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Income and Employment Dynamics in Europe

Stefania Cosci* and Valentina Sabato†

Abstract

This study intends to deepen the analysis of the dynamics of income and employment in Europe over the period 1989-1996 by considering the complex spatial consequences of the failure of the Fordist production model. Previous studies found evidence of polarisation in unemployment rates and persistence in per capita income in European regions. When we exclude Objective 1 regions from the analysis, we obtain different results but we still find a marked difference in the dynamics of income and unemployment rate. This difference may have been caused by country effects and by the features of two specific kinds of regions: old industrialised and urban and capital regions. The relationship between the dynamics of employment and the dynamics of income is therefore significantly affected by the spatial consequences of production changes and socio-economic transformations.

Keywords: regional convergence, unemployment, non parametric estimations

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1. Introduction

Most of the theoretical and empirical literature dealt with growth and unemployment separately and many studies documented how the two phenomena tend to follow different dynamics

when considering European regional data. Although the relationship between the two variables is still an unresolved issue in both theoretical and empirical analysis, policymakers presume systematically that growth would inevitably absorb unemployment[1].

As a matter of fact we think that it is very important to analyse the differences in the dynamics of per capita income and unemployment, since unemployment affects negatively the welfare of European regions. Where per capita income growth does not increase employment rates, local governments need to find new ways to avoid the negative effects of social exclusion induced by the rise of unemployment.

This study intends to deepen the analysis of the dynamics of income and employment in Europe during the period 1989-1996. According to a large part of scientific literature, during the 1980s the breakdown of Fordism altered deeply the spatial distribution of wealth in Europe, creating a more complex territorial pattern. During the 1990s this process exhausted its consequences on per capita income distribution but not yet on unemployment rates[2].

This interpretation may help to explain the results of a growing strand of empirical literature finding evidence in Europe of persistence in regional per capita income and divergence in unemployment rates[3]. In particular OVERMAN and PUGA, 2002 constructed transition probability matrices tracking changes over time in the relative position of regions within the distribution and demonstrated that from 1986 to 1996 European regions exhibited a quite strong persistence in their relative income levels and a polarisation of regional unemployment rates. A divergence process in unemployment rates and a little change in per capita GDP are consistent with a convergence process in productivity. A possible explanation of polarisation of unemployment rates across European regions, according to PUGA, 2002, is given by the model formalised by the "new economic geography": two even a priori very similar regions can reach very different income levels; when

trade costs fall below some critical value, the one of two regions having a slight advantage may benefit of a self-reinforcing mechanism leading it to become an industrialised core, while the other becomes a de-industrialised periphery[4]. More industries attract more workers and more workers attract more firms through a market access effect. If wage differentials cannot reflect agglomeration effects because of institutional constraints, trade liberalisation may cause divergences in unemployment rates. History and not initial endowment determines a polarisation process[5]. Furthermore, in presence of centralised wage setting mechanisms and low mobility of the workforce, trade liberalisation, by increasing competition, may force low productivity regions to increase labour productivity by reducing employment (MELICIANI, 2006).

In this paper, first of all we want to evaluate how the dynamics of per capita income and unemployment rate changes when we exclude European laggard regions from the analysis. Unemployment is concentrated especially in the regions entitled to receive the European Funds of Development, the so-called Objective 1 regions, that showed a great persistence in terms of both per capita income and unemployment. The polarisation result obtained by the studies quoted above strictly depends on the behaviour of laggard regions. PIACENTINI and SULIS, 2000 found a negative correlation between productivity and unemployment rate in Objective 1 regions, where therefore economic growth and unemployment appear as distinct problems.

Since, in the analysis of the whole Europe, income and unemployment dynamics of not laggard regions may be hidden by the dynamics of outlier regions, when excluding European relatively backward regions we obtain results less difficult to understand. We want to study if, in the context of a more homogeneous economic system, not affected by huge backwardness problems, we still find such a different dynamics of per capita income and unemployment rate.

The second aim of this study is to investigate on the relationship between growth and unemployment in the light of the literature on the spatial consequences of socio-economic restructuring. Most of Objective 1 regions are peripheral European regions, far from major economic activity centres and characterised by relatively high levels of population growth in the European context, low income per head, a historical specialisation in agriculture and low levels of industrialisation: a part of Europe too peripheral to compete with core areas in high-quality production and too central to compete with Third World countries in low-cost mass production processes.

When we exclude peripheral regions from our analysis, we still find a very heterogeneous Europe, where core, old industrialised and intermediate areas co-exist. According to RODRÍGUEZ-POSE, 1998, the basic conditions defining the different areas of Europe were already evident at the beginning of the 1980s. Core, urban areas were characterised by a significant concentration of company headquarters, national and international banks, a powerful financial sector and considerable levels of political decision-making power. Old industrial zones in the 1980s were characterised by an over-representation of traditional industries and under-representation of services to industries. Intermediate regions are determined by Rodríguez-Pose in a residual way as all those no-peripheral regions which do not belong to any of the mentioned categories.

We want to investigate if the lack of a strict relationship between income and employment is generalised or is limited to some European areas. European labour market rigidity may have been the cause of this divergence. Are there other reasons for these differences? May the economic history of areas where a Fordist model of production prevailed during the 1960s and the 1970s, or where large urban centres are localised, help us to understand the causes of the different behaviour of income and unemployment in Europe?

In Section 2 we analyse the evolution of per capita income and unemployment rate in not laggard European regions over the period 1989-1996 by using transition probability matrices and kernel analysis. In particular we compare the results obtained for the restricted sample of no Objective 1 regions with the results obtained for the whole Europe.

In Section 3 we analyse the correlation between the rate of change of regional per capita income and that of the unemployment rate in different groups of homogeneous regions using weighted data in order to take into account country effects. We investigate if the different dynamics of income and unemployment rate may have been influenced by the "new growth pole" effect, i.e. by the emergence in Europe of new growth spaces sharing common features, and how this affects the relative regional dynamics described in the kernel analysis reported in Section 2.

Finally Section 4 presents the main conclusions of the study.

2. A comparison between income and unemployment dynamics in European not laggard regions

The aim of this Section is to compare the transition probability matrix results obtained on the whole sample of the European regions with those obtained on a restricted sample which excludes the Objective 1 regions over the period 1989-1996.

The whole sample includes 99 European regions belonging to 12 countries (Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain and United Kingdom), of which 64 are not laggard regions (no Objective 1 regions)[6]. The sources of data are the Eurostat Regio dataset for GDP and the Community Labour Survey for employment. We follow the classification of regions proposed by RODRÍGUEZ-POSE, 1998, which coincides with NUTS (Nomenclature of Statistical Territorial Units) 2 of the Regio database for France, Italy,

Portugal and Spain, with NUTS 1 for Belgium, Germany, Greece, Netherlands and UK, and with NUTS 0 for Denmark, Ireland and Luxembourg[7]. Tables 1 and 2 report the transition probability matrices of per capita income and unemployment rate, respectively, over the period 1989-1996 for the whole sample of European regions. Tables 3 and 4 report the same transition matrices for the restricted sample of no Objective 1 regions. Per capita income and unemployment rate are relative to the sample mean. The first column of the tables gives the number n of the regions beginning their transition in a given state and the second column gives the classes that divide up the state space. Classes are defined in order to have almost the same number of observations per class. Large numbers on the main diagonal of the matrices mean that many regions remain in the same range of the distribution (persistence).

Not surprisingly, for the whole sample we get results similar to those of OVERMAN and PUGA, 2002 and MELICIANI, 2006: regional data show more persistence in the intermediate classes in per capita income than in unemployment rates, where a more polarised situation comes out.

Looking at the dynamics of European regions, as shown in Table 1[8], we notice that the per capita income distribution is very stable. Persistence in regional per capita income is particularly strong as the share of regions remaining in the same class is equal or over 80% in all the classes but the two intermediate, where it is over 50%.

By inspection of Table 2 it is evident that the dynamics of employment is different from the dynamics of income in the same period as strong persistence no longer holds. The transition matrix of unemployment rate shows more mobility in the intermediate classes, while we find strong persistence in the extreme classes, particularly in the class of regions with higher-than-average unemployment rates: 95% of regions that started with relatively high unemployment rates (most of

them being Objective 1 regions) remained with high unemployment and 84% of regions starting with relatively low unemployment rates remained in the same range.

Table 1 here

Table 2 here

In line with OVERMAN and PUGA, 2002 and MELICIANI, 2006, we improved the transition analysis of per capita income and unemployment rate with the estimation of bivariate kernel densities. Looking at the estimated stochastic kernel we can have a more detailed picture of the transition of the distribution over time. We also plot the contour map of the three dimensional kernel.

As in MELICIANI, 2006 we use Figure 1 to report density estimates and contour plots under extreme hypotheses on the behaviour of economic variables over time: the first couple of graphs at the top of Figure 1 (part (a) of the figure) shows the case of convergence where the distribution at time t + k collapses to a point; the second couple (part (b) of Figure 1) represents the case of criss-crossing where the density is concentrated around the secondary diagonal; the third couple of graphs (part (c) of the figure) shows polarisation where density at time t + k has two modes; the fourth couple (part (d) of the figure) shows stability where density is concentrated around the main diagonal.

Figure 1 here

Figures 2 and 3 report the bivariate density estimates for per capita income and unemployment rate distributions, respectively, for the whole sample of European regions. Figures 4 and 5 report the same estimates for the restricted sample of no Objective 1 regions.

Looking at Figure 2 the overall stability of per capita income distribution over the period 1989-1996 is confirmed, density being concentrated on the main diagonal; while looking at Figure 3 the unemployment rate distribution shows more mobility even if most of density is still concentrated on the main diagonal.

Figure 2 here

Figure 3 here

When we analyse the dynamics of income and unemployment in the restricted sample of no Objective 1 regions, the difference between the two dynamics is even more evident: if we look at relative regional unemployment rates reported in Table 4, we notice that percentages on the diagonal are definitely lower than those relative to per capita income reported in Table 3. Almost all relatively richer (92%) and relatively poorer (93%) regions remain in the same class, while regions that started with relatively high unemployment rates in 1989 improved substantially their position in 1996, converging toward unemployment rates closer to the mean.

