An Empirical Analysis of Employment and Growth Dynamics in the Italian and Polish Regions

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Abstract

This paper intends to contribute to the compared empirical analysis of "old" (15) and "new" (10) EU members, especially focusing on Poland and Italy, with regards to per-capita GDP and employment performance convergences and differences, mainly at the regional level (NUTS-2) for the period 1995-2001.
In Section 2 we analyse (i) the per-capita GDP levels and growth rates (correlation with human capital, employment rate, etc.) and convergence dynamics (β conditional convergence) for 249 EU-25 regions and (ii) the GDP density estimations and Lowess β convergence for the 16 Polish and 20 Italian regions.
In Section 3, we study (i) the compared employment performance of "old" and "new" EU members with respect to the objectives of the European Employment Strategy, (ii) the β convergence dynamic of employment rates for 249 EU-25 regions (distinguishing between "old" and "new" EU members' regions) and (iii) the employment density estimations and Lowess β convergence for the Polish and Italian regions.
In Section 4, in order to evaluate and compare similarities and differences between the 36 Polish and Italian regions, a cluster analysis is carried out considering both employment/unemployment variables and the sectoral employment composition (NACE 1 sector classification).
In the final Section, the main results and some policy implications are briefly presented.

JEL Classification:
Keywords: GDP and Employment Convergence, Regional Differences, Poland, Italy

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1. Introduction

We intend to contribute to the empirical analysis of two crucial real variables: GDP growth and employment performance. The study considers the "new" (10) and "old" (15) EU members, mainly at the regional level (NUTS-2) for the period 1995-2001, especially focusing on Poland and Italy.

The choice of a comparative study mainly in reference to Poland and Italy cannot be isolated from the present historical conjuncture, in which the two countries are taking part in a single European political and economic system, as they have finally overcome the historical fracture that were induced by the political and economic circumstances of the second half of the last century. At the beginning of this new common venture, Italy and Poland show some interesting similarities: their territorial expanse is almost equal, divided into a similar number of regions (twenty Italian and sixteen Polish NUTS-2 regions) and they are also the most regionally-diversified countries within the "old" EU-15 and the "new" EU member States, respectively.

Our study highlights the distance from the economic and social targets established by the European Union. The first part of the study (GDP convergence dynamics) is indeed strictly related to the EU Treaty about economic and social cohesion, while the second (employment performance) refers directly to the "Lisbon" targets, within the framework of the European Employment Strategy.

In particular, in Section 2 we analyze the per-capita GDP levels and growth rates (correlation with human capital, employment rate, etc.) and convergence dynamics (β conditional convergence) for 249 EU-25 regions and the GDP density estimations and Lowess β convergence for the 16 Polish and 20 Italian regions. In Section 3, we study the compared employment performance of "old" and "new" EU members with respect to the objectives of the European Employment Strategy, we analyze the β convergence dynamic of employment rates for 249 EU-25 regions (distinguishing between "old" and "new" EU member-regions) and, finally, we present the employment density estimations and Lowess β convergence for the Polish and Italian regions. In Section 4, in order to evaluate and compare similarities and differences between the 36 regions Polish and Italian regions, a cluster analysis is carried out considering both employment/unemployment variables and the sectoral employment composition (NACE 1 sector classification).

2. Regional Convergence Dynamics in per-capita GDP

The idea of economic convergence and the analysis carried out on convergence dynamics have been one of the major concerns of scholars and policy-makers in recent years. This has been connected to the possibility of identifying common and shared factors in the growth patterns of different economies, in order to guarantee a harmonious level of growth, common and stable development rates and to reduce regional disparities among the different territories.

There are two ideas of convergence: strong convergence and weak convergence. In the strong idea, the neoclassical growth model with exogenous technological change predicts unconditional convergence. In the weak idea, the adoption of technological innovations is the determinant factor of growth, and the development path is not homogeneous but it can be slowed by the social/political conditions and historical traditions. So the strong idea argues that equality of initial condition is necessary for the equality of long-run growth rates, while the weak version implies that some minimum absolute level of the externalities-inducing factors must be obtained in order to make the process of economic growth self-sustained (Boldrin and Canova, 2001). The policy implications of the strong and weak hypotheses are different. In the latter version, poverty traps and low-growth equilibrium do not arise because the ratio between poor and rich regions is below some critical value but, because the poor regions have not managed to cross a threshold level in their endowment of human capital, public infrastructure, social capital, R&D activity and financial structures. Without political intervention, some form of club convergence is to be expected. Regions will cluster within different clubs, which are determined by endowments of the strategic factors. Convergence within each club may therefore be observed, with countries belonging to the same club growing (or stagnating) together, without any relevant reduction of between-club inequalities (Bordin, Canova, 2001).

In the case of the European Union, the convergence among regions is a policy priority which was codified in Article 2 of the EU Treaty, where the objective of attaining and strengthening the economic and social cohesion is clearly stated; moreover, article 158 states that *"in order to promote its overall harmonious development, the Community shall develop and pursue its action leading to the strengthening of its economic and social cohesion. […] the Community shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions or islands, including rural areas".*

These objectives have become even more crucial in the perspective of the EU enlargement to ten new countries; even though they already share the values and common objectives of the old continent, they will significantly modify the basic features of the Union and its internal equilibria. In any case, the strong differences in the social, economic and political histories of these new EU countries imply important distinctive features compared with the "old" EU-15 members. From the point of view of the rural – urban relationships, the most important urban centres of these countries are, on average, smaller than those of the EU-15, while the medium cities are generally bigger. The share of rural population is higher and the important rural exodus of the eighties observed a significant slowdown during the nineties. The importance of agriculture is considerably higher than the EU average in most of the new entrants (in 1999 the average agricultural employment share was 16.5% vs. 4.5% of the EU-15, while in the same year, the share of agricultural value added was 7.2% and 2.3%, respectively). Very important differences also exist at the intra-regional level (Brasili, Oppi 2003) within each single country, reflecting different historical development patterns, as well as diverse local governance abilities. A number of authors (Quah, 1996a, b, 1997; Durlauf and Quah, 1999) claim that there is evidence that European regions are dividing into four clusters while others (Boldrin and Canova, 2001) dispute it.

In this Section, considering the period 1995-2001, we first perform a conditional convergence analysis for all (249) NUTS-2 regions included in the EU-25 and then we analyse the GDP density estimations and Lowess ß convergence for the 16 Polish (voivodships) and 20 Italian regions.

All the data are from Eurostat database "Regions". The analysis is focused on GDP levels expressed in Purchasing Power Parities per inhabitant. All the data have been standardized on the country average (=1). This transformation $z_i = x_i / \sum x_i$, where x_i is, for example, GDP, is useful to reduce problems of GDP cross-correlation among countries but the transformation also has a natural economic interpretation (i.e. we abstract from the size of the different regions). This allows us to focus on the distribution of pure numbers, thus facilitating the comparisons of densities in different points in time (e. g. Bianchi, 1997).

