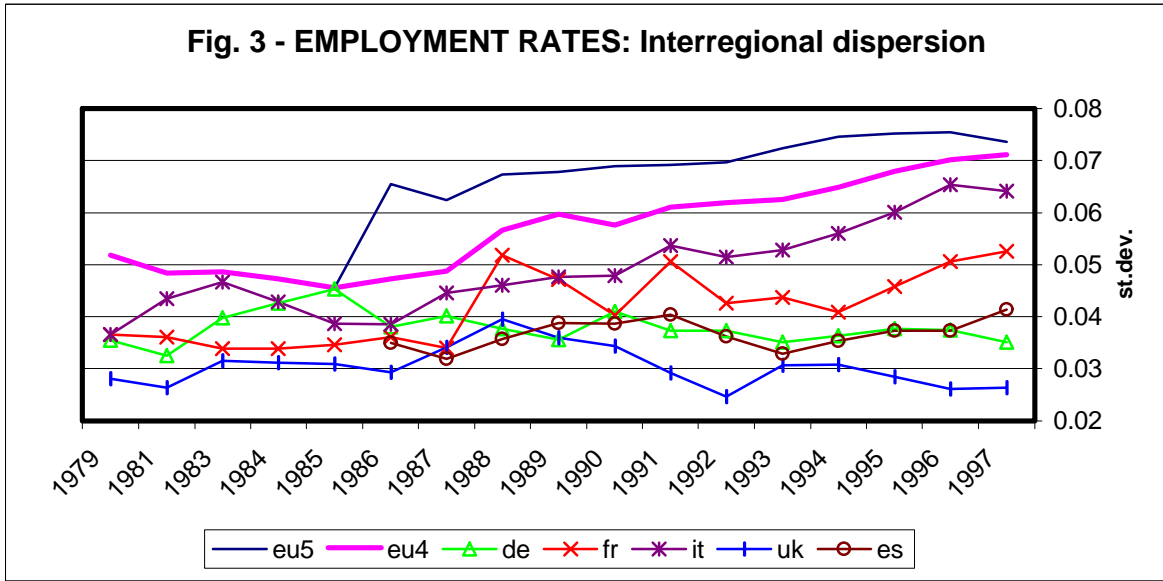


Fig. 4 - EMPLOYMENT IN EU5 REGIONS:

- (A) Growth 1986-97 vs. Growth 1979-86
- (B) Empl. Rates 1997 vs. Empl. Rates 1979

(A)

(B)

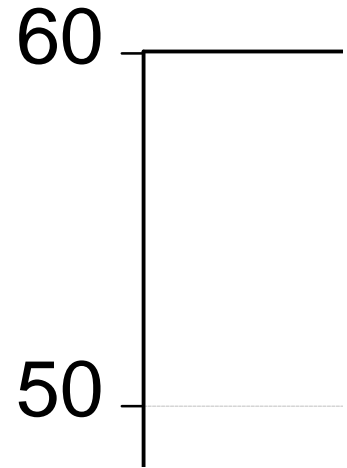
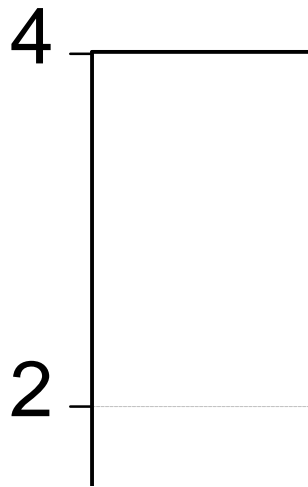


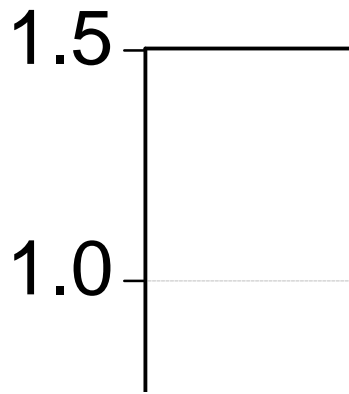
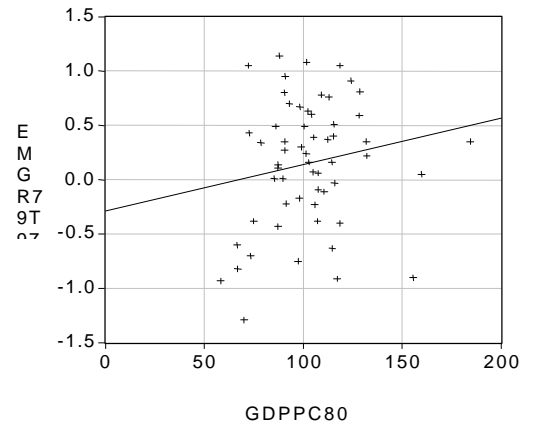
Fig. 5 - EMPLOYMENT GROWTH IN THE EU5 REGIONS