Table 3 here

Table 4 here

The results from the transition probability matrices analysis are confirmed by looking at the bivariate density estimates.

When excluding Objective 1 regions we see that over the period 1989-1996 (see Figure 4) all the distribution of per capita income remains on the main diagonal but it shows a peak in the section of the relatively poorer regions. The result of persistence in regional per capita income is therefore substantially confirmed also in the restricted sample of no Objective 1 regions.

Looking at unemployment dynamics (see Figure 5) we observe that, although there is still evidence of polarisation, the shape of the kernel contours tends toward the horizontal line in some parts of the distribution, suggesting a weak convergence.

Figure 4 here

Figure 5 here

Summarising our main findings from the analysis of per capita income and unemployment dynamics over the period 1989-1996, we find a stronger degree of persistence in per capita income when excluding Objective 1 regions from the sample of European regions, in particular for the extreme classes of per capita income. Over the same period European regions experienced a higher mobility in unemployment rate than in per capita income. Nevertheless we find more persistence in unemployment rates in the whole sample than in the restricted sample: it is very interesting to notice that in the restricted sample a large part of the regions that were characterised by relatively higher unemployment rates at the beginning of the period substantially improved their situation[9].

The difference between the dynamics of regional per capita income and regional unemployment rate is therefore particularly striking in the restricted sample that excludes regions

affected by lags in development. In the following Section we will investigate in which regions an increase in per capita income absorbs unemployment and in which ones this is not the case[10].

3. Regional patterns of growth and unemployment in Europe: the "new growth pole" effect

We may decompose real per capita income (Y/P, where Y is income and P population) into a labour productivity variable (Y/E where E is employment) and an employment or unemployment variable (L/P (1 - u), where L is labour force and u is the unemployment rate):

$$\frac{Y}{P} = \frac{Y}{E}\frac{E}{P} = \frac{Y}{E}\frac{L}{P}(1-u) .$$

OVERMAN and PUGA, 2002 demonstrated that most regions that ended up with relatively low unemployment in 1996 had relatively high employment growth over the previous decade, and most regions that ended up with relatively high unemployment had below-average employment growth. Thus they concluded that employment changes, and not labour force changes, have determined polarisation in unemployment rates. Regions that lost employment recorded a productivity rise and regions that gained employment recorded productivity falls, so that per capita income did not change significantly[11]. The reason, according to the two economists, is that, if wage differentials cannot reflect agglomeration effects because of institutional constraints, trade liberalisation may cause divergences in unemployment rates. In their analysis neighbour effects are expected to be more significant than country effects.

Divergences in unemployment rates may be caused by divergences among European countries in the degree of flexibility of the labour market (BOERI, NICOLETTI and SCARPETTA, 2000) or in labour taxes and wage setting institutions. According to MELICIANI, 2006 in the presence of

low mobility of the labour force and of centralised wage setting mechanisms, trade liberalisation, by increasing competition, might have forced low productivity regions to increase labour productivity by reducing employment. In this context country effects are expected to be relevant.

The interpretation proposed by our analysis is based on the literature on socio-economic restructuring. Until the beginning of the 1970s European regions growth rates of per capita income tended to follow long-term economic cycles, very closely linked to national trajectories. During the 1970s the Fordist model of mass production was replaced by a new production system, based on new information technologies, generalised deregulation and increasing mobility of financial assets. Location constraints linked to the availability of row materials and energy sources have been largely overcome by the reduction of transportation and inputs costs but, according to RODRÍGUEZ-POSE, 1998, labour might still be considered as the most rigid of Weber's location factors and the social and political environment a crucial condition for the acceptance of innovation. The lack of scientific research, insufficient skills, inadequate legislation and even low receptiveness and willingness to change by the population cut down the possibilities of development.

We want to test if the relationship between per capita income and unemployment rate is different among homogeneous clusters of regions sharing common socio-economic features. In particular we want to test if the divergence between the dynamics of regional per capita income and the dynamics of regional unemployment rate may be explained by national effects and by what we may name the "new growth pole" effects.

The literature on post-Fordism and socio-economic restructuring outlined the emergence in Europe of new growth spaces sharing common features. RODRÍGUEZ-POSE, 1998 demonstrated that the groups delimited by the literature (i.e. core areas, old industrialised zones, intermediate and peripheral regions) form homogeneous cross-national sets in terms of growth behaviour.

We calculated the Pearson correlation index between the rate of growth of income and that of unemployment for the different groups of regions. In order to test the relevance of the national effect we evaluated the correlation between the regional growth rate of unemployment rate and the regional growth rate of per capita income first by using original data and then by using nationally weighted data.

In order to weight data we used the same methodology adopted by Rodríguez-Pose, so that:

$$\dot{Y}_w = \frac{\dot{Y}_e}{\dot{Y}_n}\dot{Y}_i,$$

where $\dot{Y}_w$ denotes the nationally weighted rate of increase of regional per capita income between 1989 and 1996, $\dot{Y}_i$ denotes the rate of increase of regional per capita income, $\dot{Y}_n$ the rate of growth of national per capita income, and $\dot{Y}_e$ the rate of growth of European per capita income, in the same period. We then weighted the increase of unemployment rate data according to the same equation. By multiplying regional data by a national coefficient (the country weight coefficient) equal to the ratio of the European growth rate to the national growth rate ($\dot{Y}_e/\dot{Y}_n$) we are able to test if the dynamics of per capita income and the dynamics of unemployment rates are more similar when we eliminate distortions related to the country effect. The country weight coefficient is then a measure of the relative performance of the country to the European average. If a region belongs to a country growing more than European average, its growth rate is reduced accordingly to its country weight coefficient, that in this case is lower than 1. Following the same equation, if a region belongs to a country growing less than European average, the regional growth rate is increased accordingly to its country weight coefficient (greater than 1 in this case)[12]. Rodríguez-Pose weighting methodology, although very simple, has the advantage of dampening country effects to the extent that each country

dynamics deviates from the European one. Other methodologies based on the differences between the regional and the country growth rates (or their ratio) are not able to catch this aspect.

We may see in Table 5 that the correlation between the two dynamics changes radically when looking at weighted growth rates: in the whole sample of European regions the Pearson correlation coefficient, although not significant, increases substantially and this result becomes more evident when we consider homogeneous regions. In fact the evolution of weighted regional unemployment rate is significantly and negatively correlated with that of weighted per capita income in intermediate (dynamic and less dynamic) and peripheral regions. It can be seen in Figure 6 that in peripheral regions country effects are particularly relevant.

A first result of this analysis is that the lack of correlation between the two dynamics in the whole sample can be explained by the lack of correlation registered in old industrialised and urban and capital regions.

Table 5 here

Figure 6 here

Looking at Figure 6 we observe that old industrialised regions (part (b) of the figure) recorded either decreasing or increasing unemployment rates for very similar increases in per capita income[13]. These regions are former core regions undergoing industrial decline, that, during the 1980s, have been involved in a deep process of industrial restructuring also financed by national government and EU funds. They followed very different trajectories. Some regions implemented a deep process of economic rationalisation at the beginning of the 1980s and at the end of the 1980s experienced unemployment rates reductions, while in other regions this process was still in act in

the period of interest and therefore unemployment rates increased. A significant percentage of unskilled workers in these regions experienced difficulties in adjusting to changes.

Figure 6 also shows that, on the opposite, capital and large urban regions (part (c) of the figure) recorded very similar unemployment rate growth for very different rates of per capita income growth[14]. Unemployment rates increased everywhere in this group of regions but the same rate of growth of unemployment rate has been associated with low as well as very high per capita income growth rates. During the 1980s capital and urban regions achieved growth rates higher than the EU average, especially in Hamburg, Lazio, Madrid and Ile de France: the availability in these regions of a large amount of qualified labour and the existence of top-level universities have eased the assimilation of innovation and technological advances. This allowed urban regions to achieve high increases in productivity resulting in the divergence between the growth rate of per capita income and that of unemployment rate documented in Figure 6.

Data reported in Table 5 show that, in the other areas, the correlation between unemployment rate and per capita income growth is always negative and significant, when we weight the data for the national effect.

Intermediate dynamic regions have been, with urban and capital regions, the main beneficiaries of socio-economic restructuring. A large proportion of enterprises moved from central spaces and localised in intermediate regions, where local entrepreneurship and small and medium-sized firms strengthened. In these areas, according to RODRÍGUEZ-POSE, 1998, the economic and social problems of heavy industry were lacking and the supply of dynamic and qualified labour by local universities and colleges helped to overcome the problems caused by the lack of social adaptation to transformation. In such a dynamic context growth and employment moved in the same

direction with the highest correlation rate among all the considered areas, and with a significant correlation also on unweighted data.

Intermediate less dynamic regions record a significant negative correlation, but only on weighted data. During the 1980s these intermediate regions did not experience high growth rates as the dynamic ones, because of their relative isolation, an insufficient industrial network and below-average levels of education.

We observe the same situation also in peripheral regions. In particular more dynamic peripheral regions are characterised by little accessibility and relative social and economic backwardness so that they were excluded from the process of flexibilisation of production. Less dynamic peripheral regions have relatively high employment in agriculture, low level of education of human capital and recorded very low growth rates during the 1980s. In both areas we find a significant negative correlation between unemployment and growth when we eliminate distortion originating from country effects.

The evaluation of how this may have affected the relative dynamics of income and unemployment in the kernel analysis reported in Section 2 for the sample of not laggard regions is a very interesting topic which can motivate further investigation.