2.1. EU-25 Member Regions: Correlations and Conditional Convergence

Considering the 249 regions (NUTS-2) of the 25 EU-member states, we present a correlation analysis between the following variables: GDP growth rate (1995-2001), initial GDP (1995), initial value of human capital[1] initial employment rate, employment rate growth (1995-2001), initial agricultural employment rate and investments[2].

As shown in Table 1, GDP initial values (1995) are: (i) strongly and negatively correlated with the initial employment rate in the agricultural sector; (ii) positively correlated with initial total employment rate; and (iii) negatively correlated with GDP growth rate. The positive correlation between the initial values of human capital and total employment rate is also important. These four correlations are significant from a statistical point of view, whereas all the other links are very weak and/or not significant.

[1] The human capital is calculated as the fraction of the labour force which attained upper secondary or post-secondary or tertiary education levels (Source: Eurostat Regions Database).

[2] The investments are calculated as the ratio, for each region, between the gross fixed capital formation and GDP (Source: Eurostat Regions Database).

Table 1. Correlation between variables (249 EU-25 regions)

Variables	GDP growth	GDP initial	Hum. Cap._initial	Empl. rate initial	ER growth	ER agric.
GDP growth	1					
	-					
GDP initial	-0.3589	1				
	0.0000	-				
Human capital initial	0.0604	0.13	1			
	0.3422	*0.0404*	-			
Employment rate initial	0.0068	0.4072	0.3546	1		
	0.9146	*0.0000*	*0.0000*	-		
ER growth	-0.0889	0.3428	-0.075	-0.2718	1	
	0.1621	*0.0000*	*0.2385*	*0.0000*	-	
ER in agriculture	0.2128	-0.6481	-0.2987	-0.2748	-0.1267	1
	0.0007	*0.0000*	*0.0000*	*0.0000*	*0.0458*	-
Investment	-0.2073	0.4050	0.2252	0.3143	0.4152	0.3567
	0.0010	*0.0000*	*0.0003*	*0.0000*	*0.0000*	*0.2345*

We estimate a beta conditional convergence model for all of the 249 EU-25 regions (Table 2). The time period of the estimate is limited to seven years but the results show a clear pattern of convergence among the European regions ($\beta = -0.080$) with a significant contribution of the total employment rate (0.231) and of the growth rate of total employment rate (0.664).

The analysis also suggests a different pattern of the "new" EU-members[3] (weighted with the employment rate in the agricultural sector) in the convergence process. We can see that the other variables are also significant and have the expected sign in the regression.

The usual post-estimate diagnostic shows the absence of multicollinearity (VIF max <5), the absence of heteroskedasticity (chi square =0.79) and a good specification of the regression (omitted variable test F=0.48).

Table 2. Convergence analysis of the EU-25 regions: estimates

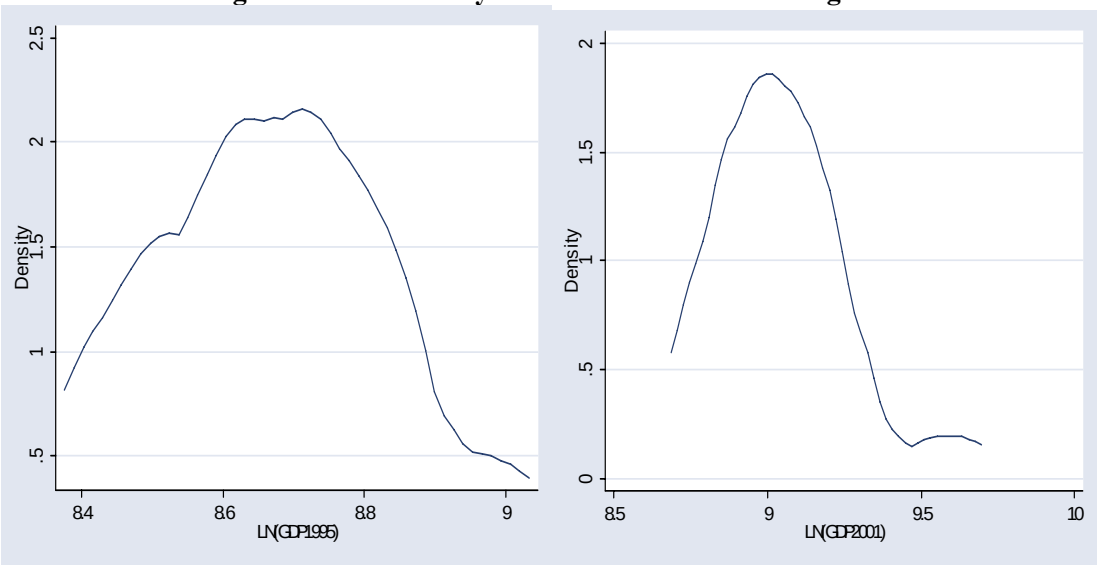
Explanatory	Coef.	Std. Err.	t-stat
GDP initial	-0.080	0.022	-3.52
ER growth	0.664	0.160	4.15
Employment rate initial	0.231	0.059	3.88
Human capital initial	0.036	0.015	2.44
New EU Members	0.044	0.022	1.92
Investment	0.007	0.004	1.94
Constant	0.115	0.244	0.47
Number of observations	249	VIF (max)	3.96
F(5, 243)	10.990	BP CW test	0.79
Adjusted R-squared	0.368		

2.2. Polish and Italian Regions: GDP Density and Lowess Convergence

We now focus the analysis on the Polish and Italian regions. The non-parametric density estimate with reference to 1995 and 2001 (Figure 1) confirms how five Polish regions (Mazowieckie, Wielkopolskie, Podląskie, Pomorskie and Lódzkie) tend to separate from the rest, showing per capita GDP values that are significantly higher (20-40%) than the national average and suggesting a second modal value in the distribution. The remaining regions, on the other hand, tend to move back towards the average values. This evidence seems to suggest the establishment of two clusters of regions, with the above-mentioned five cases representing the "better-off" contexts.