(A) Growth 1979-97 vs. Empl. Rates 1979

(B) Growth 1979-97 vs. GDP ppp 1980

(C) Growth 1979-86 vs. Empl. Rates 1979

(D) Growth 1979-86 vs. GDP ppp 1980



(A)

(B)

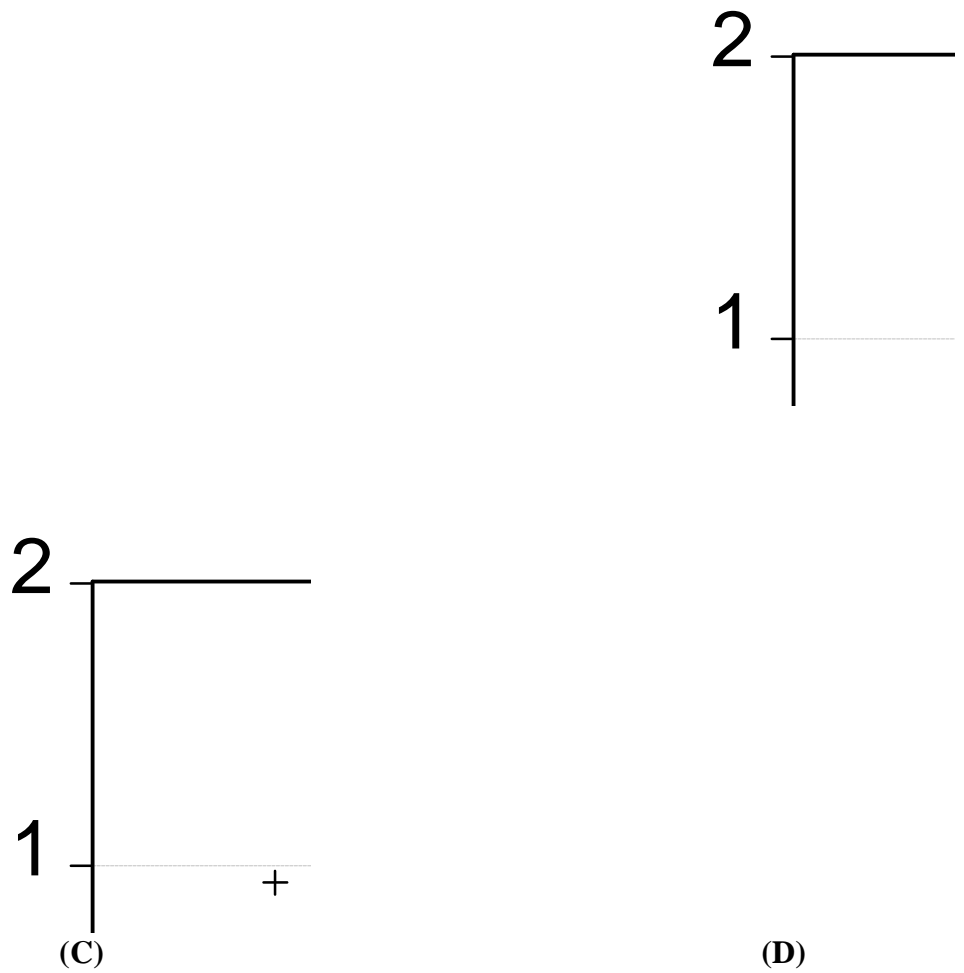


Fig. 6 - EMPLOYMENT GROWTH IN THE EU5 REGIONS

(A) Growth 1986-97 vs. Empl. Rates 1986

(B) Growth 1986-97 vs. Empl. Rates 1986 (no Spain)