The two main conclusions of the present analysis are the following:

i) the relationship between the dynamics of employment and the dynamics of income is significantly affected by country effects. National characteristics of the labour market and institutional differences operating at the national level can induce different dynamics in unemployment rates across countries, independently on the dynamics of per capita income;

ii) the relationship between the dynamics of employment and the dynamics of income is significantly affected also by the spatial consequences of production changes and socio-economic

transformations. We outlined that the two areas of capital and urban and old industrialised regions might account for the divergence between unemployment rate and per capita income dynamics documented in Section 2. In regions belonging to the first group (capital and urban) we observe above-average income growth rates without reduction in unemployment rate, while in regions belonging to the second group (old industrialised) the opposite is true, as we register decreasing unemployment with low growth rates. While the first situation is caused by a relatively high increase in productivity, the second is caused by the opposite unfavourable situation: more workers who produce the same. In the remaining part of Europe higher employment is associated with higher per capita income, when we use data depurated by country effects.

4. Conclusions

We departed from OVERMAN and PUGA, 2002 results documenting that, over the period 1989-1996, Europe recorded persistence in regional per capita income and polarisation in unemployment rates and that polarisation in unemployment rates has been caused basically by neighbour effects and not by country effects, so that geographical clusters that go beyond national borders are emerging.

MELICIANI, 2006 demonstrated that most of polarisation is due to Objective 1 regions and that country effects are more important than neighbour effects in determining polarisation of unemployment rates.

The first aim of this study was to investigate how the dynamics of income and unemployment change when we exclude Objective 1 regions from the sample.

We find that, in the restricted sample, looking at the transition probability matrix and the kernel analysis, there has been a significant mobility of regional unemployment rates over the period 1989-1996, while there has been significant persistence in regional per capita income. In particular regions characterised by relatively high unemployment rates tended to converge to the mean of the sample. We do not find evidence of any polarisation process in unemployment and therefore we may conclude that Objective 1 regions account for such a result in the whole sample of European regions.

A second aim was to investigate if the lack of a significant relationship between income and unemployment may be interpreted in the light of the socio-economic restructuring theories. We find very interesting results.

First, the relationship between unemployment and per capita income dynamics is strongly influenced by country effects: if we weight data as to avoid distortions related to the country dimension it becomes significantly negative in most of European areas.

Second, the relationship is not significant only for old industrialised and urban and capital regions while in the other European regions the two dynamics are negatively and significantly correlated.

What can therefore explain the differences between the patterns followed by regional growth and unemployment in Europe over the period 1989-1996?

We answer that divergences may have been caused by country effects and by the features of two specific kinds of regions: urban and capital regions, as a large part of them recorded high per capita income increases without a decrease in unemployment, and old industrial regions, which, on the opposite, recorded a decrease in unemployment rates also in correspondence of low per capita income growth rates. The second result could have been fostered also by the Objective 2 Structural

Funds policy, aimed at helping those regions which experienced a decline in employment. This is consistent with the evidence of the transition probability matrix reported in Table 4, where the first row shows a significant convergence of regions that started with relatively high unemployment rates. Most of those regions benefited of higher-than-average Objective 2 EU funds per employed, funds mainly aimed at increasing employment rather than production. This altered the picture of the dynamics of employment and income in Europe, a picture to be interpreted also in the light of the complex spatial consequences of the failure of the Fordist production model.

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APPENDIX

List of regions

be1	Région Bruxelles-capitale/Brussels hoofdstad gewest (no OB. 1, urban)
be2	Vlaams Gewest (no OB. 1, intermediate dynamic)
be3	Région Wallonne (OB. 1, old industrialised)
dk	Denmark (no OB. 1, *)
de1	Baden-Württemberg (no OB. 1, intermediate dynamic)
de2	Bayern (no OB. 1, intermediate dynamic)
de5	Bremen (no OB. 1, old industrialised)
de6	Hamburg (no OB. 1, urban)
de7	Hessen (no OB. 1, intermediate dynamic)
de9	Niedersachsen (no OB. 1, old industrialised)
dea	Nordrhein-Westfalen (no OB. 1, old industrialised)
deb	Rheinland-Pfalz (no OB. 1, intermediate less dynamic)
dec	Saarland (no OB. 1, old industrialised)
def	Schleswig-Holstein (no OB. 1, intermediate less dynamic)
gr1	Voreia Ellada (OB. 1, peripheral)
gr2	Kentriki Ellada (OB. 1, peripheral)
gr3	Attiki (OB. 1, urban)
gr4	Nisia Aigaiou, Kriti (OB. 1, peripheral)
es11	Galicia (OB. 1, peripheral)
es12	Principado de Asturias (OB. 1, old industrialised)

es13 Cantabria (OB. 1, old industrialised)

es21 Pais Vasco (OB. 1, old industrialised)

es22 Comunidad de Navarra (no OB. 1, intermediate less dynamic)

es23 La Rioja (no OB. 1, intermediate less dynamic)

es24 Aragón (no OB. 1, intermediate dynamic)

es3 Comunidad de Madrid (no OB. 1, urban)

es41 Castilla y León (OB. 1, peripheral)

es42 Castilla-la Mancha (OB. 1, peripheral)

es43 Extremadura (OB. 1, peripheral)

es51 Cataluña (no OB. 1, intermediate dynamic)

es52 Comunidad Valenciana (OB. 1, intermediate dynamic)

es53 Baleares (no OB. 1, intermediate dynamic)

es61 Andalucia (OB. 1, peripheral)

es62 Murcia (OB. 1, peripheral)

es63 Ceuta y Melilla (ES) (OB. 1, peripheral)

es7 Canarias (ES) (OB. 1, peripheral)

fr1 Ile de France (no OB. 1, urban)

fr21 Champagne-Ardenne (no OB. 1, old industrialised)

fr22 Picardie (no OB. 1, old industrialised)

fr23 Haute-Normandie (no OB. 1, old industrialised)

fr24 Centre (no OB. 1, intermediate less dynamic)

fr25 Basse-Normandie (no OB. 1, old industrialised)

fr26 Bourgogne (no OB. 1, intermediate less dynamic)

fr3	Nord-Pas-de-Calais (OB. 1, old industrialised)
fr41	Lorraine (no OB. 1, old industrialised)
fr42	Alsace (no OB. 1, intermediate dynamic)
fr43	Franche-Comté (no OB. 1, intermediate less dynamic)
fr51	Pays de la Loire (no OB. 1, intermediate less dynamic)
fr52	Bretagne (no OB. 1, intermediate less dynamic)
fr53	Poitou-Charentes (no OB. 1, intermediate less dynamic)
fr61	Aquitaine (no OB. 1, intermediate dynamic)
fr62	Midi-Pyrénées (no OB. 1, intermediate dynamic)
fr63	Limousin (no OB. 1, intermediate less dynamic)
fr71	Rhône-Alpes (no OB. 1, intermediate less dynamic)
fr72	Auvergne (no OB. 1, intermediate less dynamic)
fr81	Languedoc-Roussillon (no OB. 1, intermediate less dynamic)
fr82	Provence-Alpes-Cóte Azur (no OB. 1, intermediate less dynamic)
ie	Ireland (OB. 1, *)
it11	Piemonte (no OB. 1, old industrialised)
it12	Valle d'Aosta (no OB. 1, intermediate dynamic)
it13	Liguria (no OB. 1, old industrialised)
it2	Lombardia (no OB. 1, intermediate dynamic)
it31	Trentino-Alto Adige (no OB. 1, intermediate dynamic)
it32	Veneto (no OB. 1, intermediate dynamic)
it33	Friuli-Venezia Giulia (no OB. 1, intermediate dynamic)
it4	Emilia-Romagna (no OB. 1, intermediate less dynamic)

it51	Toscana (no OB. 1, intermediate less dynamic)
it52	Umbria (no OB. 1, intermediate less dynamic)
it53	Marche (no OB. 1, intermediate less dynamic)
it6	Lazio (no OB. 1, urban)
it71	Abruzzo (OB. 1, peripheral)
it72	Molise (OB. 1, peripheral)
it8	Campania (OB. 1, peripheral)
it91	Puglia (OB. 1, peripheral)
t92	Basilicata (OB. 1, peripheral)
it93	Calabria (OB. 1, peripheral)
ita	Sicilia (OB. 1, peripheral)
itb	Sardegna (OB. 1, peripheral)
lu	Luxembourg (no OB. 1, *)
nl1	Noord-Nederland (no OB. 1, *)
nl2	Oost-Nederland (OB. 1, *)
nl3	West-Nederland (no OB. 1, *)
nl4	Zuid-Nederland (no OB. 1, *)
pt11	Norte (OB. 1, peripheral)
pt12	Centro (P) (OB. 1, peripheral)
pt13	Lisboa e Vale do Tejo (OB. 1, urban)
pt14	Alentejo (OB. 1, peripheral)
pt15	Algarve (OB. 1, peripheral)
uk1	North (no OB. 1, old industrialised)

uk2 Yorkshire and Humberside (no OB. 1, old industrialised)

uk3 East Midlands (no OB. 1, intermediate dynamic)

uk4 East Anglia (no OB. 1, intermediate dynamic)

uk5 South East (no OB. 1, urban)

uk6 South West (no OB. 1, intermediate dynamic)

uk7 West Midlands (no OB. 1, intermediate less dynamic)

uk8 North West (no OB. 1, old industrialised)

uk9 Wales (no OB. 1, old industrialised)

uka Scotland (OB. 1, intermediate dynamic)

ukb Northern Ireland (OB. 1, peripheral)

* Regions excluded from the groupings in the correlation analysis of Section 3.