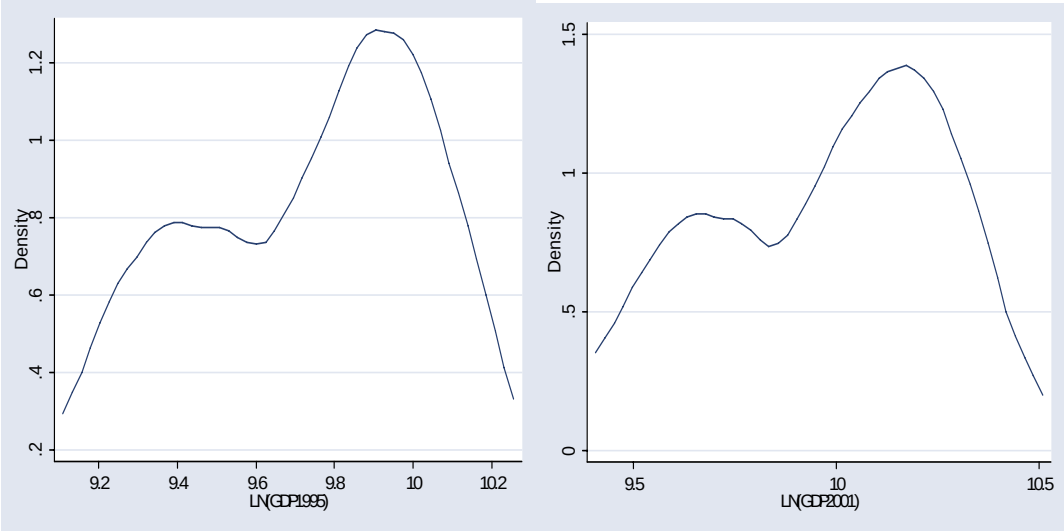
3 The New EU Member variable is a dummy variable weighted with the employment rate in the agricultural sector. Broadly speaking, this variable is equal zero for the "old" EU regions and is equal to the relative employment rate in agriculture for each new EU region.

Figure 1. GDP Density estimation for 16 Polish regions



In the same period, among the Italian regions, a higher stability of the well-known bimodal structure can be observed, even though a greater disparity between the two groups of regions emerges. The northern-eastern regions (plus Lombardy and Piedmont) seem to isolate more clearly from the remaining regions, even though with weaker intra-regional disparities (Figure 2).

Figure 2. GDP Density estimation for Italian regions



The dynamics observed in the descriptive analysis are partially confirmed in the non-parametric convergence analysis, even though the outcomes should take into account the reduced availability of data (period 1995-2001). Using a non-parametric technique of estimation (LOWESS – locally weighted scatterplot smoothing), adopting a 0.8 span, the per capita GDP growth rate and initial (starting condition) level were regressed. The aim of this technique is not to inferentially explain the observed phenomenon, but simply to extend the analysis by graphically showing the beta convergence relationship (the worse-off regions show higher growth rates than the better-off ones) or to suggest eventual multiple relationships.

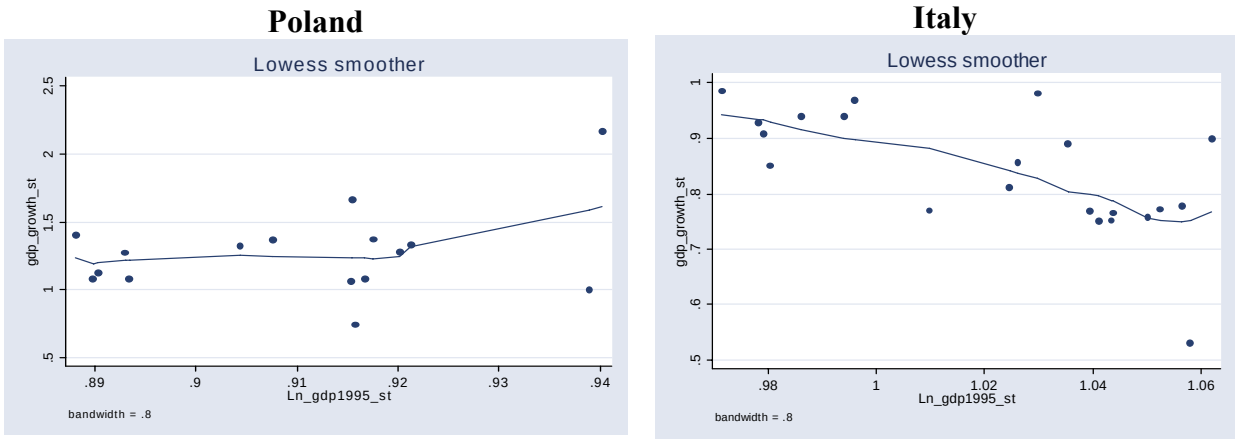
To better understand these figures note that 0.8 on the horizontal axis corresponds to 80% of the European average income; the 1 indicates the European average income and so on.

With reference to the 20 Italian regions (Figure 3) a weak convergence relationship only emerges among the worse-off regions (initial GDP lower than 1.04), since their natural logarithm of per capita GDP

growth rates are higher. This trend towards a polarization into two clubs (worse-off and better-off regions) excludes a general convergence process among the Italian regions in this period.

The relationship that emerges among the 16 Polish regions is much clearer. A convergence trend does not exist, since the regions with the best initial conditions have a development rate that is similar to the rate of the other regions. In this case, the confirmation of the outcomes of the descriptive analysis is not apparent, but the results show homogeneous dynamics with persistence disparities among the Polish regions.

Figure 3. GDP Convergence trends for the Polish and Italian regions: Lowess estimation



Source: Elaborations on Eurostat Regions Database

3. Employment Performance: Differences, Convergence and European Goals

The Luxembourg Job Summit (November 1997) launched the European Employment Strategy (EES) on the basis of the new provisions in the Employment title of the Amsterdam Treaty. At the Lisbon European Council (March 2000), the European Union set a new strategic goal for the next decade: "*to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion*". The strategy was designed to enable the Union to regain the conditions for "full employment"[4]. The Council defined two employment goals to be obtained by 2010: (i) an overall EU employment rate of 70% and (ii) a female employment rate higher than 60%. The Stockholm European Council (March 2001) added a third goal: (iii) an employment rate higher than 50% (by 2010) for older (55-64) workers. The EES is designed as the main tool to give direction to and ensure co-ordination of the Member-State employment policies. The EU co-ordination on employment policies is an important part of the Community *acquis*. The objective of the Commission is to ensure that candidate countries define employment policies that will prepare them for membership in the Union and progressively adjust institutions and policies to the European Employment Strategy, to allow the full implementation of the Employment Title of the Treaty from the time of accession[5]. The ten "new" EU members (May 2004) submitted their first National Action Plan in September/October 2004. We first present a comparison, at the national level, of the employment performance (2003 employment rates and the 1997-2003 changes in ER), distinguishing "old" and "new" EU members, with particular attention given to the position and progress of Poland and Italy. We than estimate some convergence models of the regional employment rates with reference to the EU-25 (parametric convergence analysis) and to the Italian and Polish regions separately (non-parametric estimates).

[4] A discussion of this benchmarking approach can be found in Tronti (2003).

[5] It was agreed that, in a first step, the candidate countries and the Commission would analyse the key challenges for employment policies in "Joint Assessment Papers" signed by the Commissioner for Employment and Social Affairs and by the Ministers of Labour.

