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**DISPARITIES IN ECONOMIC GROWTH AND
UNEMPLOYMENT ACROSS THE EUROPEAN REGIONS:
A SECTORAL PERSPECTIVE**

Abstract

The picture on disparities in productivity growth and in unemployment across European regions reveals the existence of a slow and not very systematic convergence of labor productivity toward a common level, and of an even more uncertain convergence of unemployment rates. This paper uses a unified framework to study both phenomena. We adopt a three-sector perspective (agriculture, industry and services) to assess whether sectoral dynamics helps explaining the observed heterogeneity in the growth and employment regional performances. The main theoretical hypotheses upon which our empirical investigation is based are obtained by models on the dual-economy (e.g. Mas Colell and Razin 1973), where predictions on how out-migration from agriculture can generate convergence are formulated; and by Baumol (1967), where the role of an expansion of services on aggregate growth is studied.

Part of our evidence is based on the use of cluster analysis to identify subsets of regions homogeneous in terms of variables such as sectoral dynamics, labor market dynamics, and overall productivity growth. The results are largely consistent with the adopted theoretical framework. Regions that start from a low agricultural share are the richest and grow relatively slowly; regions that start from very high agricultural shares are characterized by a fast decline of that share and by higher than average growth rates; they also show a limited decline in their employment rates. Regions specialized in service activities show a particularly slow rate of productivity growth and a rising employment rate.

More generally, we find a large body of evidence suggesting that convergence in aggregate productivity is strongly associated with out-migration from agriculture, and that the magnitude of the impact of the latter on aggregate regional growth depends significantly on which sector absorbs the migrating workers.

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1. Introduction ♦

The recent acceleration of the European integration has been mainly designed as the convergence in the monetary variables, while the disparity in the real variables has remained as an open issue, especially the disparities in economic growth and unemployment. Many studies have revealed that the two variables exhibit a great dispersion across the European regions. This fact weakens the whole European Union because it makes external shocks highly asymmetric, and monetary policy more difficult. Moreover, the relationship between economic growth and unemployment is a problem in itself, both from an analytical and interpretative point of view, as well as for the policy prescriptions. The bulk of theoretical and empirical literature has dealt with the two phenomena separately, but their correlation is not at all evident, if the cross-section of the European regions is considered. Nevertheless, the policy makers' presumption is invariably that growth absorbs unemployment.

The purpose of this paper is firstly to evaluate the evidence on disparities of economic growth and unemployment across the Western European regions that emerges from the literature, and to highlight the problem of the relationship between the two phenomena. This is pursued in section 2. Secondly, a fairly simple but insightful perspective to study the disparities in economic growth and unemployment, and to correlate them is proposed, i.e. the sectoral subdivision of the economy into agriculture, industry, and services. The three sectors, in fact, are characterized by different capacity to employ labor and to promote growth, and

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they markedly differ across regions in the productivity levels and in their dynamics. Section 3 will provide an overview of this perspective, which remains partly tentative. We first study the relationship between sectoral dynamics and growth using the traditional subdivision between agriculture and the non-agricultural sector, as Lewis has taught us, as well as the subdivision between industry and services, as Baumol has taught us. In addition to this, we try to cover some of the not much explored grounds of analyzing regional convergence from a three-sector perspective.

In section 4 the relationship between sectoral dynamics and convergence process is further examined thanks to new empirical evidence. A comprehensive picture, based on a cluster analysis, of the role of structural change, technological capacity and employment rate in the description of different growth patterns is presented. The sectoral perspective makes it evident the opportunity to include the governance of the three-sector mix among the objectives of economic policy. A brief discussion of this will appear in the Conclusions.

2. Disparities in economic growth and unemployment: evaluation of the aggregate evidence

The studies on disparities in the real variables of the European regions are concentrated onto some specific questions, which can be linked within a simple framework. Let us decompose real per capita income (Y/P) into a labor productivity variable (Y/E) and an employment or unemployment variable, i.e.:

$$[1] \quad \frac{Y}{P} \equiv \frac{Y}{E} \frac{E}{P} \equiv \frac{Y}{E} \frac{L}{P} (1-u)$$

where Y stands for real income, P for population, E for employment, L for the labor force, and u for the unemployment rate, i.e. the unemployment share of the labor force¹. Five main questions can thus be identified:

¹ Two further distinctions should be made in their application to the European regions: the distinction between income and GDP, and that between resident

- (i) whether different regional Y/P s have converged toward a same (growing) level over time, which is the most investigated question. This question refers to the dynamics of the distribution of new wealth;
- (ii) the question of the regional distribution of the unemployment rate (u), or of the employment rate (E/P), which refers to how much of the labor force is involved in the production of new wealth;
- (iii) the question of the convergence of Y/E , which refers to the technological capacity to produce new wealth;
- (iv) the question of the correlation between Y/E and E , which includes the apparently obvious view that, at least at the macroeconomic level, a competitive system creates employment;
- (v) the question of adjustment of P on E mainly through migration.

Question (i) does not give account of the other four, though appearing as a synthesis of them, since, e.g., convergence in the per capita income can emerge even if the disparity of unemployment rises, although being more than compensated by the convergence in productivity. Nevertheless, it has been most studied, and some results are obtained². On the whole, from the 1950s onwards, convergence in real per capita income among the European regions seems to have taken place, but this fact is also subject to a number of severe limitations. Firstly, the speed of convergence has been progressively declined up to a very slow rate, passing through the 1980s as a period of crisis. At the current speed the gap among regions would substantially reduce only in several decades. Secondly, the disparity remains very large. In fact, the bottom 10 regions of the European Union exhibit a per capita Gdp in the period 1988-97 which is the 26% of that of the 10 top regions³.

population and working age population. But they are not yet particularly investigated due to the lack of reliable data.

² Cfr. Tondl (1997) for an extensive survey and check of the results.

³ Data on employment and value added are from Cambridge Econometrics; value added is in million of ECU 1990 and it has been corrected for PPS. 15

Thirdly, the convergence among the Southern club of regions, inclusive of Portugal, Spain, the South of Italy, and Greece, is more sluggish than that of the Northern club of regions⁴. Fourthly, a contributing factor to the sluggishness in converging towards a common European level seems the lack in convergence of the national trends (Canova and Marcet 1995; Croci Angelini and Farina 1999). Fifthly, spatial contiguity between regions matters in the convergence process (Quah 1996, Fingleton 1999, Lopez Bazo *et al.* 1999, Cuadro-Roura *et al.* 2000), so that the emergence of agglomerations may weaken the overall convergence. These results are obtained by means of the analysis of the dispersion, i.e. the σ -convergence, and the analysis of the Solovian β -convergence, as well as the method of the Markovian transition matrices (Quah 1996).

Question (ii), i.e. that of regional dispersion of the employment (and unemployment) rates has been insufficiently studied instead, if compared to its importance. The 10 bottom regions exhibit an employment rate in the period 1988-97 which is the 55% of that of the 10 top regions. As is well known unemployment is concentrated in many regions of the Mediterranean countries, and it shows a high persistence over time (European Commission 2000; Baddeley *et al.* 1998). After the peak of the mid-1980s, the disparity seems reducing, but also in this case at a very slow speed. Moreover, the regions with high unemployment that are entitled to receive the European Funds of Development, called “Objective I regions”, exhibit a *rising* disparity from the European average (Piacentini and Sulis 2000).

Also in the case of regional unemployment it has been often called for more flexible wages (Abraham and van Rampuy 1995; Abraham 1996; Pench *et al.* 1999), while migration appears in this

members and 131 regions of the EU are considered, excluding the East part of Germany. The list of the regions appears in the Appendix.

⁴ Moreover, at a finer level of territorial disaggregation, the richest areas of the Northern regions reveal an increased deviation from the others (Dunford 1993; Magrini 1999; Rombaldoni 1998).

case as even a better candidate for adjustment. The argument of the wage flexibility should be taken into consideration, since the Mediterranean countries undoubtedly show many rigidities in the labor market (Koenig and Kremers 1996). However, no study has given any idea of how much flexibility is needed to close the unemployment disparity, while very different wages across regions would certainly raise the problem of cohesion in the European Union (Epifani 1998). The other adjustment mechanism, i.e. migration (our question (v)), has been of little importance in Europe, at least in the most recent decades (Decressin and Fatas 1999; Bentivogli and Pagano 1998). More precisely, it seems that interregional migration is particularly low exactly where unemployment disparity is high, i.e. in Italy and in the Southern regions generally (Neven and Gouyette 1995). Nor relative wages appear as sound signals for potential migrants of possibility to find jobs, unless for very high unemployment, because wages are mainly set at the national level (Abraham 1996)⁵.