Table 1 – Transition matrix for per capita income distribution: European regions

(1989-1996)

			Per capita GDP 1996				
	n		[0.00-0.75)	[0.75-0.94)	[0.94-1.03)	[1.03-1.18)	[1.18-∞)
Per capita	20	[0.00-0.75)	0.80	0.15	0.05	0.00	0.00
GDP	18	[0.75-0.94)	0.00	0.83	0.17	0.00	0.00
1989	20	[0.94-1.03)	0.00	0.35	0.55	0.10	0.00
	21	[1.03-1.18)	0.00	0.00	0.33	0.57	0.10
	20	[1.18-∞)	0.00	0.00	0.00	0.15	0.85

Table 2 – Transition matrix for unemployment rate distribution: European regions (1989-1996)

			Unemployment rate1996				
	n		[1.30-∞)	[1.00-1.30)	[0.78-1.00)	[0.60-0.78)	[0.00-0.60)
Unemploy-	20	[1.30-∞)	0.95	0.00	0.05	0.00	0.00
ment rate	20	[1.00-1.30)	0.25	0.30	0.40	0.05	0.00
1989	20	[0.78-1.00)	0.00	0.25	0.45	0.20	0.10
	20	[0.60-0.78)	0.00	0.00	0.20	0.55	0.25
	19	[0.00-0.60)	0.00	0.00	0.00	0.16	0.84

Table 3 – Transition matrix for per capita income distribution: no Objective 1 European regions

(1989-1996)

			Per capita GDP 1996				
	n		[0.00-0.84)	[0.84-0.91)	[0.91-0.96)	[0.96-1.11)	[1.11-∞)
Per capita GDP 1989	12	[0.00-0.84)	0.92	0.08	0.00	0.00	0.00
	13	[0.84-0.91)	0.31	0.38	0.31	0.00	0.00
	12	[0.91-0.96)	0.00	0.58	0.34	0.00	0.08
	13	[0.96-1.11)	0.00	0.00	0.15	0.62	0.23
	14	[1.11-∞)	0.00	0.00	0.00	0.07	0.93

Table 4 – Transition matrix for unemployment rate distribution: no Objective 1 European regions (1989-1996)

			Unemployment rate1996				
	n		[1.34-∞)	[1.10-1.34)	[0.90-1.10)	[0.70-0.90)	[0.00-0.70)
Unemploy-	13	[1.34-∞)	0.46	0.15	0.31	0.08	0.00
ment rate	13	[1.10-1.34)	0.31	0.38	0.155	0.155	0.00
1989	13	[0.90-1.10)	0.00	0.46	0.155	0.23	0.155
	12	[0.70-0.90)	0.00	0.00	0.17	0.58	0.25
	13	[0.00-0.70)	0.00	0.00	0.00	0.23	0.77

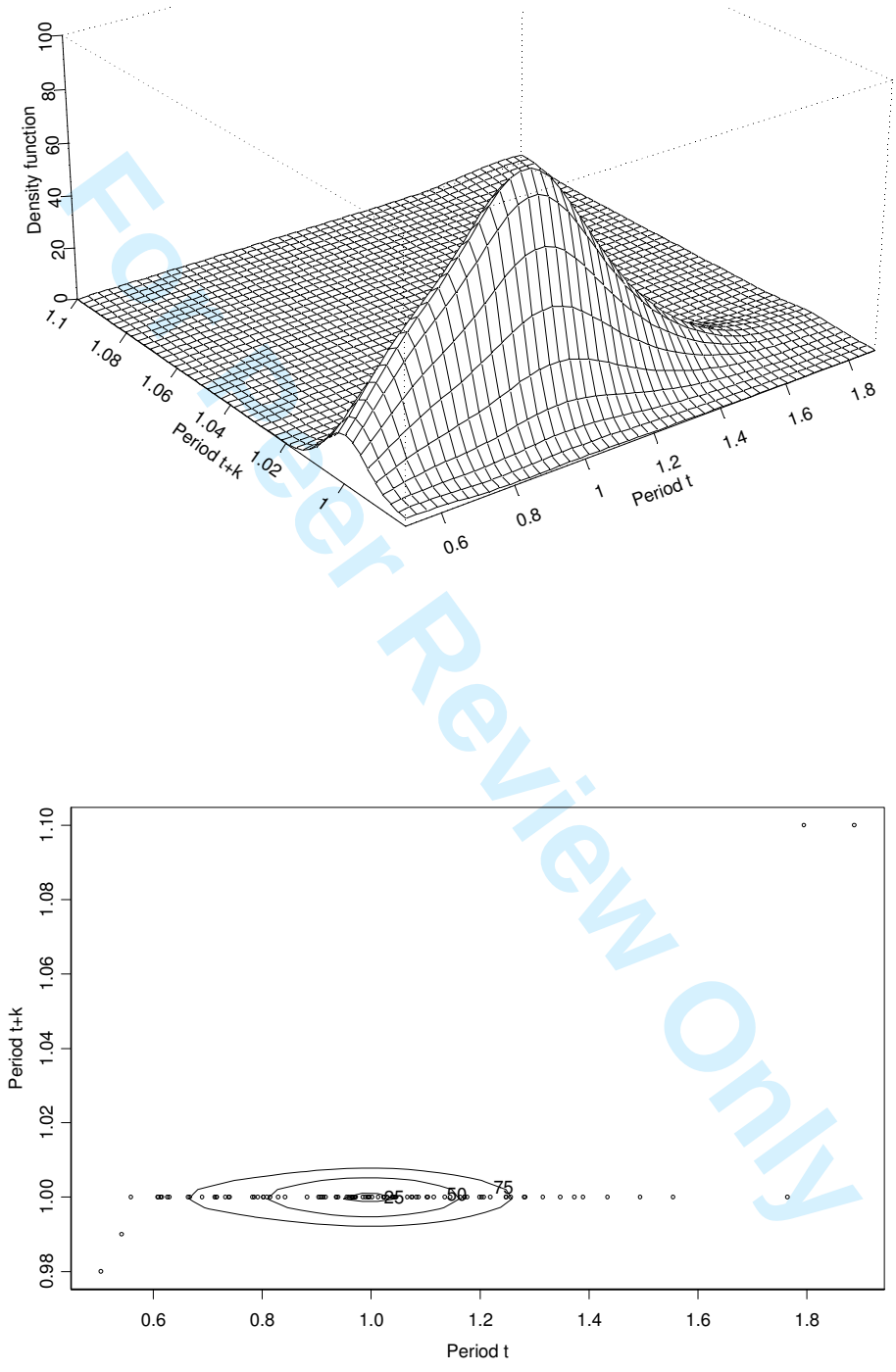
Table 5 – Correlation between per capita income and unemployment rate dynamics

(1989-1996)

	Number of regions	Pearson Correlation Index	
		Regional data	Country weighted data
European regions	92	0.086	-0.146
Old industrialised regions	20	0.203	0.175
Urban regions	8	0.086	-0.057
Intermediate dynamic regions	20	-0.417	-0.445*
Intermediate less dynamic regions	20	-0.431	-0.545*
Peripheral regions	24	0.214	-0.407*

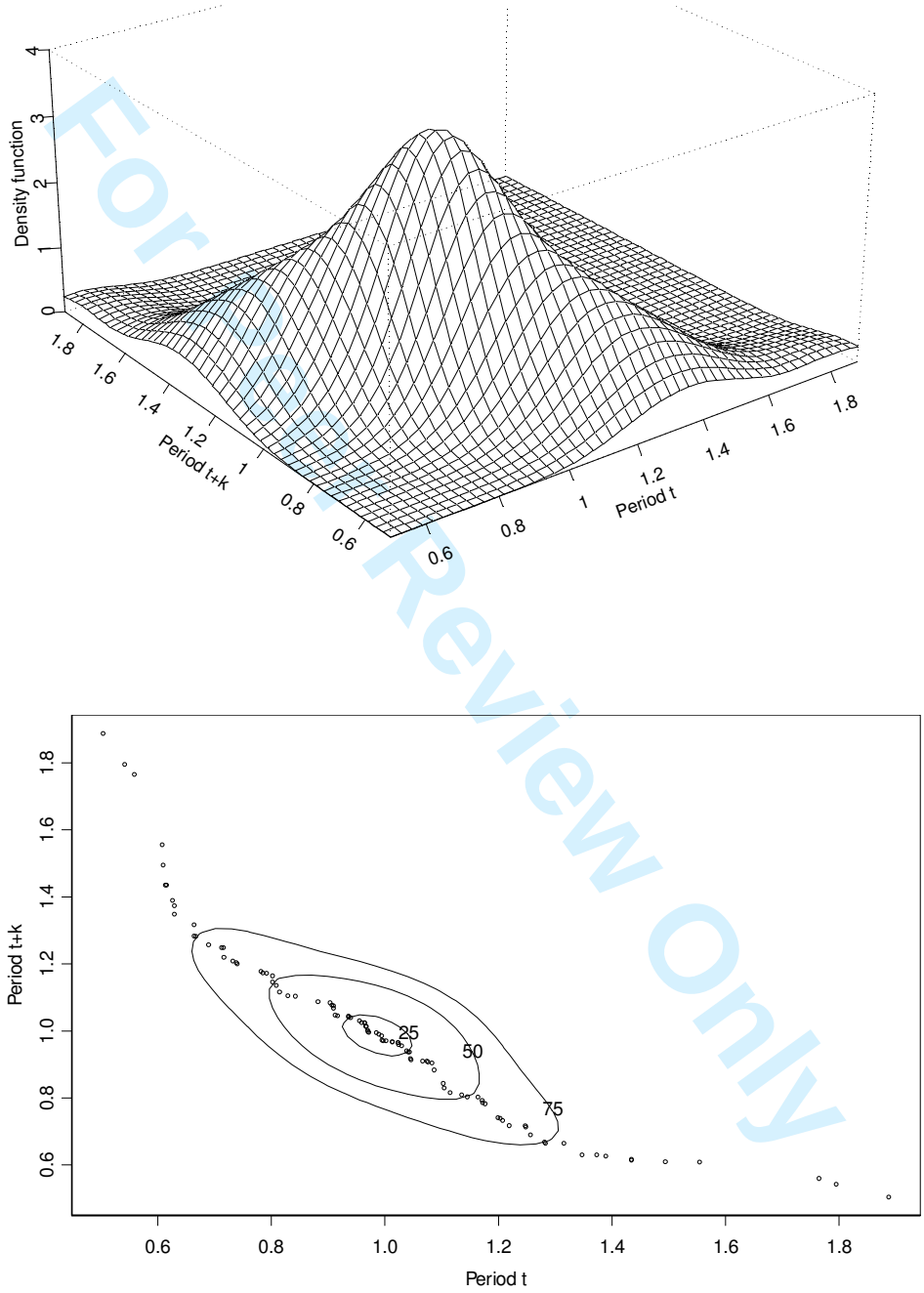
* Significant at 0.05 level (2-tails)