3.1. National Performance and Convergence Towards EU Goals

With respect to the main "Lisbon objective", only four "old" EU-15 countries have reached total employment rates exceeding 70% (Denmark, the Netherlands, Sweden, the United Kingdom); ten countries (four "old" EU-15, four "new" EU members, plus Romania and Bulgaria) have total employment rates (ER) under 60% (Spain, Belgium, Greece, Slovak Republic, Romania, Hungary, Italy, Malta, Bulgaria, Poland). The remaining countries (seven "old" EU-15 and seven "new" EU members) have ER between 60 and 70%. The changes in total employment rates between 1997 and 2003 are all positive for the "old" EU-15 members (especially Spain, Ireland, The Netherlands, Italy and Finland)[6], whereas five "new" EU members (Poland, the Slovak Republic, the Czech Republic, Estonia and Lithuania) plus Romania show a negative variation.

Table 3. Total Employment rates (TER): rankings in level (2003) and changes 1997-2003

Employment level Total Employment Rate 2003 (Ranking)	Net Job Creation or Destruction Δ TER 1997-2003 (Ranking)	% Net Job Creation or Destruction (Δ TER 1997-2003)* 100/TER 1997 (Ranking)
Denmark 75.1	Spain +10.3	Spain +20.9%
Netherlands 73.5	Ireland +7.9	Ireland +13.7%
Sweden 72.9	Netherlands +5	**Italy +9.4%**
U.K. 71.8	**Italy +4.8**	Hungary +8.8%
Austria 69.2	Hungary +4.6	Netherlands +7.3%
Cyprus 69.2	Finland +4.4	Finland +7.0%
Finland 67.7	Cyprus +3.5	France +5.4%
Portugal 67.2	Sweden +3.4	Cyprus +5.3%
Ireland 65.4	France +3.2	Luxembourg +5.3%
Germany 64.8	Luxembourg +3.2	Greece +5.1%
Czech Republic 64.7	Belgium +2.8	Belgium +4.9%
Luxembourg 63.1	Greece +2.8	Sweden +4.9%
Estonia 62.9	Bulgaria +2.1	Bulgaria +4.2%
France 62.8	Latvia +1.9	Latvia +3.2%
Slovenia 62.6	U.K. +1.9	U.K. +2.7%
Latvia 61.8	Portugal +1.5	Portugal +2.3%
Lithuania 61.1	Austria +1.4	Austria +2.1%
Spain 59.7	Germany +1.1	Germany +1.7%
Belgium 59.6	Malta +0.3	Malta +0.6%
Greece 57.9	Denmark +0.2	Denmark +0.3%
Slovak Republic 57.7	Slovenia 0.0	Slovenia 0.0%
Romania 57.6	Lithuania -1.2	Lithuania -1.9%
Hungary 57.0	Estonia -1.7	Estonia -2.6%
Italy 56.1	Czech Republic -2.6	Czech Republic -3.9%
Malta 54.5	Slovak Republic -2.9	Slovak Republic -4.8%
Bulgaria 52.5	**Poland -7.7**	Romania -11.9%
Poland 51.2	Romania -7.8	**Poland -13.1%**

Source: Eurostat, 2004.

Note: TER for Luxembourg refer to 2002; NJC: 1997-2002 for Luxembourg; 1998-2003 for the Czech Republic, Estonia, Latvia, Lithuania and the Slovak Republic; 2000-2003 for Cyprus, Malta and Bulgaria.

Poland had the lowest employment rate in 2003 (51.2), but Italy was also (56.1) situated near the bottom of the ranking. Considering the period 1997-2003, Poland experienced remarkable net job destruction with a decrease of 7.7 in the total employment rate (-13.1%). In contrast, during the same period, the Italian employment rate increased by 4.8 (+9.4% of net job creation).

An important European objective, not defined in precise quantitative terms, regards the emergence of irregular employment from the shadow economy. The extent of the shadow economy in the "old" EU-15

[6] It should be noted that the EU-15 employment growth during the period 1997-2002 (more than 12 million new jobs) was largely made up of permanent contracts (79% of total net job creation: 44% females, 35% males). The remaining 21% is represented by temporary contracts (13% females, 8% males). In addition, the same job creation was mainly due to full-time contracts (69% of net job creation: 36% males, 33% females), as opposed to part-time jobs (31% new jobs, 24% females, 7% males) (EU, 2003 and 2004).

(expressed as a percentage of the GNP) is generally lower than in the "new" EU members (Table 4). It should be noted (Figure 4) that, as already emphasized (e.g., Perugini and Signorelli, 2004), a significant negative correlation exists between total (regular) employment rate and the size of the shadow economy. Thus, the countries with the worst employment performances have a higher incidence of "irregular employment"[7].

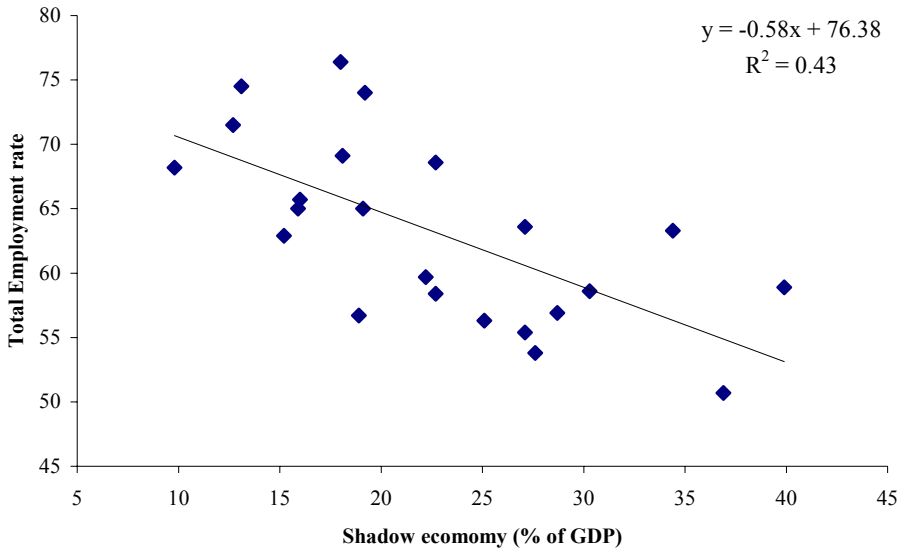
Table 4. The size (% of GDP) of the shadow economy in Europe (1999-2000)

"Old" European Union – 15		"New" EU members, plus Romania and Bulgaria	
Austria	9.8	Slovak Republic	18.9
United Kingdom	12.7	Czech Republic	19.1
Netherlands	13.1	Hungary	25.1
France	15.2	Slovenia	27.1
Ireland	15.9	Poland	27.6
Germany	16.0	Lithuania	30.3
Denmark	18.0	Romania	34.4
Finland	18.1	Bulgaria	36.9
Sweden	19.2	Latvia	39.9
Belgium	22.2	Estonia	n.a.
Spain	22.7	Cyprus	n.a.
Portugal	22.7	Malta	n.a.
Italy	27.1		
Greece	28.7		
Luxembourg	n.a.		

Source: Schneider (2003) calculations based on "currency demand approach" ("old" EU-15) and Schneider (2003) calculations based on Worldbank data, Washington D.C., 2002 ("new" EU members plus Romania and Bulgaria).