The question of convergence of productivity (question (iii)) could be expected as less controversial, since technology and capitals can be transferred across regions more easily than institutions. The evidence confirms this expectation; however, the speed of regional convergence of productivity remains very slow (Paci 1997). The 10 bottom regions exhibit a labor productivity in the period 1988-97 which is the 32% of that of the 10 top regions.

The questions of the dispersions in the per capita income, in the employment rates and in productivity can find a synthetic representation in the three diagrams of Figg.1a-c, thus also recalling the decomposition [1]. The represented indices are the weighted standard deviation normalized with the group average for the Northern and Southern regions of the EU-15 over the time periods for which data are available. Surprisingly, these indices are

⁵ The evidence on the effectiveness of unemployment and wages on migration is mixed. The unemployment variable is not significant according to Bentivogli and Pagano (1998) and Neven and Gouyette (1995), but it is significant according to Fagerberg et al. (1997). As for the wage variable, the opposite pattern is detected.

neglected by the literature, although they give a more correct picture than the usual unweighted corresponding indices. Moreover, they have better properties, since they guarantee us that the European index lies in between the indices of the Northern and the Southern regions, and that the three diagrams are consistent.

A most striking result emerges: that the Southern regions display a far higher disparity in real income, in the employment rate, and in productivity than the Northern regions, so that those regions can hardly be called a club (see also Tondl 1998). Secondly, the sluggishness of convergence in all three indices appear as evident. These results do not emerge, or emerge to a less extent, if unweighted indices are used instead⁶.

The last question to briefly discuss pertains the relationship between productivity and (un)employment (question (iv)). This is extremely important for policy makers, but the literature remains very far from a conclusive answer. It ranges from the Verdoorn's optimistic view that output growth is positively correlated with both productivity and employment⁷, to the pessimistic view by Aghion and Howitt (1994), who rather expect a negative relationship between productivity growth and the employment level. Our data, insofar as they are taken without any sectoral disaggregation, do not add any positive result, but they rather suggest further research. In fact, productivity and (un)employment

⁶ This conclusion is confirmed by the absolute β -convergence. In fact, by adopting OLS weighted by the population in the middle of the estimation period (1975-96), the following R^2 can be obtained for per capita Gdp and productivity, respectively: 0.035, 0.17. If the same procedure is applied for the employment rate, a significant *positive* β obtains, with $R^2=0.075$. If the unweighted OLS is run for the three cases, then the R^2 s are 0.073, 0.33, 0.23 respectively, thus confirming the importance of weighting.

⁷ For an application to the European regions see Fingleton and McCombie (1998).

in the levels exhibit weak correlations⁸, while growth in productivity and growth in employment exhibit a negative correlation. Finally, almost no correlation is found between (un)employment and growth in productivity⁹. Therefore, economic growth and unemployment appear as distinct problems, i.e. the solution of one problem does not necessarily appear as also the solution of the other.

In conclusion, aggregate analysis does not bring us very far. The traditional adjustment mechanisms of rising capital / labor ratios, of transferring technology and capitals, of flexible wages and of migration seem to work insufficiently to reduce disparities in unemployment and economic growth. Moreover, these mechanisms have obtained different results in the different regions, thus leaving unemployment and economic growth as uncorrelated across regions. These results are too little for efficacious policy measures that intend to make the European Union a more homogeneous area on the real side.

3. Structural change and regional convergence in Europe

3.1 The dualism-driven convergence process

As we have emphasized in the previous section, convergence in labor productivity is a key component of the process of income per capita convergence. In Europe, the evident weakness of the latter is due – partially, at least – to the insufficient strength of the former (eg, Paci 1997). In this section we concentrate on labor productivity convergence, and we will do this by offering an

⁸ Piacentini and Sulis (2000) find some *negative* correlation between productivity and the employment rate (defined in gaps with the employment average), but *within* the “Objective I regions”.

⁹ The correlation coefficients linking the specified variables are the following:

	E/P	$g(E/P)$	u
Y/E	-.035	.33	.116
$g(Y/E)$.053	-.591	-.06

where $g(\cdot)$ stands for growth rate, and the variables are calculated as averages over 1975-97.

assessment of the various sources that are supposed to drive the process.

Identifying the sources and measuring their role is crucial especially if we are interested in relevant policy implications aimed at strengthening the process. Among the sources of convergence, we believe that structural change has been often overlooked. In this section we show that this is true especially (but not exclusively) in the European case.

Structural change can be a source of convergence in several ways. Even if long-run growth rates are uniform across sectors and regions, sectoral dynamics can still generate convergence as long as (i) the factor-reallocation is growth-enhancing (eg. labor migration from lower- to higher-productivity sectors), (ii) migration flows of this kind are stronger in poorer regions. Condition (i) clearly implies that sectoral adjustment through inter-sectoral migration is not instantaneous. Interestingly for convergence analysis, conditions determining the speed and strength of the adjustment process can be heterogeneous across regions, so that their identification and measurement can be relevant to the task of interpreting the process at the aggregate level and of obtaining robust policy implications (on this see below).

The first question we would like to address in this section is the following: Is structural change an important component in real-world convergence?

The answer is positive, not only for the European regional data as a whole. Caselli and Coleman (1999) study state convergence in the US starting from 1880. By decomposing overall South-North convergence they find that “Southern incomes converged to Northern incomes mainly because agricultural wages converged to non-agricultural wages (between industry wage convergence), and because Southern workers left agriculture at a higher speed (labor reallocation)”. More precisely, “rising relative agricultural wages and agricultural out-migration can explain 81% of the convergence of Southern to Northern per capita service incomes between 1880 and 1950, and 58% of the convergence of Southern to Northern

per capita labor incomes between 1940 and 1990” (p. 14). For the US case see also Bernard and Jones (1996a).¹⁰

Similar results are available for several individual European countries. In particular, the role of sectoral dynamics in the regional convergence process in Italy has been assessed for the period 1970-92 by Paci and Pigliaru (1997), who apply a shift-share methodology to measure the structural change component in the overall observed convergence. The result is striking – once this component is filtered out from the overall growth rates of labor productivity, the within-sector component turns out to be statistically not significant in cross-region growth regressions. In other words, structural change seems to be by far the major component of the (weak) convergence process in Italy. Other papers showing the important role of sectoral dynamics within European countries are, among others, de la Fuente (1996) and de la Fuente and Freire Seren (2000) for the Spanish regions; Siriopoulos and Asteriou (1998) for the Greek regions.

To sum up, not only structural change is relevant for regional convergence analysis in general, in Europe and elsewhere, but we often find a common pattern of sectoral dynamics going hand in hand with aggregate convergence. This pattern is strongly characterized by remarkable shifts of resources out of agriculture. This is so especially in poorer regions, where aggregate productivity is low because of the large size of a relatively backward agricultural sector.

In other words, the pattern of sectoral dynamics typical of a dual economy in its transitional stages seems to be an important factor of convergence. This conjecture is supported by further available evidence on some features of the poorer Southern European regions. Paci and Pigliaru (1999a) show that:

1. The poorer Southern regions are specialised in agriculture: the average labor share of agriculture is four times higher than in Northern Europe (22% vs 6% in 1980).

¹⁰ For the European countries see Doyle and O’Leary (1999).

2. In agriculture does exist a strong negative correlation between sector size and productivity level ($r=-0.7$).
3. The North-South productivity gap is higher in agriculture than in the other sectors (2.0 vs 1.2 in industry, 1.1 in services). The coefficient of variation in agriculture is more than double as compared to those of industry and sectors (51, 25 and 23 respectively).

Taken together, these data suggest that poorer Southern European regions are characterized by dualistic features and therefore have a potential for convergence by shifting resources out of a too large agriculture.