(C) Growth 1986-97 vs. GDP ppp 1986

(D) Growth 1986-97 vs. GDP ppp 1986 (no Spain)

(A)

(B)

(A)

(B)
(C)

B)

(

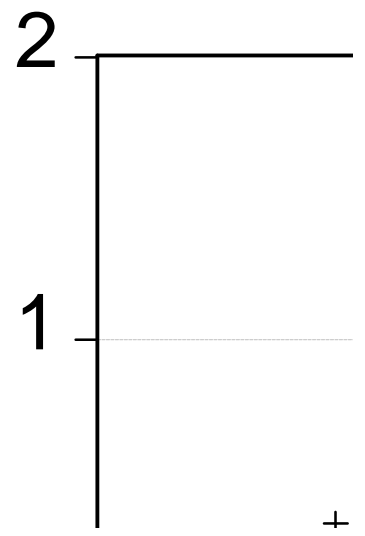


Fig. 7.A - Regional unemployment rates - GERMANY

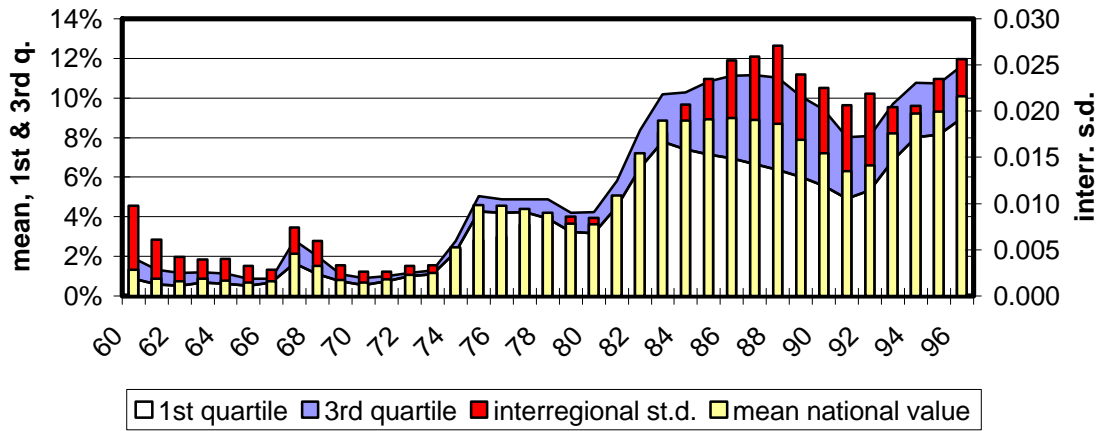


Fig. 7.B - Regional unemployment rates - UNITED KINGDOM

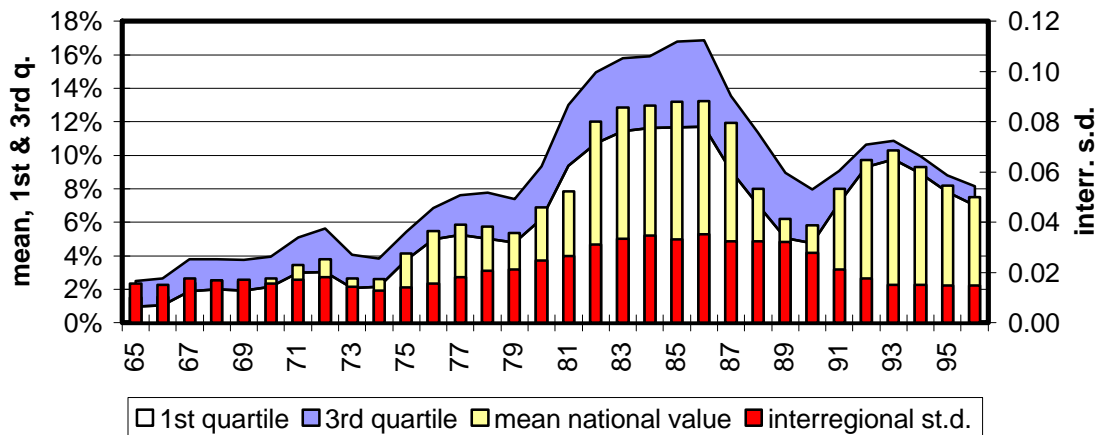