Figure 4. Correlation between total employment rate and size of the shadow economy (2000)

European Union (23)*



Source: elaboration on Eurostat data (Total Employment rates) and Schneider data (shadow economy in Table A1).
*Note: * Data not available for Luxemburg and Estonia.*

[7] If official employment rates were corrected to allow for irregular employment, a general convergence and upward shift of "corrected" employment levels would result. Employment in illegal activities is, of course, excluded from the definition of "irregular employment".

3.2. "New" and "Old" EU Members: Regional Convergence

The national employment performances are often the result of significant regional differences. Before comparing in a static framework the main employment structure and performance indicators at regional levels focusing on Italy and Poland, it will be useful to evaluate, in dynamic terms, the evolution of the labour market indicator (total employment rate) assumed as crucial by the EES. This will be done by building, through the methodologies already explained in the first part of the paper, (i) a first convergence parametric regression of the total employment rates (ER) of the regions of the EU-25; and (ii) using non-parametric estimates to describe the convergence/divergence dynamics of the ERs for the Italian and Polish regions, separately (Lowess non-parametric estimates).

As regards the first model, the convergence regression estimates are described below (Table 5). The time period of the estimate is limited by the availability of the new labour force survey data harmonized at the EU level. The variables have been transformed into natural logarithms, as is usually done in this kind of analysis.

Table 5. Convergence of regional employment rates of the EU-25 regions: estimates

Dependent: ER growth 1999-2003	*Coefficient*	*P-values*
1999 ER	- 0.111	0.000
Constant	0.477	0.000
Number of observations: 249		
Adjusted R-squared: 0.067		
Prob F: 0.0000		

Source: Elaborations on Eurostat Regions Database

The estimates of the basic model clearly show a strongly converging trend between the labour market performances (in terms of ERs) of the regions of the EU-25 members. If the model is specified by distinguishing the new- and the old-member states regions (Dummy *new_member* =1 if the region belongs to a new member, 0 otherwise), the estimates are significantly robust and improve the explicative power of the model (measured by the Adjusted R-squared) (Table 6). Moreover, the sign of the dummy suggests that the new-member state regions perform significantly lower in terms of employment growth with respect to the old-member regions.

Table 6. Convergence of regional employment rates of the EU-25 regions: estimates

Dependent: ER growth 1999-2003	*Coefficient*	*P-values*
1999 ER	-0.148	0.000
D_new_members	-0.084	0.000
Constant	0.643	0.000
Number of observations: 249		
Adjusted R-squared: 0.389		
Prob F: 0.0000		

Source: Elaborations on Eurostat Regions Database

This important structural diversity suggested the need to estimate two separate regressions for the new- and the old-member regions. Although the degrees of freedom drop significantly, especially for the second model, the outcomes show how the convergence dynamics are opposed within the two subsets (Table 7).

Table 7. Convergence of regional employment rates of the "Old" and "New" EU members

	NEW MEMBERS	OLD MEMBERS
Dependent: ER growth 1999-2003	*Coefficient and P-values*	*Coefficient and P-values*
1999 ER	0.145 *(0.236)*	-0.172 (0.000)
Constant	-0.635 *(0.205)*	0.744 (0.000)
	Number of observations: 40 *Adjusted R-squared: 0.0114* *Prob F: 0.2360*	*Number of observations: 209* *Adjusted R-squared: 0.331* *Prob F: 0.0000*

Source: Elaborations on Eurostat Regions Database

In particular, if the aggregate estimation shows a general converging pathway, this is the result of a strong converging trend for the old-member regions and of a diverging dynamics (not statistically significant) inside the club of the new EU members.

3.3. Polish and Italian Regions: Kernel Density and Convergence Dynamics

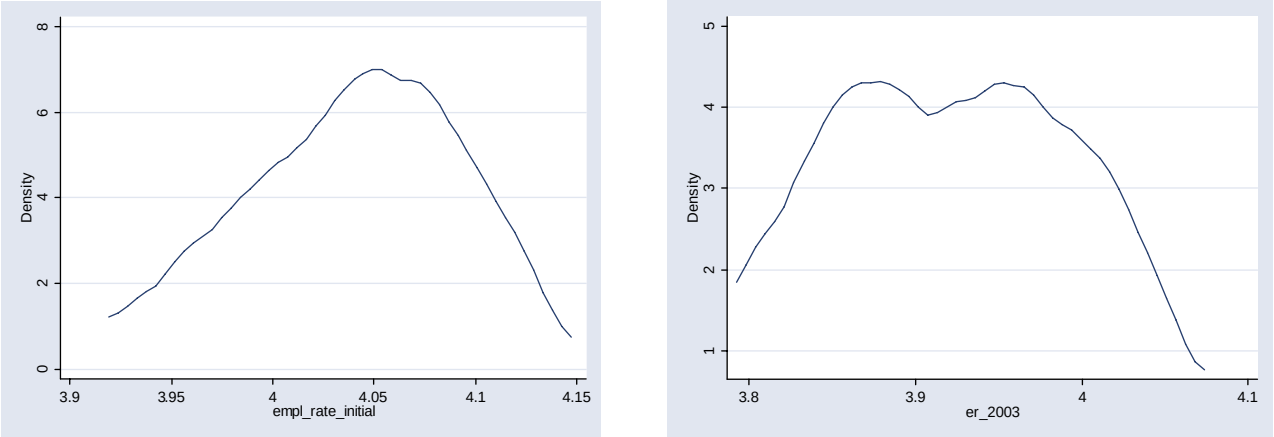
Always in terms of total employment rates, it is possible to evaluate the converging/diverging pathways within the single countries. To the aims of the present paper, for the reasons explained above, we now focus on Italy and Poland and evaluate the evidences among labour market performances of their regions (using non-parametric techniques). To this purpose, we present the density function of the distribution of ER in 1999 and 2003 (Kernel estimations) and the converging trend (Lowess estimations).

From the first elaborations (Figure 5), we note that in Poland from 1999-2003 there was a general backward shift of the whole distribution and the insurgence of a bimodal pattern. In other words the ER decreased in all 16 regions over the five years and this led to the formation of a fairly clear distinction between regions with lower and higher ERs. This is also apparent if one looks at the Lowess convergence estimation (Figure 6), where the initial decreasing trend is opposed to the divergence of the second portion of the interpolation line. This shows that for a club of Polish regions the decrease in ERs has been particularly severe compared to the general negative trend.