Two attempts at measuring how much convergence has been achieved by this kind of mechanism are reported in the following. First, Paci and Pigliaru (1999a) measure the sources of convergence across 109 regions in the period 1980-90, using the decomposition methodology proposed in Bernard and Jones (1996a). Sectoral dynamics is characterized by strong flows of out-migration of labor from agriculture towards sectors that are highly heterogeneous across European states and regions (on this more below). In spite of such heterogeneity, out-migration from agriculture is still capable of generating aggregate convergence since, on average, it is stronger in poorer regions and it moves towards higher-productivity sectors. The result is that 76% of the (weak) aggregate labor productivity convergence is due to sectoral dynamics. As for the within effect, productivity growth in agriculture was faster in poorer regions, while the opposite is true for manufacturing.

Second, Paci and Pigliaru (1999b) use an analytical model of the dual economy (Mas-Colell and Razin 1973) in order to obtain more detailed evidence on what constrains the full functioning of these convergence-enhancing components. In such an economy, the value of marginal productivity in agriculture is lower than in the non-agricultural sector along the transitional path leading to the steady-state. Since wages are determined by marginal values, an automatic incentive exists for out-migration from agriculture.

Moreover, since the wage-gap is a decreasing function of the (relative) size of the agricultural sector, the incentive to out-migrate is stronger in the poorer (agricultural) regions. Here fast out-migration is good for aggregate growth because it allows a fast increase of the (high-productivity) non-agricultural sector¹¹.

Consequently, we should expect lagging agricultural regions to grow faster. Notice that in this context, any obstacle to out-migration is also an obstacle to convergence. We will come back to this important point at the end of the present section.

Paci and Pigliaru (1999b) find that the pattern of convergence characterizing 109 European regions for the period 1980-90 is broadly consistent with most of major predictions of the model.

The new dataset used in the present paper yields further supporting evidence. Fig. 2 shows that, for the European regions, the higher the initial agricultural labor share, the larger the outflow from agriculture (correlation coefficient $r = -0.84$ ¹²). This shows the empirical relevance of the theoretical relationship between the initial non-agricultural labor share and its rate of change at the core of the dual model discussed above. Fig. 3 shows that the larger the outflow from agriculture, the higher the rate of growth of aggregate labor productivity ($r = -0.41$). This suggests that the potential for convergence associated to the dualistic features of the poorer regions has been achieved – partially¹³.

¹¹ This is of course a very simplified account of the transitional dynamics of the dual economy. See Paci and Pigliaru (1999b).

¹² All the correlation coefficients presented in this section are based on 131 observations and are statistically significant at 1% level, unless otherwise specified.

¹³ Their results also show that by ignoring the dualistic sectoral dynamics, transitional features (that do not determine stationary values) can be wrongly interpreted as permanent ones (that do determine them). Wrong policy implication could then be derived. For instance, in the early phases of the process a large size of the agricultural sector can exert a negative influence on a region's growth rate. However, this influence is *transitory* in the dual economy. Ignoring this feature could lead to a very different interpretation about the role of agriculture in growth.

However, given the weakness of the overall European regional convergence, the main use of this type of exercise is perhaps that once a relevant convergence-enhancing mechanism is identified, the diagnosis of its strong and weak points becomes easier. Indeed, using the dual-economy model as our starting point, three weak elements in the real of convergence can be identified at this stage.

First, in some cases out-migration from agriculture has been much weaker than predicted by the model. Second, recall that convergence is obtained when existing agriculture implies entering a higher-productivity sector. While the assumption of the two-sector benchmark model used above makes this outcome inescapable in theory, in reality the “non-agricultural” sector is highly heterogeneous and outflows from agriculture may actually end in a low productivity sector. Therefore we should consider explicitly the role of at least a third sector – i.e. services. Finally, it must be noted that out-migration from agriculture, instead of moving to other economic activities, may imply an increase in the unemployment rate and a decrease in the participation rate, which result in a decrease in the overall employment rate. In the following three sections we will analyze each of these elements in details.

3.2 Too little out-migration from agriculture?

Let us go back to Figure 2 above. Recall the crucial relationship between sector sizes and intersectoral migration in the dual-economy model. As we noted above, the comparison between the theoretical relationship and the actual data does confirm the relevance of the dualistic mechanism. However, it also shows that reality differs in at least one important respect from (this) theory. The data show the existence of a large variance characterizing the subset of the poorer regions – i.e. the Southern agricultural regions (Greece, Spain, Portugal plus some Mezzogiorno regions) for which the potential for convergence is stronger (their agricultural share in the labor force ranges from around 60% to around 25%).

We know from section 1 that a large disparity characterizes the main aggregate data of Southern regions. It is interesting to find out that such a feature is confirmed at the level of sectoral data. The cluster analysis contained in section 4 below identifies a subset of 15 regions characterized by lower than expected rates of out-migration and of aggregate labor productivity growth (see cluster 4 in section 4 below).

Clearly, much of the potential out-migration is not obtained mechanically. Understanding why this is so should be of help in identifying a source of weakness in the process of income per capita convergence across the European regions. Several testable hypotheses can be advanced at this stage of the analysis, all concerning those regions where out-migration was less than expected by the theory. (a) *Spatial externalities in the non-agricultural sector*: given the existence of important agglomeration economies associated to technology adoption (eg, Paci and Usai 2000), the development of a non-agricultural sector in poorer regions might depend crucially on quality of their economic institutions and of their adopted policies. (b) *Efficient specialization*: economic integration might assign specialization in agriculture to some of those regions. Under such circumstances, a currently inefficient agriculture might obtain important efficiency gains and therefore convergence through the *within-sector* mechanism. (c) *Harmful sectoral policies*: the European policy aimed at sustaining the farmer's income might have weakened the incentive to out-migrate and – consequently – overall convergence. Finally, the private cost of migration should also be considered. Migrating from a low-towards a high-productivity sector might require costly individual investment for acquiring sector-specific skills (Caselli and Coleman 1999). The cost of such investment might vary significantly across regions due to the heterogeneity of educational institutions and the quality of vocational training projects.

The cluster analysis in section 4 will yield some evidence concerning especially hypothesis (a). A full assessment of the other hypotheses requires further regional data not yet available at this stage of our research.

3.3 Does out-migration always move to the “right” sector(s)?

Let us now turn to the second problem – convergence might have been weak or absent even in some of the regions where out-migration was as strong as expected. As we noticed, in the theoretical two-sector model, migration is necessarily from a low- to a high-productivity sector, with the non-agricultural sector being the growth-enhancing one. However, the non-agricultural sector consists of manufacturing and services, i.e. sectors characterized by large productivity differentials. Analyzing our data by taking account of such a three-sector context, we find that the main relationships between sectoral dynamics and convergence are as follows. First, out-migration from agricultural is faster in regions where the decline of the share of manufacturing is slower. Second, regions where the decline of the share of manufacturing is slower enjoy a faster grow of aggregate labor productivity. These two pieces of evidence are shown in Figures 4 and 5 respectively. The correlation coefficient in Fig. 4 is -0.73 ¹⁴ and in Fig. 5 is 0.34.

On the contrary, changes in the labor share of both private and public services do not seem to exert a significant influence on aggregate growth ($r = 0.04$ and $r = 0.13$ respectively). Such an absence of correlation also characterizes each individual component of the sector “private services” in our dataset.

If we are looking at the explanation, we could turn to the well-known Baumol model (1967) of unbalanced growth, which would predict a negative effect of growing services on overall productivity growth, even if the service share in real value added were not rising. The basic assumption of the model is that productivity growth is lower in services than in the other sectors, thus defining services as a stagnant sector; the prediction is of a tendency of productivity growth of the economy toward productivity growth of services through expanding the service employment. This prediction appears to be supported, at least for

¹⁴ As for the correlation between changes in agriculture and in services shares, its value is -0.38 .

1980-90, by the shift-and-share decomposition of overall productivity growth, since the contribution of services is far larger than the contribution of industry, mainly because of structural change. Moreover, it has been observed the convergence of productivity *within* the service sector across regions (Paci and Pigliaru 1999a)¹⁵.