Fig. 7.C - Regional unemployment rates - ITALY

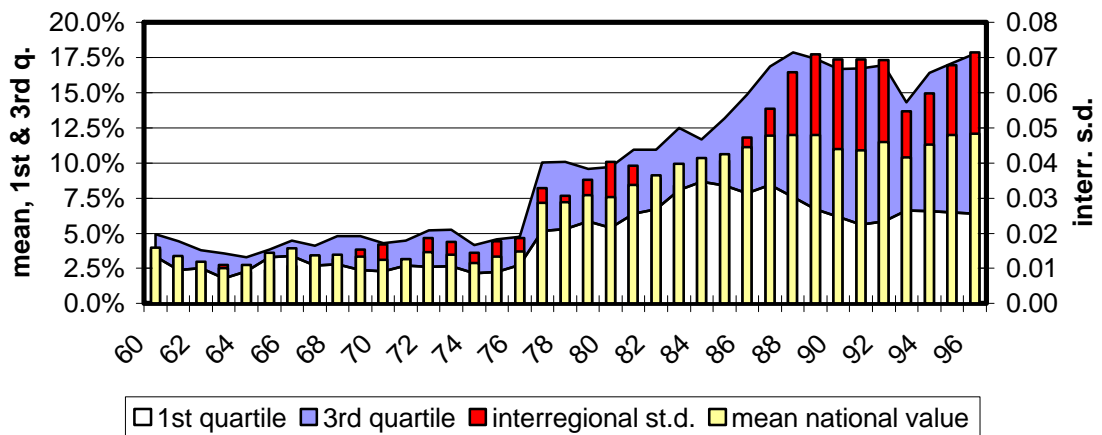


Fig. 8.A - Regional unempl. rates - GERMANY

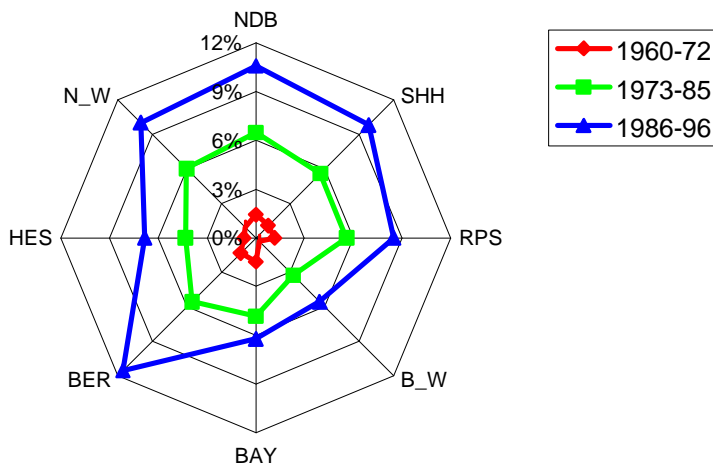


Fig. 8.B - Regional unempl. rates - UNITED KINGDOM

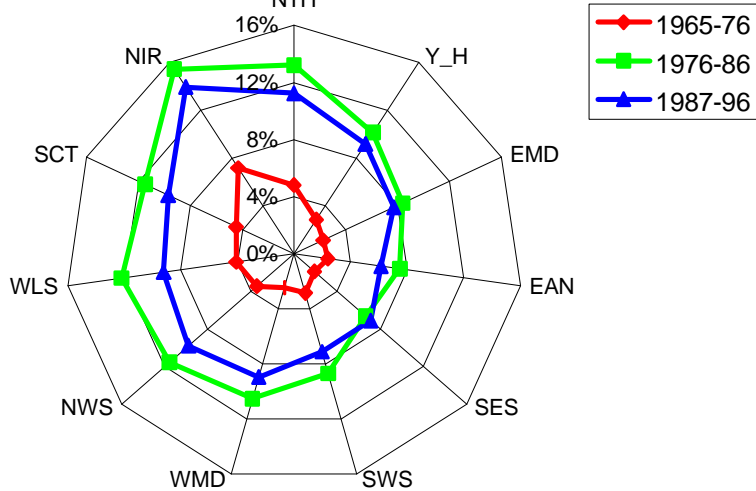


Fig. 8.C - Regional unempl. rates - ITALY