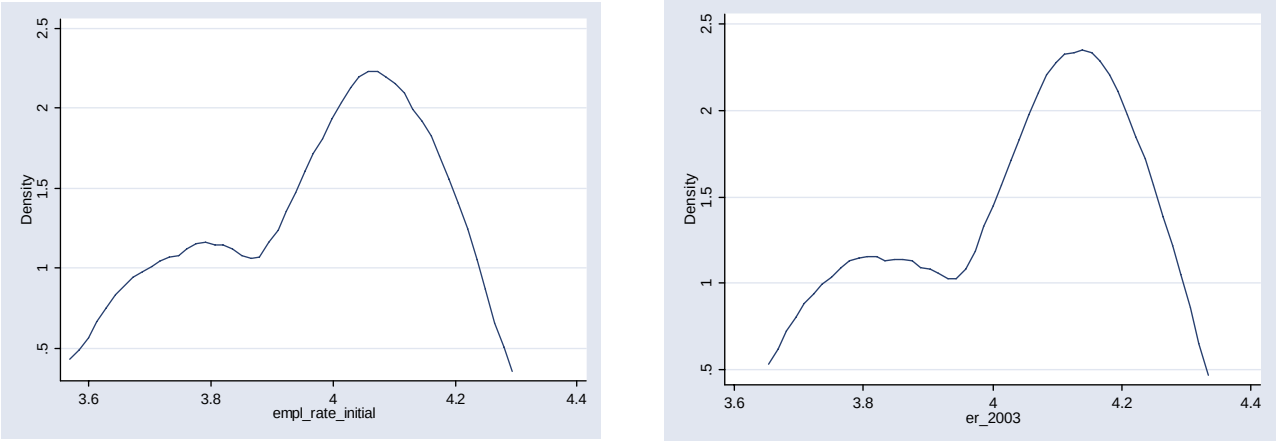
As regards Italy, the well-known bimodal distribution of the regional labour market performance is clearly shown and confirmed in the two years considered, but the distribution seems to shift slightly forward, indicating a generalised growth trend. Within this *scenario*, a remarkable club convergence dynamics has been highlighted in the Lowess estimation, together with a much weaker general convergence.

Figure 5. ER convergence trends for the Italian and Polish regions: Kernel density estimations

Poland



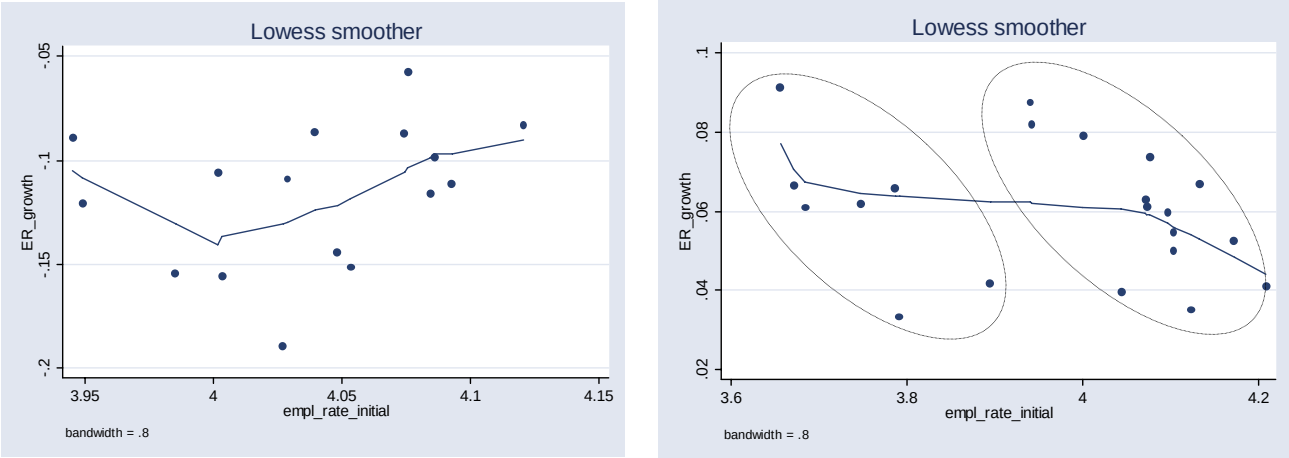
Italy



Source: Elaborations on Eurostat Regions Database

Figure 6. ER convergence trends for the Italian and the Polish regions: Lowess estimation

Poland *Italy*



Source: Elaborations on Eurostat Regions Database

So, the two countries, within the general framework previously depicted, show very different patterns in the evolution of regional employment. This suggested and encouraged a further investigation aimed at deepening other particular features of the regional labour markets of the two contexts.

4. A Cluster Analysis for Polish and Italian Regional Labour Markets

In particular, the marked diversification of Italy and Poland at the regional level with regards to employment performance and structures[8], together with the dynamic information gathered in the course of the paper, encouraged the analysis of the possible dimensions and levels of similarity/diversity among the regions of the two countries. Their comparison could indeed reveal eventual common structural features or the existence of groups of regions with unexpected relative labour market characteristics. To this aim, the cluster analysis techniques, of the family of multivariate statistics, looked very promising, since they allow the observed cases (regions), described by a set of variables, to be classified into a smaller number of classes (or clusters), not known a-priori, maximising the similarity within the groups and the diversity among them (Fabbris 1997, p. 301).

In order to maximise the reliability of the outcomes obtained, the cluster analysis was carried out using different methods and was preceded by a factor analysis aimed at reducing the high number of labour market indicators to the relevant dimensions. The following section describes in detail the applied methodology; in section 4.2 the outcomes are presented and discussed.

4.1. The Methodology of Analysis

The territorial units chosen for this study are the 36 NUTS 2 regions of Italy (20) and Poland (16). The choice is due to the high comparability between these levels of regional aggregation for the two countries and to the large availability of data at this territorial level. The labour market indicators used in the research refer to employment performances (general/male/female, 55-64 years, part-time, temporary and self employment rates), unemployment rates (general, male, female, youth and long term), and sectoral (NACE 1 sector classification) employment rates.

The significant number of indicators compared to the observations suggested that it would be opportune to reduce the variables of the basic matrix. This was done by implementing three factor analyses (one for each group of variables), in order to identify a number of latent factors (fewer than the starting indicators of the three groups) that can extract the maximum variance of the indicators with the minimum loss of information. This reduced the nine variables regarding the sectoral employment rates to three factors (Table 7); seven employment rates to two factors (Table 8); and five unemployment rates to only one component (Table 9). As can be observed from the tables, the three factor analyses provide effective reductions of variables (in terms of cumulated variance extracted) and acceptable test performances (Fabbris, 1997, p. 194).

Table 7. Factor analysis for the 9 NACE 1 sectors: outcomes

NACE 1 sectors	Comunalities		Rotated* components		
	Initial	Extracted	1	2	3
AB	1.000	0.588	-0.753	-0.000	-0.118
CE	1.000	0.733	-0.325	-0.165	0.775
D	1.000	0.763	0.637	-0.580	0.144
F	1.000	0.496	0.233	0.624	0.229
GH	1.000	0.840	0.884	0.241	-0.000
I	1.000	0.596	0.130	0.173	0.741
JK	1.000	0.831	0.867	0.147	-0.241
L	1.000	0.915	0.219	0.924	-0.114
MQ	1.000	0.820	0.743	0.363	-0.370
Explained variance %			*41.046*	*17.229*	*14.845*
Cumulated explained variance			*41.046*	*58.293*	*73.138*
Test KMO			*0.604*		
Bartlett's Sphericity test (sig.)			*0.000*		

*Varimax rotation with Kaiser normalisation

[8] See the statistical tables in the Appendix to note the relevant differences in terms of the indicators of the EES main indicators and of the agricultural employment levels.