A satisfactory test of the hypothesis maintaining that services are harmful to growth, however, would need reliable and disaggregated data, which are not available, at least for the European regions. The basic problem is that of measuring productivity of services in real terms (Storrie 2000; De Bandt 1998; Nakamura 1997). As Solow has noticed, everybody knows that an extraordinary acceleration in productivity has been recently taken place in the activities linked to the information technology, and thus also in services, but this does not emerge from national accounts. Hence, Baumol's stagnant sector is more restrictive than the services sector, and a careful selection of service activities would be necessary¹⁶. Moreover, as far as regional disparity is concerned, the information technology innovations undoubtedly favour accessibility of the peripheral areas, thus favouring convergence in both growth and unemployment (European Commission 2000).

The original Baumol model considers two final sectors, however an amount of literature has recognised that many service activities, like research, counseling, legal services, financial services, etc., are inputs for industries with growth-enhancing effects (Miles 1993; Windrum and Tomlinson 1999; Antonelli 1998; Ochel and

¹⁵ A stronger convergence in services than in manufacturing total factor productivity is found for the Oecd countries (Bernard and Jones 1996b; Gouyette and Perelman 1997).

¹⁶ Not only a large part of transport and communication services should be excluded from the stagnant sector, but also some typical personal services, like some health services, which have benefited from a great scientific progress, or like some tourist services.

Wegner 1987; Gazier and Thevenot 2000)¹⁷. Information technology has magnified these effects. The pessimistic conclusion of Baumol model on overall productivity growth, therefore, is not at all safe. However, this does not necessarily represents good news for the lagging regions, since these growth-enhancing service activities tend to agglomerate geographically, especially in some metropolitan areas.

Although Baumol's model should be applied with important amendments, it still addresses an inescapable problem: that stagnant activities, now typically represented by performing arts, child and elderly care, will produce at rising relative prices, thus discouraging demand for them. In particular, many household services find only a limited market externalisation, as compared to the US, because of high relative prices (Anxo and Fagan 2000). This can be seen as an explanation of both under-tertiarisation and low employment rates in continental Europe (Borzaga and Villa 1999; Pugno 2000).

In conclusion, the effects of a growing service sector on disparities in productivity growth across regions differ greatly, depending on the specific activity considered. Knowledge-based services, in general, favours accessibility to the peripheral regions, but the service activities most linked to manufacturing, though enhancing growth, are very concentrated. For personal services Baumol would predict a negative effect on growth, but also a rise in relative prices of these services, so that they may be rationed by consumers. Excessive regulation in these markets, as it is has been recognized for continental Europe, works as a further constraint (OECD 1991; Koefijk and Kremers 1996; Pilat 1996; Pugno 2000).

3.4 Does out-migration reduces overall employment rate?

The third weakness in the convergence process as due to classical dualism is that part of out-migration from agriculture may

¹⁷ Services provide increasingly inputs and innovations also to themselves. This may create new service products but tends to rise geographical concentration.

go to the pool of unemployed or of the retired from the labor market. Figure 6, which reports the association between out-migration from agriculture and overall employment rate, shows that there is some truth in this presumption : increases in employment rates are larger where out-migration is smaller.

However, while this relation is statistically significant ($r=0.36$), it is weakened by the high variability of the Southern European regions. For example, in some Southern regions the high reduction of the agriculture share has been accompanied by remarkable increases of employment in the service sector, especially public administration (P4, Alentejo +14 % points, E11 Extremadura +13) or tourism (G6, Ionia Nisia +21 % points, P5 Algarve +30).

One reason for the negative association between out-migration from agriculture and overall employment rate may be due to the difficulties shown by industry in absorbing employment. In fact, during the most recent decades both agriculture and industry have reduced employment throughout the European regions. The decline in agriculture is well-known, and it is analyzed in the previous section, while the decline in industry is less known for its extent and spreading. During the period 1975-97 industrial employment diminishes in 114 regions, while in 3 regions only it rises above 1% per year (see also European Commission 2000). It is interesting to note that this decline takes place in the regions irrespective of their level of per-capita income.¹⁸ Moreover, it cannot be expected that future growth of industrial activity will be able to solve the problem of unemployment. First, growth in industrial value added does not seem to be much correlated with growth of industrial employment any longer. In fact the simple correlation coefficient between the two variables is 0.3 for the period considered (the regression coefficient is 0.33). Secondly, no correlation emerges between growth in industrial value added and the *overall* employment rate (0.19), and between the share of industrial employment and the overall employment rate (0.06).

¹⁸ The correlation coefficient between the percentage change in industrial employment and per-capita value added is 0.2 for the period considered.

Thirdly, even the increase in competitiveness, as approximated by growth in industrial value added per worker, appears to do not favor the overall employment rate (-0.03). These results take the face values of national accounts, so that they do not take into account the externalization of services from manufacturing firms, which has been recently an increasing process, as noted above.

By contrast, the service sector has absorbed much employment, and it is expected an increasing role to this end (Elfring 1989; Storrie 2000). In fact, all regions but four have experienced an increase in employment of the market services over 1975-97, and in 92 regions the increase is above 1% per year. Moreover, employment in market services grows both in the poorest regions, and in the richest regions (Dathe and Schmid 2000)¹⁹. This result is relevant, because it confirms that out-migration from agriculture, which is greater in the poorest regions, may by-pass manufacturing and go to services.

The contribution of the service sector to the solution of the unemployment problem can be more properly seen by observing the relationship between the service share in value added and the overall employment rate. Simple correlations show some positive relationship across the European regions ($-.01$, $.15$, $.35$ for the subperiods 1975-83, 1984-91 and 1992-97 respectively; for German regions see Dathe and Schmid 2000). More precisely, by disaggregating services one finds that the relationship for market services becomes closer, though very much less for Distributive Trades, whereas for non-market services it turns from positive in 1975-83 to practically zero afterwards²⁰. This results are only indicative, and reveal that the positive contribution of market

¹⁹ The correlation coefficient between per-capita value added and the employment growth rates of the market services is 0.29.

²⁰ The correlation coefficients are $-.22$, $-.25$, $-.09$ for Distributive Trades, $.39$, $.51$, $.49$ for Transport and Communications, $-.24$, $.03$, $.34$ for Finance and Insurance Services, $.21$, $.40$, $.46$ for Other Market Services, and $.09$, $.12$, $.01$ for non-market services. At the national level, more disaggregated data reveal that within Other Market Services those for producers employ at a very increasing rate, while those for consumers tend to stagnate (European Commission 1999).

services in absorbing unemployment is positive, but very unsystematic across regions. A general rise in the value added share in market services may tighten the labor market in some areas, while still leaving other areas with great unemployment. Fortunately, metropolitan areas seem recently to start to delocalise some service activities, but a clear trend is not yet established (Illeris 1996; Mur 1996).

4. Different growth patterns across European regions

Our analysis of the growth process across the European regions has called attention to three important factors that have influenced the speed and the direction of the convergence process. The first factor is structural change, whose key mechanism seems to be associated with the shift of labor shares from agriculture towards sectors with different productivity levels (manufacture and services). A second feature we will deal with is the evolution of the employment rate within the convergence process. This is a crucial element for our analysis since, as we have already noticed, convergence in terms of labor productivity may differ from per capita income simply because there are large differences among regions in the levels and evolution of the participation and unemployment rates.

A third element is localized technological capacity; i.e. the ability, specific to each region, to create new ideas and to imitate from external innovations. This element can both play an independent role in convergence, and interact with the process of dualism-driven convergence by affecting the conditions that allow a successful expansion of the non agricultural sector (see section 3.2 above).

Our analysis in this section aims at sketching the relationships between these three elements in order to draw a final picture of regional growth in Europe based on an exercise of cluster analysis. Let first briefly describe the data and the chosen variables.

Structural change: Employment share in agriculture in the initial year 1975 (**QA75**); variation of the agriculture share over the period 1975-1997 (**QAD**).²¹

Labor market dynamics: variation over the period 1975-1997 of the ratio employment / population; for simplicity we refer to this indicator as “employment rate” (**ERD**).²²

Technological capacity: ratio patents / GDP, average value 1985-1986 (**PY**).²³

Labor productivity: levels of overall labor productivity in the initial (1975) and final (1997) years (**Y75, Y97**); annual average growth rate of labor productivity over the period 1975-97(**YG**).