Figure 1 – Convergence, criss-crossing, polarisation and stability



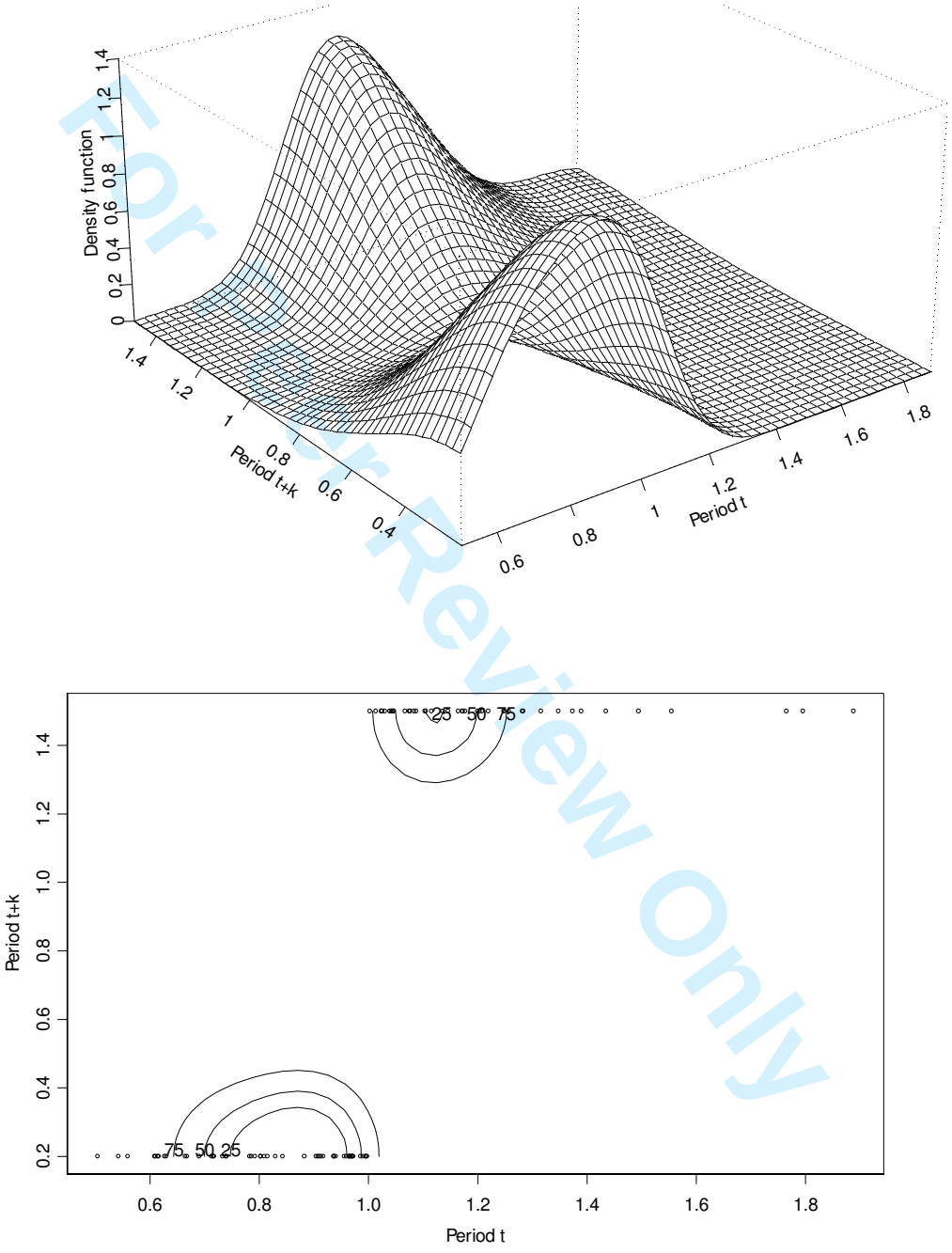
(a) Convergence

Figure 1 (continued)



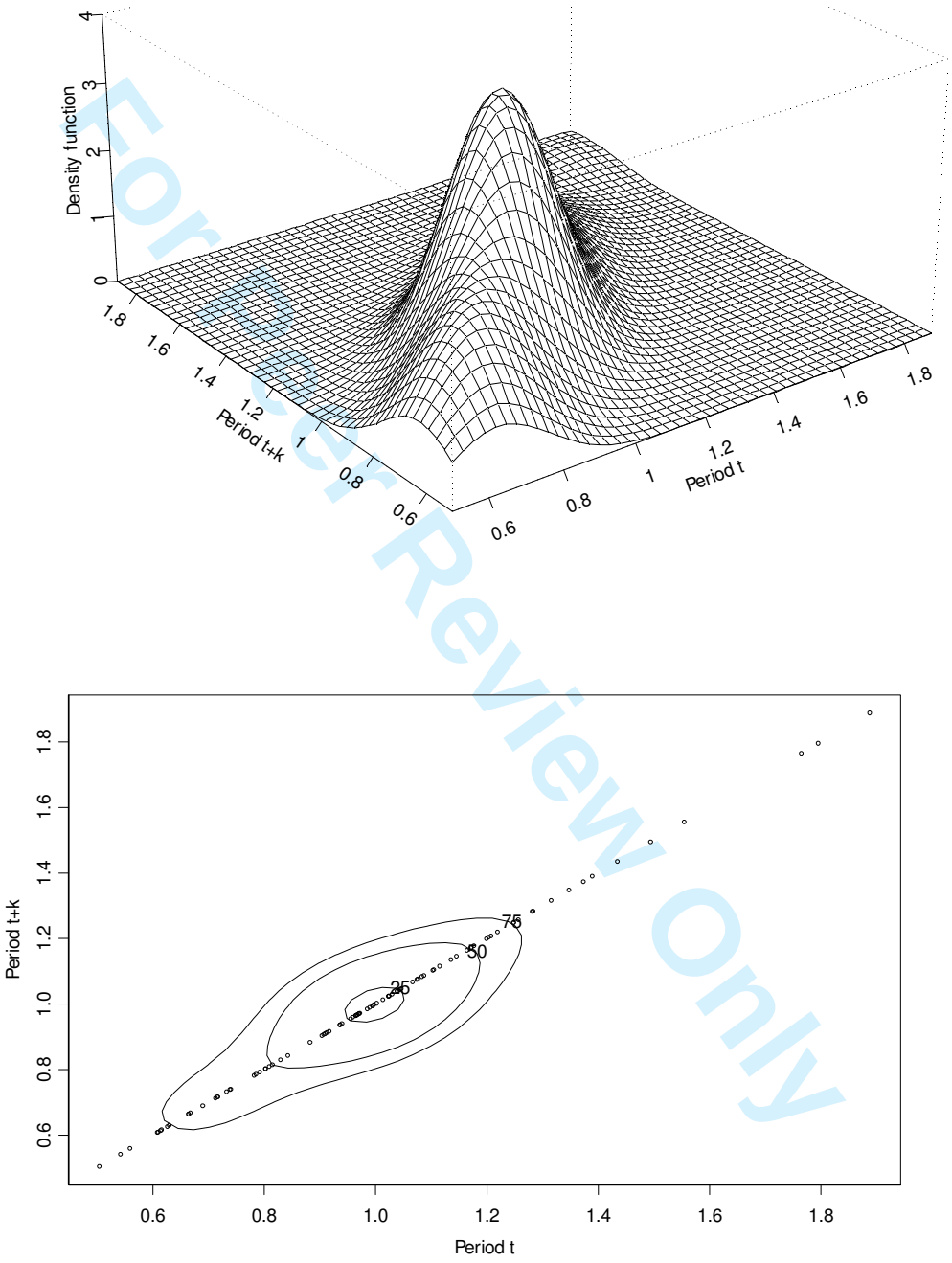
(b) Criss-crossing

Figure 1 (continued)



(c) Polarisation

Figure 1 (continued)



(d) Stability

Figure 2 – Bivariate density estimates for per capita income: European regions (1989-1996)