Table 8. Factor analysis for the employment rates: outcomes

Employment Rates	Comunalities		Rotated* components		
	Initial	Extracted	1	2	3
ER. General	1,000	0.988	0.983	-0.137	0.000
ER. Male	1,000	0.919	0.863	0.415	0.000
ER. Female	1,000	0.953	0.833	-0.507	0.000
ER. 55-64 years	1,000	0.943	0.000	0.000	0.967
Part-time ER.	1,000	0.807	0.585	-0.406	0.548
Self ER.	1,000	0.861	0.744	0.234	0.503
Temporary ER	1,000	0.833	0.000	0.910	0.000
Explained variance %			*52.061*	*21.632*	*16.346*
Cumulated explained variance			*52.061*	*73.692*	*90.038*
Test KMO			*0.532*		
Bartlett's Sphericity test (sig.)			*0.000*		

*Varimax rotation with Kaiser normalisation

Table 9. Factor analysis for the unemployment rates: outcomes

Unemployment rates	Comunalities		Component
	Initial	Extracted	1
UR. General	1.000	0.968	0.984
UR. Male	1.000	0.887	0.942
UR. Female	1.000	0.949	0.974
Long Term .UR.	1.000	0.923	0.961
Youth UR.	1.000	0.950	0.975
Explained variance %			*93.545*
Cumulated explained variance			*93.545*
Test KMO			*0.671*
Bartlett's Sphericity test (sig.)			*0.000*

Having significantly reduced the number of variables by eliminating the most evident redundancies, the cluster analysis was finally implemented on the reduced matrix of 36 rows and 7 columns. Considering the attributes of the outcomes that can be obtained from the cluster analysis (Fabbris, pp. 301-302), the elaboration was organized into two levels of analysis, taking into account the clustering options available in the SPPS package. Firstly, through the *hierarchic Ward method*, the units were classified into 5 groups that were considered satisfying (dendrogram inspection and consistency with the ex-ante available information). Subsequently, in order to test the stability of the outcome, such clustering was optimized through a new cluster analysis, but using the *non-hierarchic k-means method*, with the instruction to classify the observations into 5 groups whose centers coincided with those of the groups of the previous application (Ward). With the exception of just one Polish region that moved from the fourth to the fifth cluster, this procedure gave a classification that was coincident with the previous one. For this reason it was considered to be sufficiently reliable and was finally adopted.

4.2. The Outcomes

The first important outcome of the cluster analysis is the evidence of a basic structural diversity between Italy and Poland, able to clearly separate the regions of the two countries; the outcome is not trivial considering the distribution of the labour market regional indicators. The Italian regions fall into the first three clusters while the Polish ones fall into the fourth and fifth groups: there is no mixing between the regions of the two countries. This outcome is also confirmed when the cluster analysis is implemented excluding the sectoral employment rates, which represent the most different structural features of Polish regions compared to the Italian ones; or when the unemployment indicators are not considered.

Table 10. Outcomes of the cluster analysis

Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5
Lombardia	Valle d'Aosta	Molise	PL01 Dolnoslaskie	PL03 Lubelskie
Piemonte	Trentino-Alto Adige	Campania	PL02 Kujawsko Pomorskie	PL05 Lodzkie
Veneto	Friuli-Venezia Giulia	Puglia	PL04 Lubuskie	PL06 Malopolskie
Emilia-Romagna	Liguria	Basilicata	PL0B Pomorskie	PL07 Mazowieckie
Toscana	Lazio	Calabria	PL0C Slaskie	PL08 Opolskie
Umbria	Abruzzo	Sicilia	PL0E Warminsko-Mazurskie	PL09 Podkarpackie
Marche		Sardegna	PL0G Zachodniopomorskie	PL0A Podlaskie
				PL0D Swietokrzyskie
				PL0F Wielkopolskie

The clustering of the Italian regions into the first three clusters highlights once again the well-known dualism of the Italian economy and labour market. Cluster 3 is indeed made up of all the southern Italian regions, while the central and northern parts of the country are articulated in the two remaining groups. In particular, cluster 2 includes six geographically discontinuous regions of northern Italy plus Lazio and Abruzzo. The inclusion of this region in this group confirms the important evolutions it has undergone in terms of structural labour market features[9]. Cluster 1 groups a contiguous set of regions of the traditional NEC (North-East-Center) model, plus Lombardy and Piedmont. On the Polish side, the output of the analysis confirms (Perugini – Signorelli, 2004) the significant differences between the central and southeastern regions and the northern and northwestern ones.

Since the outcomes of the cluster analysis clearly differentiate between the Italian and Polish regions, a comparison of the groups is also useful for observing differences at the national level.

Table 11. Characterization of the clusters (employment rates)

	ER. General	ER. Male	ER. Female	ER. 55-64 years	Part-time ER.	Self ER.	Temporary ER
Cluster 1	63,2	74,3	51,8	26,2	5,6	18,2	3,7
Cluster 2	60,8	73,2	48,4	29,3	5,6	17,5	4,0
Cluster 3	45,0	62,0	28,1	31,2	3,4	13,0	4,6
Cluster 4	51,0	57,5	44,5	20,7	4,2	8,6	2,6
Cluster 5	57,5	63,3	51,7	34,5	7,2	16,0	2,7
General Mean	55,4	65,8	45,0	28,5	5,2	14,6	3,5

In terms of employment rates, it should be observed that the performances of Polish cluster number 5 is significantly better if compared with the weak southern Italian. The Polish group with the lowest performance however, also performs better than cluster three in two out of three Lisbon objectives (namely, the general and female employment rates). Cluster five, on the other hand, shows the best performance in the 55-64 year-old employment rate and substantially reaches the female employment rate of cluster one. It also has the highest performance in terms of part-time employment rate and a significant level of self-employment. The option of temporary employment is, however, significantly lower in Poland as a whole.

[9] In a previous study (Perugini – Signorelli, 2003) about local labour markets, carried out considering the provincial territorial level, three out of the four provinces of Abruzzo (Teramo, Chieti and Pescara) fell into clusters of central and northern provinces, while only L'Aquila belonged to one of the two groups of southern Italy.