We now make use of the seven variables listed above to define homogeneous groups of regions using the cluster analysis technique. Table 1 reports for each group of homogeneous regions the average values of the included variables; the groups are listed according to the decreasing value of their 1975 labor productivity level; a geographical distribution of the six clusters is displayed in Figure 7. The main features of each cluster are discussed below and are determined not only on the basis of the included variables, but also looking at the mean value of other relevant variables within each cluster.

²¹ We have also considered other indicators of sectoral composition and change relative to manufacture, building, private and public services. However, their inclusion leave almost unchanged the clusters composition, confirming that the key role of structural change is played by the out-flow of labor from agriculture.

²² The complement to the employment / population ratio is a measure of both the unemployment and the participation rates which can be viewed as the two adjustment channels to labor market disequilibrium. Due to the lack of reliable data on unemployment and labor forces at the regional level in Europe, we prefer to use the employment / population ratio as a comprehensive indicator of the labor market characteristics.

²³ Patents data are from CRENoS databank (www.crenos.it) and refer to patent applications to the European Patent Office.

Table 1. European regions growth process. Final cluster centers for the included variables

cluster	n. regions	QA75	QAD	Y75	Y97	YG	ERD	PY
1	56	7.5	-4.2	27.7	42.6	2.0	0.0	4.4
2	36	23.8	-14.0	22.4	35.9	2.2	-2.7	1.4
3	19	3.9	-1.5	22.4	29.5	1.2	2.2	5.3
4	15	45.9	-18.5	11.9	20.9	2.6	-1.8	0.1
5	3	20.8	0.7	10.4	22.5	3.6	-13.8	0.2
6	2	58.1	-22.0	6.1	15.3	4.2	-29.2	0.0

See text for a detailed description of the indicators.

Cluster 1: the core group

This cluster includes 57 regions and represents the core of rich areas mainly located in the North of Europe, France and northern Italy. At the beginning of the period considered, 1975, this group is already characterized by a “modern” sectoral mix (QA75 = 7.5%). Nonetheless, in the subsequent two decades there are signs of the presence of a residual process of out-migration from agriculture (QAD = -4.2), which takes place in the absence of significant changes in the employment rate. In 1997, at the end of the period considered, this cluster has the highest labor share in manufacture (22.4%), with this sector in turn showing the highest labor productivity level among all clusters and sectors. Strictly related to the good performance of the manufacturing sector is the high technological capacity exhibited by this cluster. As predicted by convergence theory, the growth rate of labor productivity in these rich regions is lower relative to the initially poorer ones. However, it is important to notice that, at the end of the period, the productivity lead of the core group with respect to the followers is still remarkable.

Cluster 2: the growing periphery

Cluster 2 includes 36 regions belonging mainly to France, Spain and Southern Italy and Finland. This group is characterized by an initial productivity level slightly lower than the European average and by the presence of a large agriculture sector (QA75=23.8%). Over the period these regions display a strong out-flow of labor from the primary sector: the proportional variation of the agricultural share is equal to -58.8% . In spite of such a strength of out-migration, the decrease of the aggregate employment rate is rather small (ERD= -2.7). More in detail, the general tendency to a decrease of manufacturing labor share here looks less pronounced, probably thanks – among other things – to the presence of a significant technological activity at the local level. The overall productivity growth rate is the highest among the advanced regions (YG=2,2%). All in all, in this cluster, part of the convergence appears to be compatible with the hypothesis that the dualistic mechanism is at work. From this point of view, a comparison with the characteristics of cluster 4 is particularly interesting.

Cluster 3: specialization in public services

This cluster includes 19 regions belonging mainly to the North (Brussels, Berlin, Dutch and British regions) with the only exceptions of the capital region of Greece (Attiki). Interestingly, these regions started in 1975 with the same labor productivity level of cluster 2. The common feature of these regions is the low incidence of agriculture even in the mid seventies (QA75=3,9%) and the strong specialization in manufacture and services which give rise to a relevant technological capacity (PY=6). In these regions most of the dualistic transition has already taken place, even though we still notice a reduction of the agricultural share. A very important feature which distinguishes this cluster from all the others is the increase of the overall employment rate (ERD=2,2). Looking at the sectoral composition of employment in 1997, we

find in this cluster the highest share of public services (27%), which seems to have act as a solution to the employment pressure. The effects of this process in terms of growth performance are negative: this group displays the lowest growth rate of aggregate labor productivity among all European regions (1.2%). Clearly, dualism-driven convergence is not present, and the gap between these regions and the richer ones seems to have reached a rather stationary level.

Cluster 4: structural change and safeguard of employment levels

This cluster gathers 15 Southern European regions which have gone through a strong process of structural change (QAD = -18.5). There are similarities with respect to Cluster 2: a rather large initial agricultural share; a rather fast reduction of the latter during the subsequent period; a limited decrease of the employment rate; a growth rate higher than that of the richer cluster. Here again the dualistic mechanism seems to be at work in generating convergence. However, there are two important (related) differences. The initial gap in labor productivity is much larger, as well as the size of the agricultural sector (46% v 24%). All other things constant, we would expect a higher rate of change of the agricultural share and a significantly higher aggregate growth rate. Both predictions are rejected by the evidence: the agricultural share decreases in the period at a rate equal to -40.3% (far less than in cluster 2), and the growth rate is only a little higher than in cluster 2. In other words, regions in this cluster appears to lie below the theoretical relationship behind the dualism driven convergence mechanism described in section 3.1. As a consequence, in these regions there seems to exist some potential for convergence associated to the existence of dualistic features not fully exploited. Why this is so is a problem that deserves some attention in future research. For the time being, we should notice that we detect a low level of local technological activity. This might be part of the explanation, as suggested in section 3.2.

Cluster 5: adapt to the market openness

This group includes only three southern regions, two Greek and one Portuguese. The structural change process was already started ($QA75 = 20\%$) so that, over the period considered, these regions have carried out an increment of their labor share in agriculture ($QAD = 0.7$). Nonetheless, the overall employment rate show a clear reduction ($ERD = -13.8$) signaling a process of expulsion of redundant labor from other sectors. More specifically, these regions show a reduction of employment in manufacture (-13% points over the entire period) associated with a high growth of labor productivity, necessary as a response to the increasing international competition. The results of this structural adjustment on the aggregate growth rate of productivity are positive ($YG = 3.6\%$) even though lower than in the cluster 6. This result give additional support to the idea that the key feature of a structural change growth-enhancing process is the out-migration of labor from agriculture.

Cluster 6: radical structural change

Again this is a very small subset formed of only two Greek regions. In contrast with the previous cluster, here the regions are characterized by a radical decline of the agriculture labor share ($QAD = -22$), associated with an analogously strong reduction of the employment rate. Such changes allow these regions to obtain the highest increase in agriculture labor productivity (5% annual average) and also a significant productivity growth in the non-agriculture sectors. Therefore, the overall productivity growth of these economies is the highest among all clusters ($YG = 4.2\%$).

In conclusion, our cluster exercise confirms the crucial role of the dualistic mechanisms in defining different growth paths (and consequently homogeneous groups of European regions) in terms of both labor productivity growth and employment rate dynamics.

5. Conclusions

The picture on disparities in productivity growth and in unemployment across European regions shows three main broad characteristics: a slow and not very systematic convergence of labor productivity toward a common level; an even more uncertain convergence of unemployment rates; absence of correlation between growth rates and unemployment.

The literature, both theoretical and empirical, has usually dealt with the two kinds of disparities in a separate manner, and often in aggregate terms, so that a comprehensive explanation has not yet been provided. This paper has offered an attempt to use a unified framework to study both phenomena, by adopting a sectoral perspective, i.e. by considering the relationship between agriculture, industry and services, and their role in enhancing growth and absorbing employment. Our contribution has been to collect and organize different kinds of evidence from the more recent literature, to provide new evidence, and to interpret both the previously known and the new evidence within the same unified framework. To be more specific on this latter point, we should add that we have also pursued an implicit aim – i.e. obtaining an initial assessment about the consistency of our evidence with a specific, multi-sector theoretical framework.