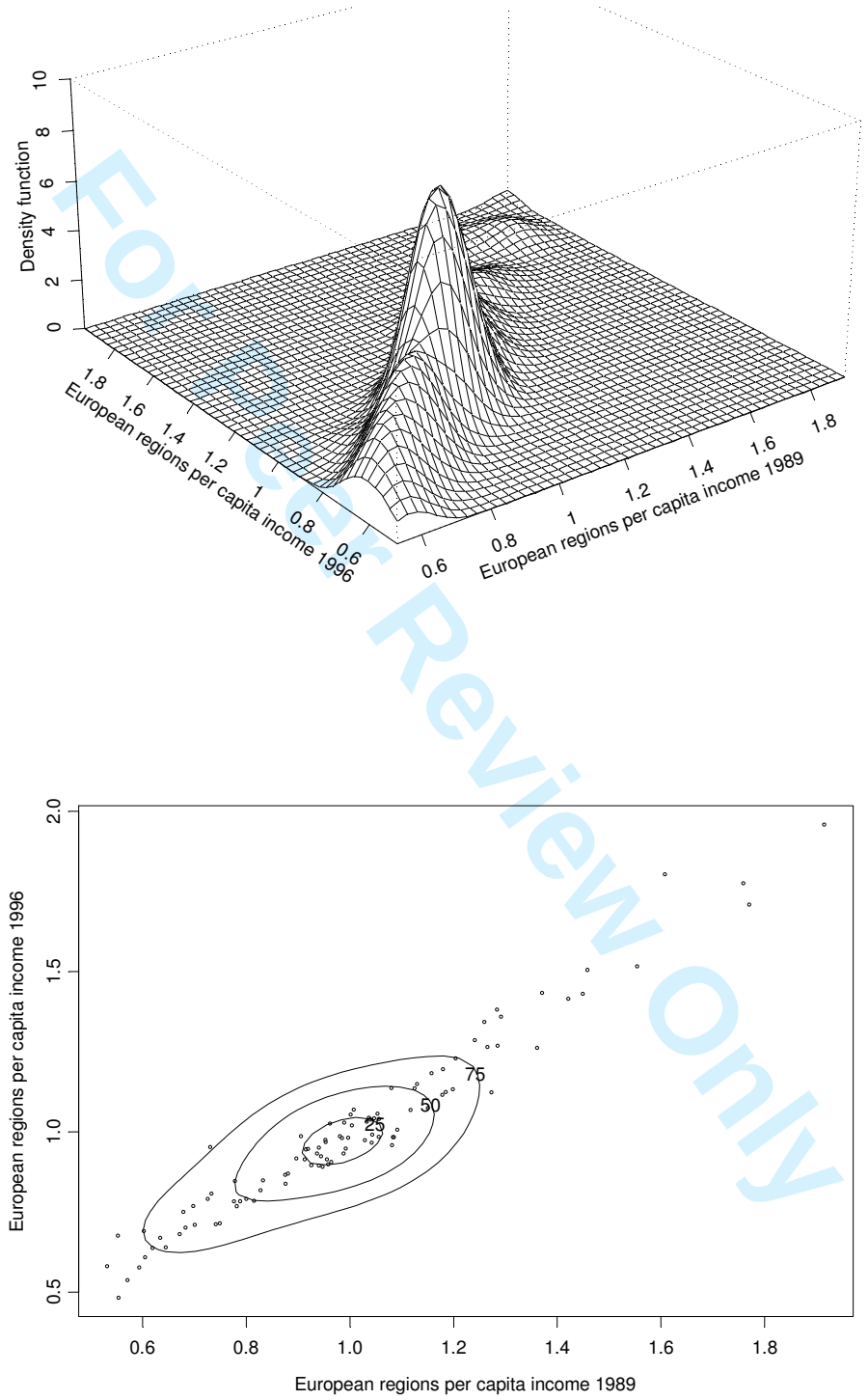


Figure 3 – Bivariate density estimates for unemployment rate: European regions (1989-1996)

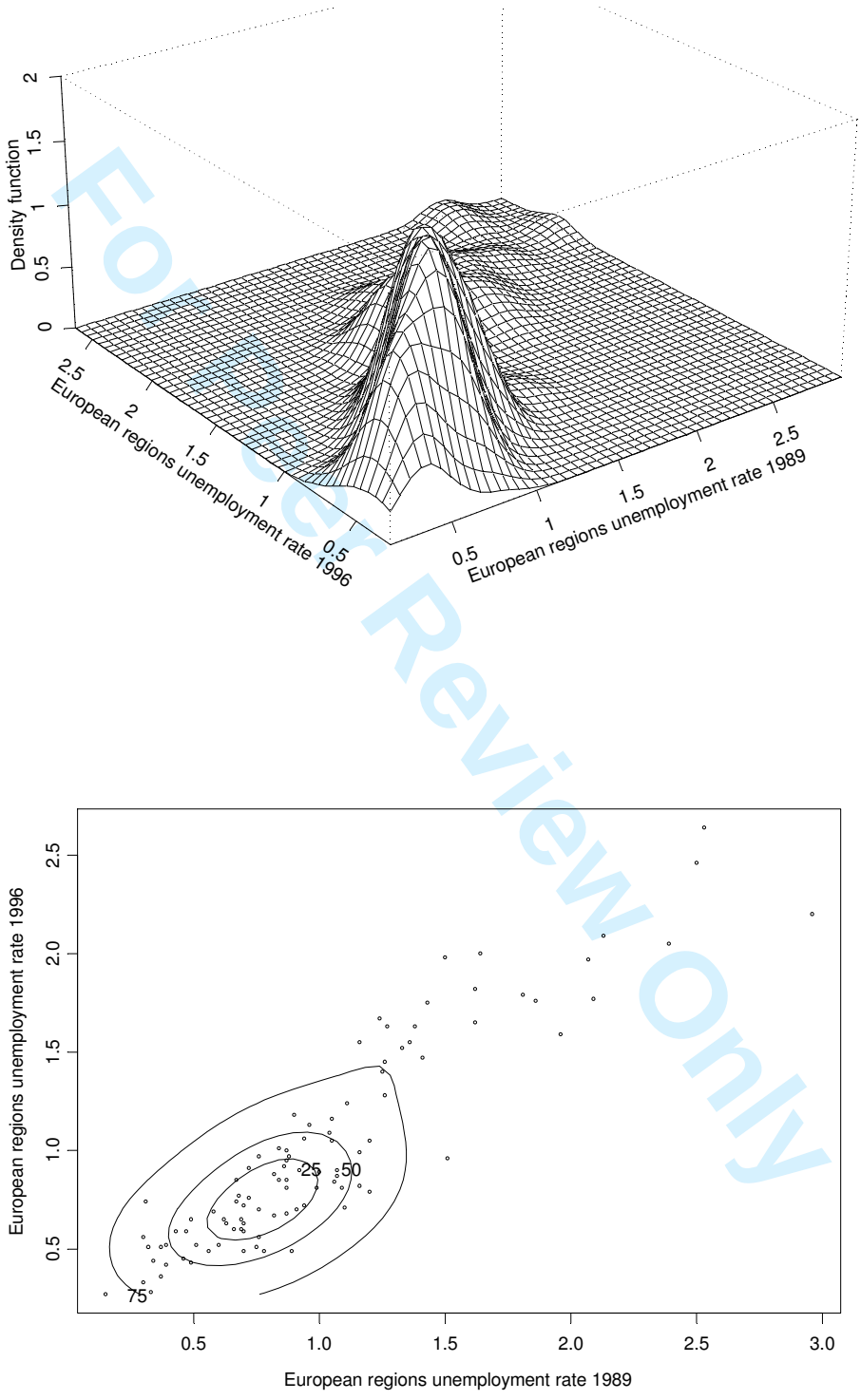


Figure 4 – Bivariate density estimates for per capita income: no Objective 1 regions (1989-1996)

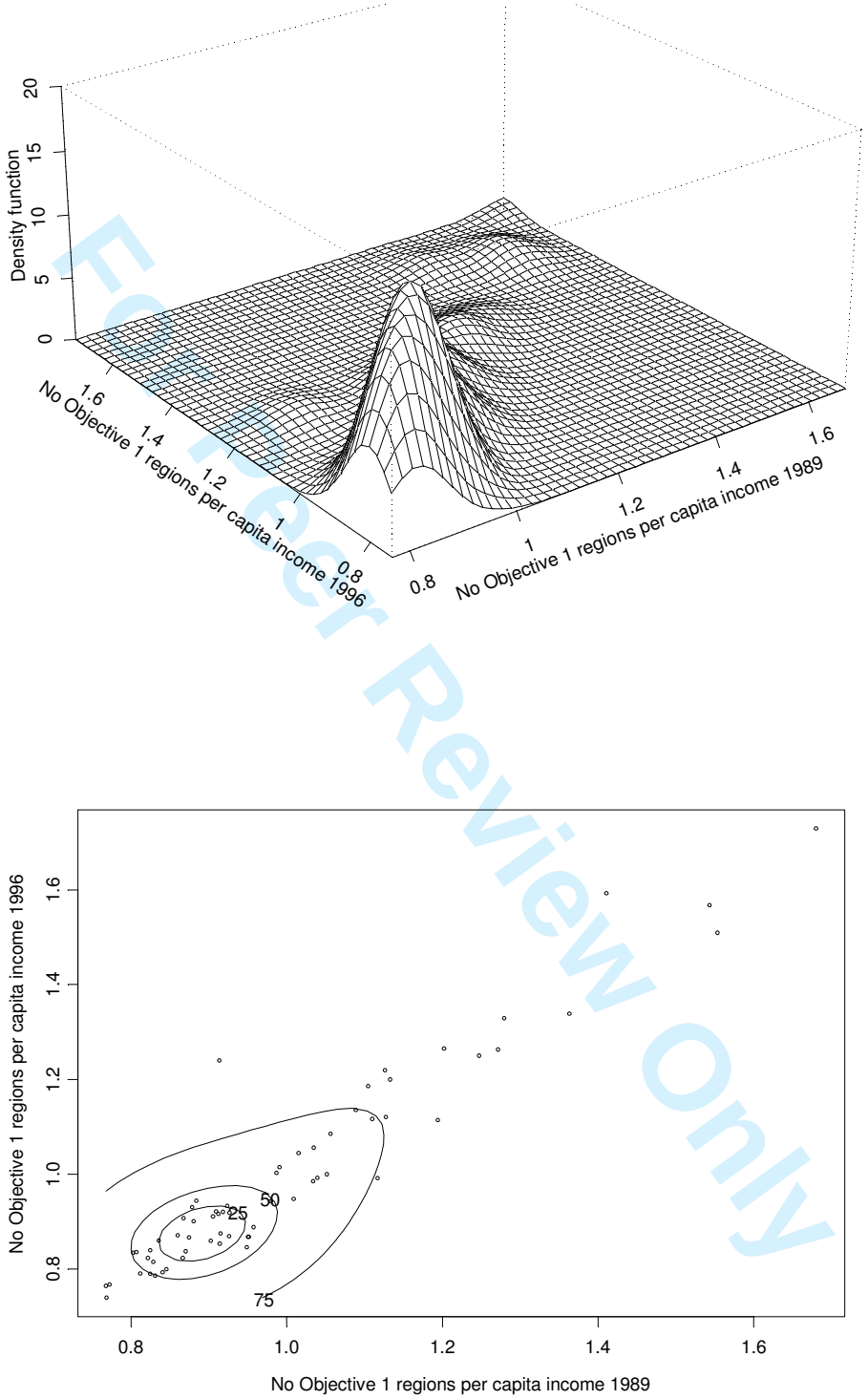


Figure 5 – Bivariate density estimates for unemployment rate: no Objective 1 regions (1989-1996)