This underlying theoretical framework can be summed up as follows. We think that the observed patterns of aggregate convergence can be better analyzed and understood by taking explicitly account of the underlying sectoral dynamics. First, the reallocation between agriculture and the non-agricultural sectors during the transition of a dual-economy towards its steady-state is potentially a powerful source of convergence; second, the Baumol model gives a useful account of the role that the service sector may play in aggregate growth; third, the well-known Engel's Law links the declining weight of agriculture to the rising weight of services. Clearly, putting these pieces together is not a simple task. To name just one problem, they are based on assumptions about technology

and/or preferences that appear to be far from homogeneous²⁴. However, combining them is useful as long as we pursue the limited aim of achieving some simple insights of how convergence is obtained within a three-sector framework. The key predictions that can be obtained by this exercise are as follows. Economies which differ in their initial conditions tend to converge in overall economic growth rates, provided that long-run productivity growth is homogeneous across economies and sectors. Convergence is mainly due to that fact that, according to the dualistic model, labor migrates from the least productive sector, since it is attracted by higher values of marginal productivity elsewhere, thus reducing the agricultural sector, consistently with the Engel's law, and feeding the sector crucial for growth, i.e. manufacturing. In fact, this migration does not always translate into a sufficient expansion of the non-agricultural sector, so that a reduction in the labor participation rates often accompanies the process. The more backward regions would then exhibit the largest intersectoral migration, the highest overall productivity growth, and the largest reduction in the employment rates. According to Baumol, labor migrates to services so that a constant share in real expenditure for them is maintained, in the presence of a level of productivity lower than that prevailing in manufacturing. If labor supply is not constraining, employment would rise (Tronti, Sestini and Toma 2000). Engel's law would emphasize this effect by predicting a rising share in real expenditure for services.

This theoretical framework has not been formally developed in the paper, but the bulk of the empirical findings from the European regions discussed in this paper is broadly consistent with

²⁴ Baumol assumes that productivity growth differs exogenously across sectors, while no such difference is present in the dual-economy model used in section 3.1 above; preferences are homothetic in these two models while Engel's law reflects non-homotheticity. More analytical work is clearly needed to assess in depth the complementarity of these three potential components of a more general framework. However, intermediate results are available in several recent papers, for instance Murat and Pigliaru (1998), where some of Baumol's results are obtained in the absence of unbalanced growth.

the approach defined above. In fact, most of the European regions seem to follow the predicted pattern of convergence and structural change. For instance, at this stage we have much evidence suggesting that convergence in aggregate productivity is strongly associated with out-migration from agriculture, and that the magnitude of the impact of the latter on aggregate growth depends significantly on which sector absorbs the migrating workers.

The most promising piece of new evidence is perhaps the exercise presented in section 3, where we have used cluster analysis to identify subsets of regions homogeneous in terms of variables such as sectoral dynamics, labor market dynamics, and overall productivity growth. The picture that emerges is consistent with the main relationships characterizing the three-sector framework sketched in this paper. Regions that start from a low agricultural share (cluster 1) are the richest and grow relatively slowly; regions that start from high agricultural shares (both cluster 2 and 4, although heterogeneous in other respects) are characterized by a fast decline of that share and by higher than average growth rates; in addition to this, these regions show a limited decline in their employment rates. The few remaining regions exhibit rather diverse features, but they can still be grouped into few main clusters, the characteristics of which are again easily interpreted within the proposed framework. In particular, the group specialized in service activities, mainly metropolitan areas (cluster 3), shows a particularly slow rate of productivity growth and a rising employment rate.

All in all, we think that the evidence discussed in this paper shows the relevance of a sectoral perspective on convergence analysis. By understanding what controls the flows of out-migration from agriculture and their direction (towards manufacturing, services or else) we should be able to better identify the strong and weak points of the overall convergence. Consequently, more research in the same direction, both theoretical and empirical, will certainly be useful especially for those researchers aiming at obtaining well-founded and detailed

policy implications on how to strengthen the process leading to smaller regional differentials in the long-run.

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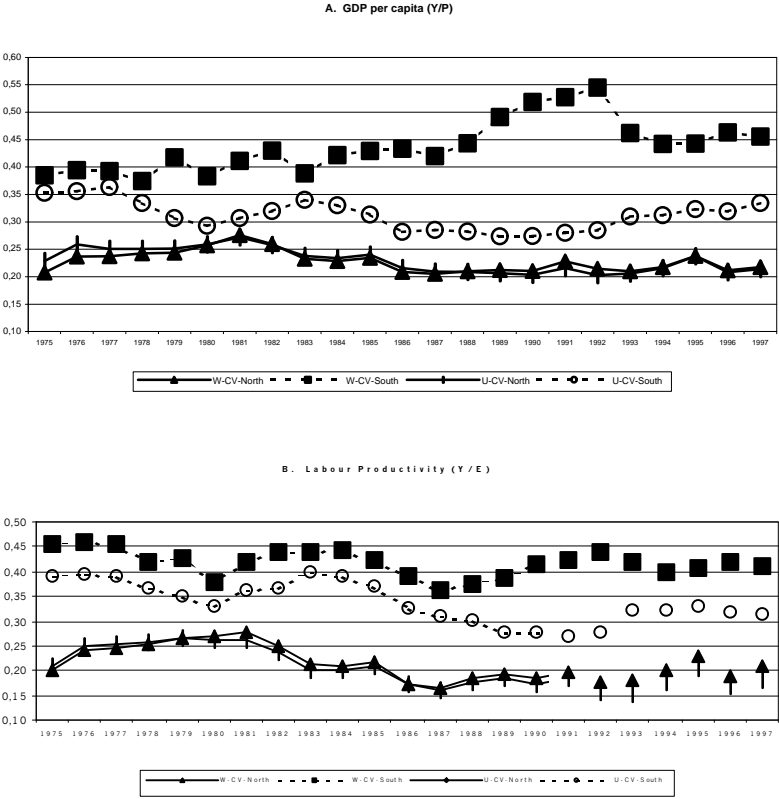
Appendix 1. List of the 131 European regions included

B1	Bruxelles	E1	Galicia
B2	Vlaams Gewest	E2	Asturias
B3	Région Wallonne	E3	Cantabria
		E4	Pais Vasco
DK	Denmark	E5	Navarra
		E6	La Rioja
D1	Baden-Württemberg	E7	Aragón
D2	Bayern	E8	Madrid
D3	Berlin	E9	Castilla y León
D4	Bremen	E10	Castilla-la Mancha
D5	Hamburg	E11	Extremadura
D6	Hessen	E12	Cataluña
D7	Niedersachsen	E13	Com. Valenciana
D8	Nordrhein-Westfalen	E14	Baleares
D9	Rheinland-Pfalz	E15	Andalucia
D10	Saarland	E16	Murcia
D11	Schleswig-Holstein	E17	Canarias (ES)
G1	Anatoliki Makedonia	F1	Île de France
G2	Kentriki Makedonia	F2	Champagne-Ardenne
G3	Dytiki Makedonia	F3	Picardie
G4	Thessalia	F4	Haute-Normandie
G5	Ipeiros	F5	Centre
G6	Ionia Nisia	F6	Basse-Normandie
G7	Dytiki Ellada	F7	Bourgogne
G8	Stereia Ellada	F8	Nord - Pas-de-Calais
G9	Peloponnisos	F9	Lorraine
G10	Attiki	F10	Alsace
G11	Voreio Aigaio	F11	Franche-Comté
G12	Notio Aigaio	F12	Pays de la Loire
G13	Kriti	F13	Bretagne
		F14	Poitou-Charentes
F15	Aquitaine	N1	Noord-Nederland

F16	Midi-Pyrénées	N4	Zuid-Nederland
F17	Limousin		
F18	Rhône-Alpes	P1	Norte
F19	Auvergne	P2	Centro (P)
F20	Languedoc-Roussillon	P3	Lisboa e Vale do Tejo
	Provence-Alpes-Côte	P4	Alentejo
F21	Azur		
F22	Corse	P5	Algarve
IE	Ireland	U1	North East
		U2	North West
I1	Piemonte	U3	Yorkshire and Humber
I2	Valle d'Aosta	U4	East Midlands
I3	Liguria	U5	West Midlands
I4	Lombardia	U6	Eastern
I5	Trentino-Alto Adige	U7	South East and London
I6	Veneto	U8	South West
I7	Friuli-Venezia Giulia	U9	Wales
I8	Emilia-Romagna	U10	Scotland
I9	Toscana	U11	Northern Ireland
I10	Umbria		
I11	Marche	A1	Burgenland
I12	Lazio	A2	Niederosterreich
I13	Abruzzo	A3	Wien
I14	Molise	A4	Karnten
I15	Campania	A5	Steiermark
I16	Puglia	A6	Oberosterreich
I17	Basilicata	A7	Salzburg
I18	Calabria	A8	Tirol
I19	Sicilia	A9	Vorarlberg
I20	Sardegna		
		S1	Stockholm
LU	Luxembourg	S2	Östra Mellansverige
		S3	Småland Med Öarna
N2	Oost-Nederland	S4	Sydsverige
N3	West-Nederland	S5	Västsverige

S6	Norra Mellansverige	FN1	Itä-Suomi
S7	Mellersta Norrland	FN2	Väli-Suomi
S8	Övre Norrland	FN3	Pohjois-Suomi
		FN4	Uusimaa
		FN5	Etelä-Suomi

Fig. 1. Dispersion among the Northern and Southern European regions.
 Weighted and unweighted coefficient of variation (CV)



C. Employment rate (E/P)

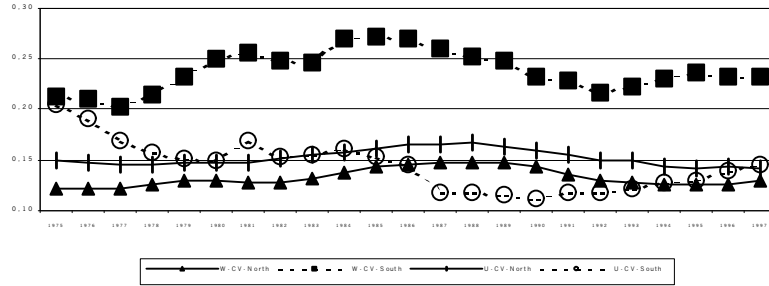


Figure 2. Initial labor share in agriculture (QA75) and its variation 1975-1997 (QAD)
($r=-0.84$)

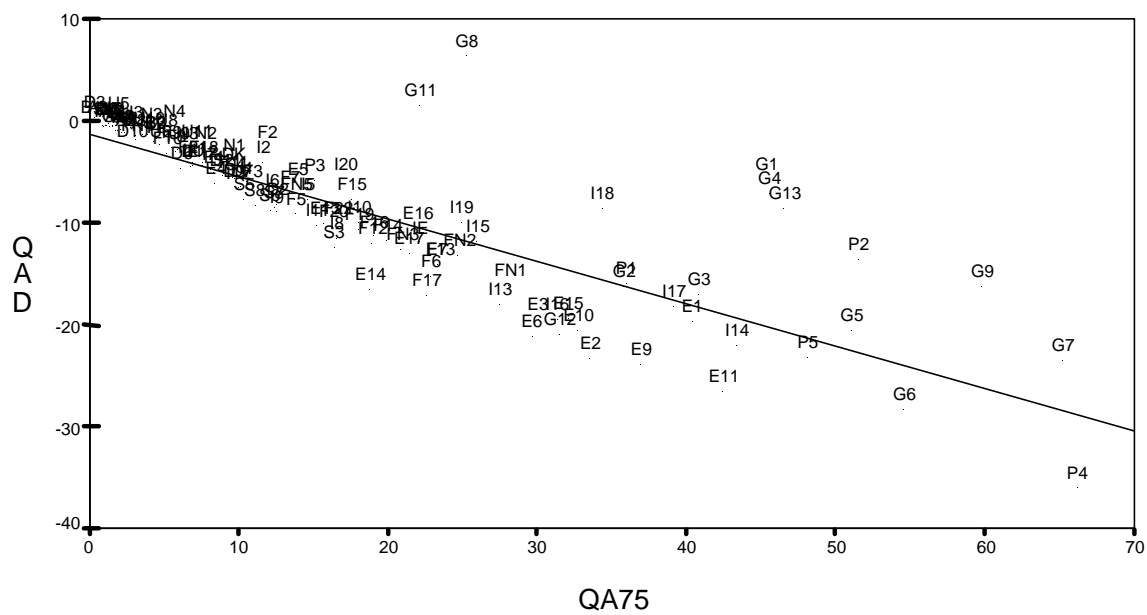


Figure 3. Variation 1975-97 of labor share in agriculture (QAD) and growth rate of aggregate labor productivity (% annual average, YG) ($r=-0.41$)

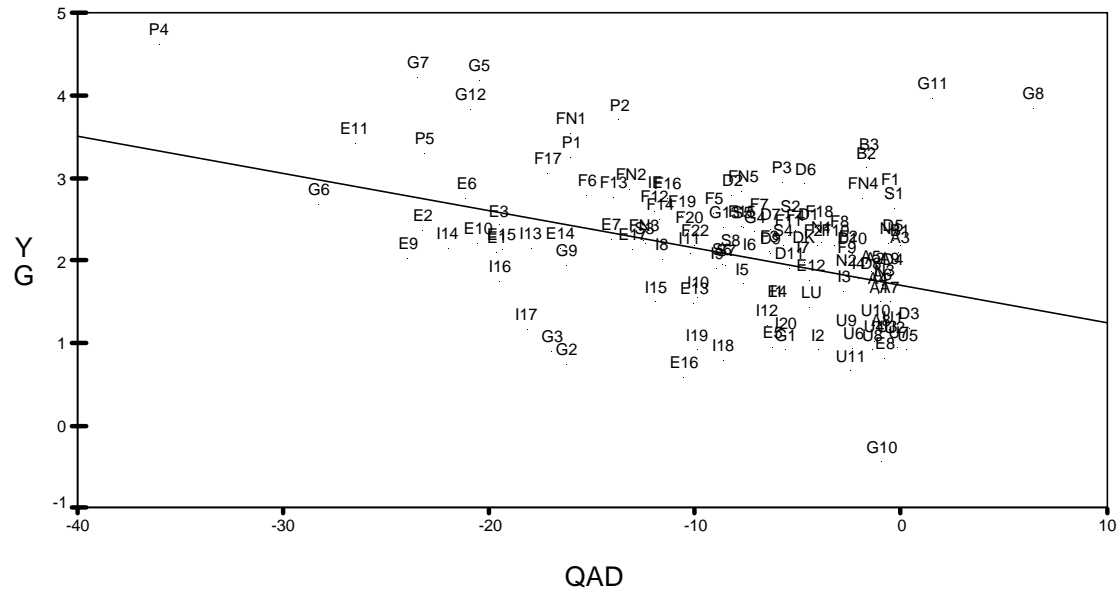


Figure 4. Variation 1975-97 of labor shares in agriculture (QAD) and manufacture (QMD) ($r=-0.73$)