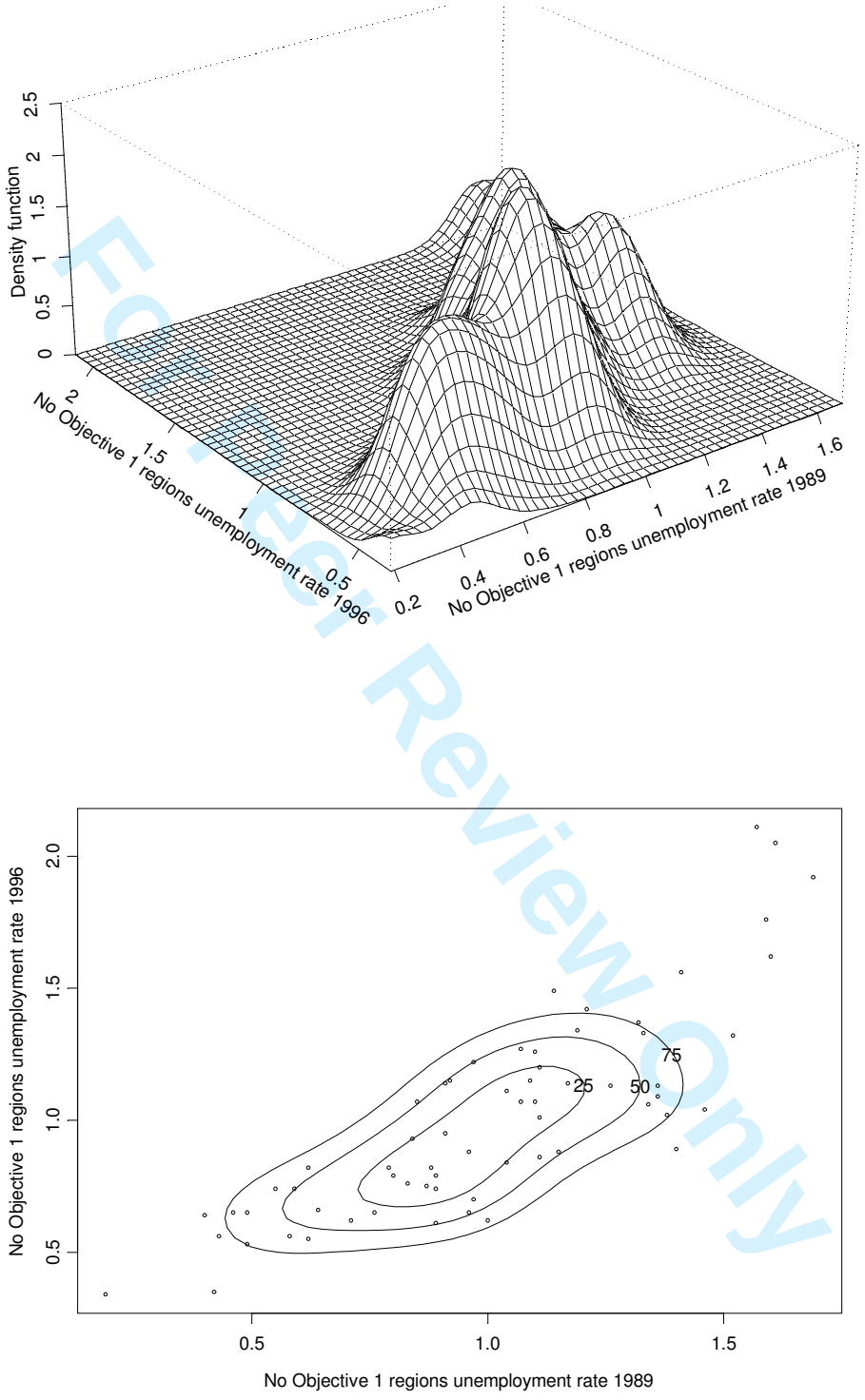
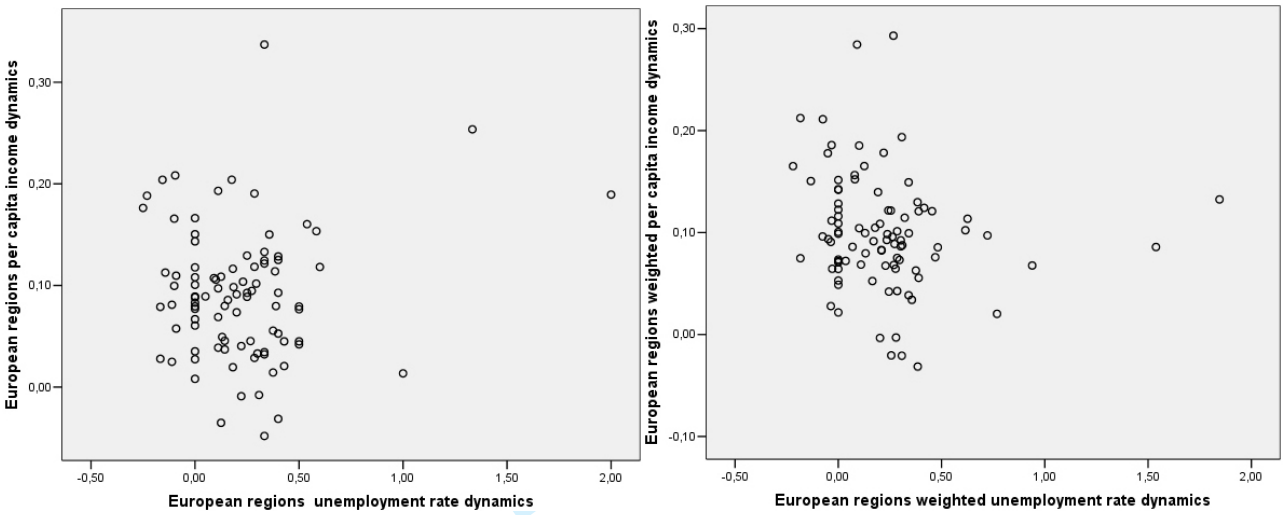
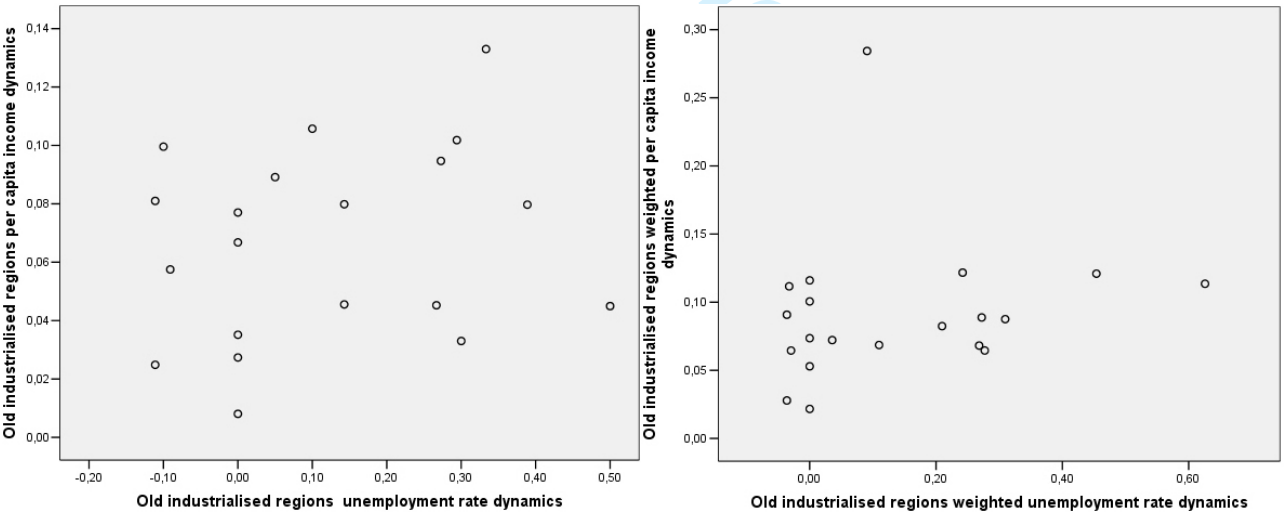


Figure 6 – Correlation between per capita income and unemployment rate dynamics

(1989-1996)

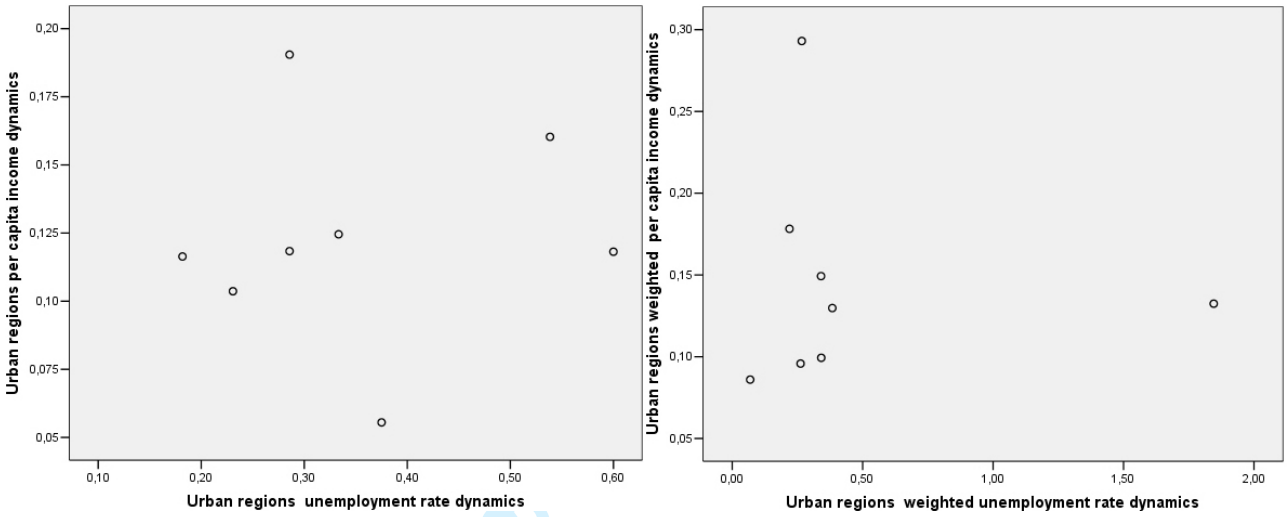


(a) European regions

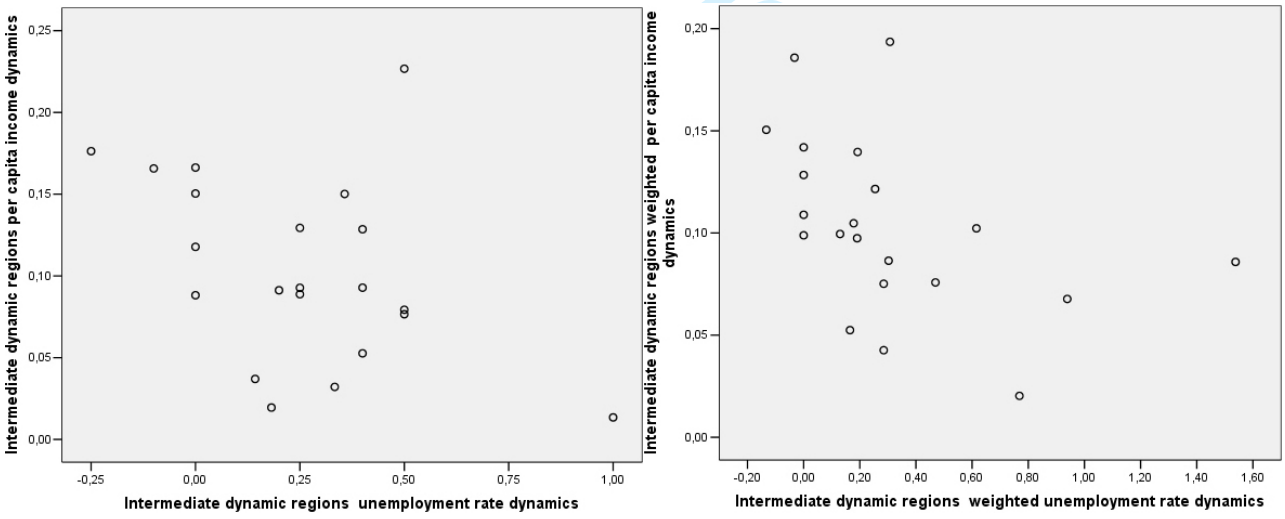


(b) Old industrialised regions

Figure 6 (continued)

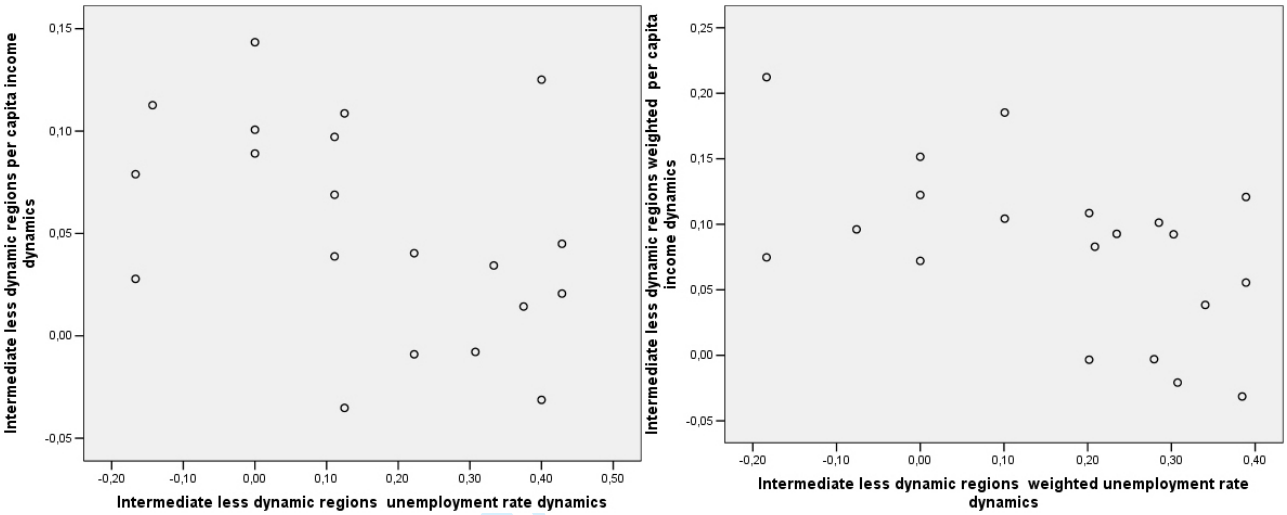


(c) Urban regions

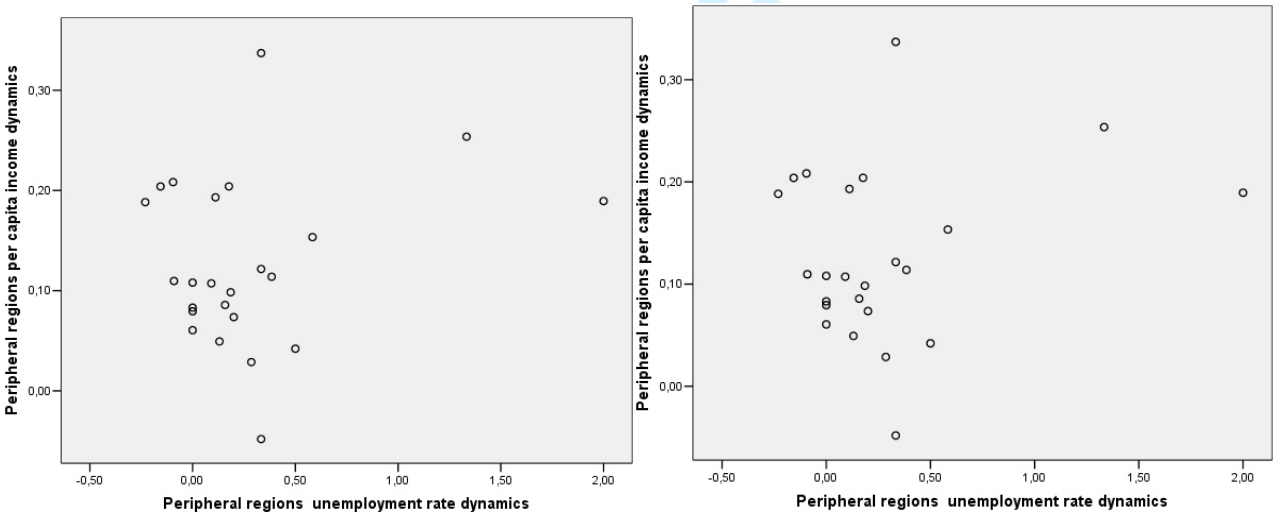


(d) Intermediate dynamic regions

Figure 6 (continued)



(e) Intermediate less dynamic regions



(f) Peripheral regions

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[1] We have the Verdoon's optimistic view, adopted in the study of European regions by FINGLETON and MCCOMBIE, 1998, that output growth is positively correlated with both productivity and employment, and the expectation of a negative relationship between productivity growth and unemployment level as in AGHION and HOWITT, 1994.

[2] For a survey on this literature, see RODRÍGUEZ-POSE, 1998. Consistently with this interpretation, in a previous work studying the dynamics of European regional per capita income over the periods 1980-1988 and 1989-1996, we found more mobility during the 1980s than during the following period (COSCI and SABATO, 2004).

[3] See LÓPEZ-BAZO *et al*., 1999; CANOVA and MARCET, 1995; NEVEN and GOUYETTE, 1995; RODRÍGUEZ-POSE, 1998; PUGA, 2002; OVERMAN and PUGA, 2002; PACI, 1997; MARTIN and TYLER, 2000; MELICIANI, 2006.

[4] See OTTAVIANO and PUGA, 1997; MARTIN, 1999.

[5] See KRUGMAN, 1991.

[6] Objective 1 regions are those regions which received EU Structural Funds in the period of interest.

[7] The list of the regions is reported in the Appendix.

[8] In Tables 1 to 4, as in Figures 1 to 5, per capita income and unemployment rate are measured as the regional values relative to the sample mean so that, for example, in Table 1 class [0.00-0.75) includes all the regions having per capita income levels between 0 and 0.75 times the average per

capita income of the sample. As classes are defined so as they have almost the same number of observations per class, they are different in each matrix.

[9] As shown in COSCI and SABATO, 2004, most of the above-average unemployment regions are those which utilised Objective 2 EU Structural Funds to an above-average extent.

[10] Note that, if regions starting with higher-than-average unemployment rates are also characterised by lower-than-average per capita income, when employment rises with per capita income we may observe a convergence in income and unemployment. Otherwise an increase in income and employment would cause different relative dynamics of income and unemployment rate. For example four regions of UK (East Anglia, East Midlands, South West and West Midlands) are characterised in 1989 by lower-than-average unemployment rates (between 0.49 and 0.91) and by lower-than-average per capita income (between 0.84 and 0.91); in this case an increase in per capita income and employment would cause convergence in per capita income and divergence in unemployment in the transition probability matrix. In any case, since we observe stability in income and mobility in unemployment, we may deduct that many regions experienced increases or decreases in their unemployment rates without changing their position in terms of regional per capita income.

[11] As we documented in a more detailed paper (see COSCI and SABATO, 2005), all the regions in our sample recorded variations of the participation rate much smaller than those of unemployment rate.

[12] The same effect for the negative regional data is obtained by dividing, instead of multiplying, them the regional data by the country weight coefficient. Note that Rodríguez-Pose's methodology cannot be used when the country weight coefficient results negative. Since the rate of variation of

the unemployment rate in Nederland is negative, its 4 regions have been excluded from the analysis. We excluded from our analysis also Denmark, Ireland and Luxembourg because in those cases the region coincides with the country.

[13] If we exclude the outlier (Basse-Normandie) from the sample, the Pearson correlation ratio is still not significant (0.304).

[14] If we exclude the outlier (South East Anglia) from the sample, the Pearson correlation ratio is still not significant (0.281).