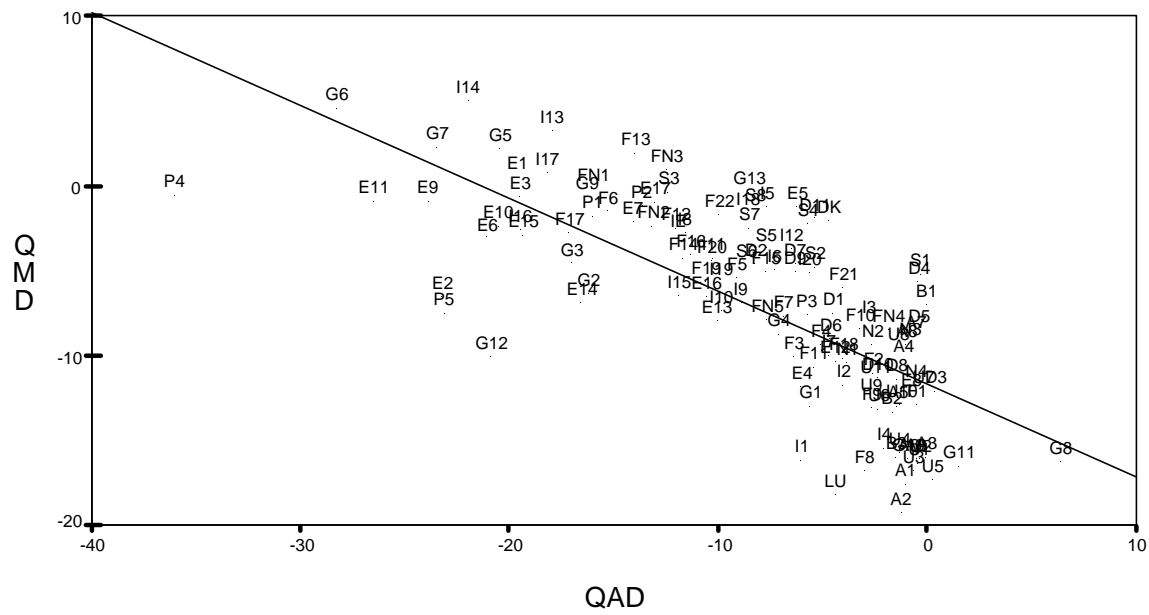


Figure 5. Variation 1975-97 of labor share in manufacture (QMD) and growth rate of aggregate labor productivity (% annual average, YG)
 (r=0.34)

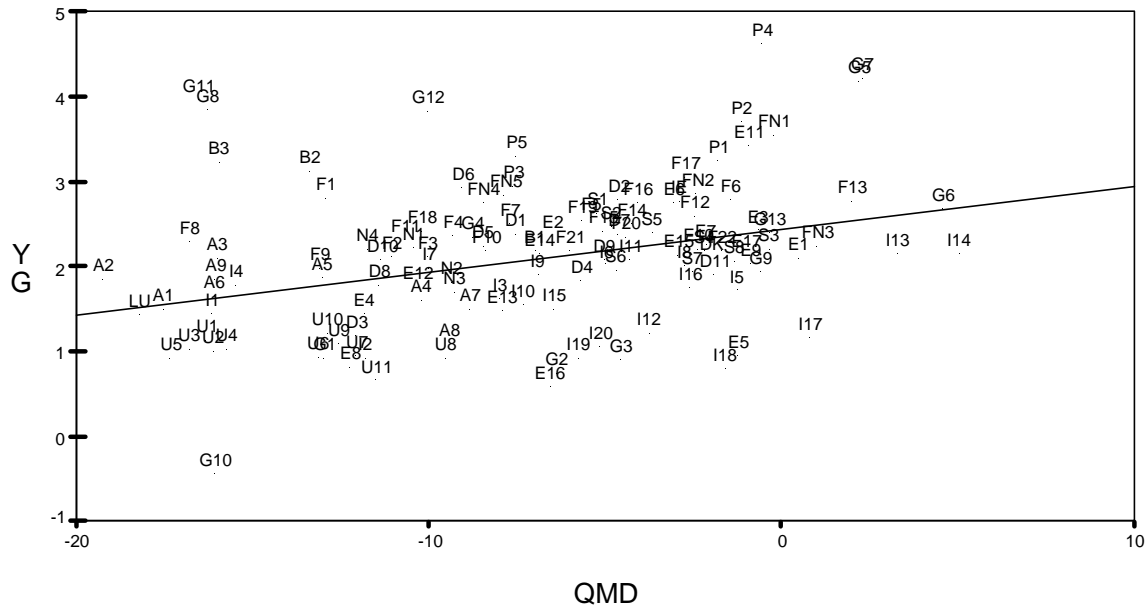
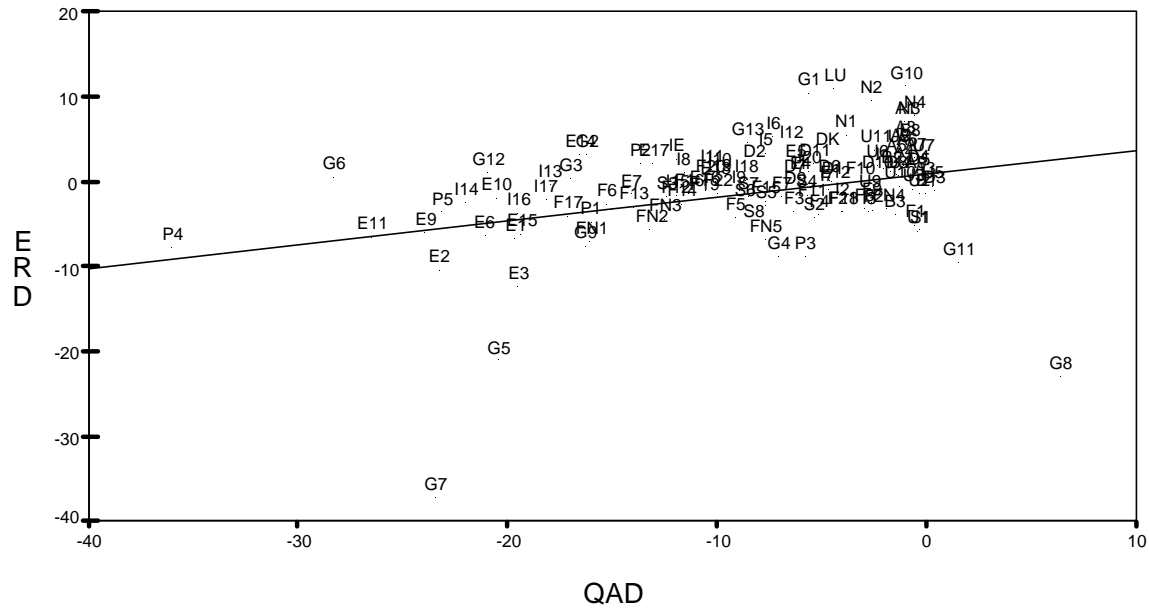
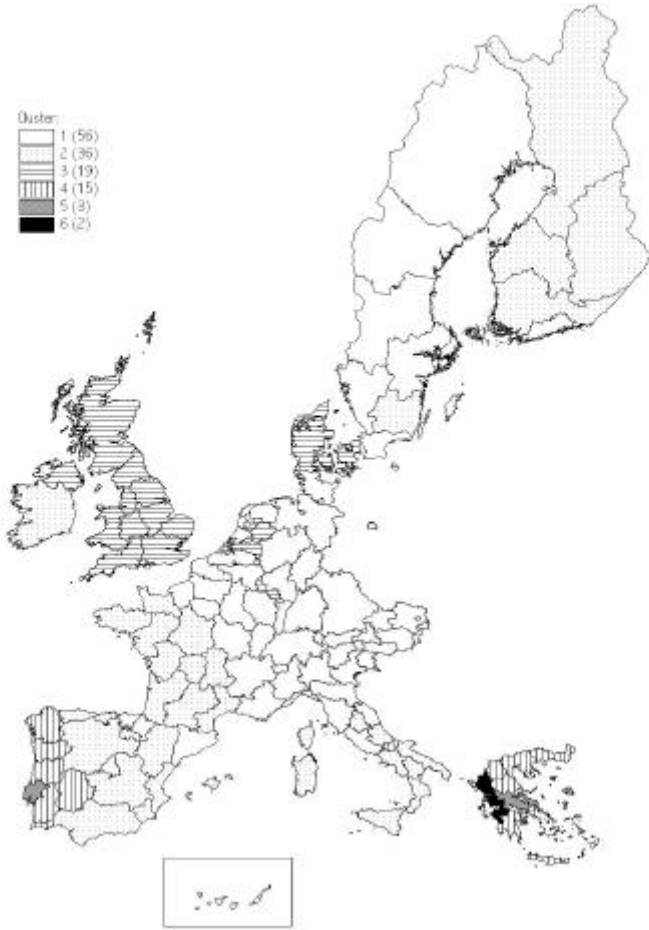


Figure 6. Variation 1975-97 of the labor share in agriculture (QAD) and of the overall employment rate (ERD)
($r=0.36$)



**Figure 7. Clusters of the European regions
(see Table 1 for the included variables)**



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