Table 12. Characterization of the clusters (unemployment rates)

	UR. General	UR. Male	UR. Female	Long Term .UR.	Youth UR.
Cluster 1	4,4	2,9	6,6	1,7	12,9
Cluster 2	5,5	3,9	8,1	2,7	18,6
Cluster 3	19,0	14,2	28,0	12,8	49,3
Cluster 4	20,2	17,7	23,1	9,0	38,7
Cluster 5	14,9	13,4	16,7	6,4	34,8
General Mean	13,1	10,6	16,7	6,6	31,2

As regards unemployment, even though the Polish regions generally show a poorer labour market performance, some considerations made above are confirmed or even reinforced. With the exception of male and general unemployment rates, the cluster of southern Italy is the worst-performer. Cluster 5 shows indicators that are far better than southern Italy, particularly with reference to long-term and youth unemployment rates. The first two clusters of central and northern Italy are, instead, significantly distant from the other ones.

Table 13. Characterization of the clusters (sectoral employment rates)

	A.B	C.E	D	F	G.H	I	J.K	L	M.Q
Cluster 1	2,4	0,5	19,2	4,4	14,2	2,9	8,2	2,9	13,9
Cluster 2	3,1	0,6	10,8	5,3	14,9	3,4	7,8	5,8	14,3
Cluster 3	4,7	0,4	6,9	4,0	9,6	2,3	6,0	4,0	12,7
Cluster 4	5,3	2,4	11,2	4,0	8,8	3,9	3,3	3,3	9,1
Cluster 5	15,4	1,5	11,0	4,3	8,4	3,1	3,3	3,0	9,7
General Mean	6,5	1,1	11,8	4,4	11,0	3,1	5,6	3,7	11,8

A.B. (Agriculture and Fishing); C.E (Mining and Quarrying); D (Manufacturing); G.H (Trade & Repair, Hotels and Restaurants); I (Transport, Storage and Communication); J.K (Financial Intermediation, Real Estate, Renting and Business Activities); L (Public Administration); M.Q (Other Services).

The sectoral employment rates help interpret some of the surprising evidence that emerged. In particular, it should be noted that the primary sector accounts for a significant part of employment in cluster 5, the best performer of the two Polish clusters having high employment rates. This high reliance on a low-productivity farming sector, that will probably undergo significant changes in the near future, probably influences the employment performance of the Polish regions and suggests a possible deterioration of the labour market indicators. On the other hand, the service sectors are still significantly under-sized, especially with reference to Financial Intermediation, Trade and Repair and Hotel and Restaurants.

5. Concluding remarks

The aim of this paper is to contribute to the empirical analysis of two crucial real variables: per-capita GDP growth and employment performance. The study considers, mainly at the regional level (NUTS-2) for the period 1995-2001, the "new" (15) and "old" (10) EU members, especially focusing on Poland and Italy.

Considering the 249 regions (NUTS-2) of the 25 EU-member states, we present correlation and convergence investigations. The correlation analysis highlighted that the initial (1995) GDP values are strongly and negatively correlated with initial employment rates in the agricultural sector; positively correlated with the initial total employment rate and negatively correlated with the GDP growth rate. Moreover, a positive correlation was observed between the initial values of human capital and total employment rate.

The estimate of a beta conditional convergence model showed a clear convergence dynamic among the European regions ($\beta = - 0.080$) with a significant contribution of the total employment rate (0.231) and of the net job creation (0.664). A different pattern of convergence arose for the "new" EU-member regions.

As for the Polish regions, the non-parametric per-capita GDP density estimate, with reference to 1995 and 2001, suggests the establishment of two clusters of regions.

In the same period, a higher stability of the well-known bimodal structure among the Italian regions can be observed, even though there is a greater disparity in per-capita GDP between the two groups of regions.

A non-parametric convergence analysis (Lowess) highlighted (i) a weak convergence trend only among the worse-off Italian regions and (ii) the absence of a convergence dynamic among the 16 Polish regions.

The analysis of employment performance, first of all, highlighted that only four "old" EU-15 countries have already reached the main quantitative European goal (employment rate at 70%). It should be noted that the changes in total employment rates between 1997 and 2003 are all positive for the "old" EU-15 members[10], whereas five "new" EU members showed a net job destruction.

Poland had the lowest employment rate in 2003 (51.2), but Italy (56.1) is also situated near the bottom of the ranking. Considering the period 1997-2003, Poland experienced a remarkable net job destruction with a decrease of 7.7 in total employment rate (-13.1%); in contrast, the Italian employment rate increased of 4.8 (+9.4% of net job creation) during the same period.

Considering the employment rates of the EU-25 member regions, a significant β convergence emerged. However, using two separate regressions, a significant and strong converging dynamic for the "old" EU members' regions is accompanied by a (not statistically significant) diverging trend for "new" EU-member regions.

As for the Polish regions, in the period 1999-2003, there was a general backward shift (net job destruction) of the whole distribution with the insurgence of a bimodal pattern together with a prevailing diverging trend.

As regards Italy, the well-known bimodal distribution of the regional labour market performance is clearly evidenced and confirmed, but the distribution tends to shift forward (net job creation). Finally, a remarkable club convergence dynamics in the Italian regions has been highlighted in the Lowess estimation, together with a much weaker general convergence.

The marked diversification of Italy and Poland at the regional level with regards to employment performance and convergence trend, suggested the need for further investigation. A cluster analysis based on a large number of variables (employment, unemployment and sectoral employment rates) showed the existence of five similar groups, without any mixing between the Polish and Italian regions.

In particular, the Italian regions are distinguished into three clusters, confirming once again the well-known dualism of the Italian economy and labour market: cluster 3 is indeed solely made up of all the southern Italian regions.

It should be noted that cluster 5, including the better-off Polish regions, is characterised by better performance indicators compared to cluster 3 (the southern Italian regions). However, the primary sector accounts for a significant part of employment in cluster 5. The first two clusters of the central and northern Italian regions are significantly distant from this cluster.

In conclusion, this empirical analysis of per-capita GDP growth and employment performance showed the existence of complex converging/diverging dynamics in the EU-25 member regions, with remarkable differences in distribution, convergence and structure for the Polish and Italian regions. The above evidence cannot be ignored when defining the effective development and employment policies at the different institutional levels (European, national and regional/local).

In particular, the European Employment Strategy, launched in 1997, has favored significant employment improvement and convergence in the "old" EU-member regions (also confirmed by the Italian case), while the "new" EU-member regions are still largely dominated by the net job destruction effects of the transition process[11]. The notable regional differences (in terms of both employment structure and performance) indicate the appropriateness of the (vertical and horizontal) subsidiarity principle and the need for its effective enforcement, as envisaged by the EES and concretely translated, for example, into the enhanced importance of the regional dimension in defining priorities according to the main financial instrument of the EES (European Social Funds). From this point of view, the greater importance attached to the so-called Active Labour Market Policies (ALMP) in itself implies a de-centralisation process, since their implementation requires in-depth knowledge of labour markets features at the regional/local level.

[10] It should be noted that the EU-15 employment growth during the period 1997-2002 (more than 12 million new jobs) was largely made up of permanent contracts (79% of total net job creation: 44% females, 35% males). The remaining 21% is represented by temporary contracts (13% females, 8% males). In addition, the same job creation was mainly due to full-time contracts (69% of net job creation: 36% males, 33% females), as opposed to part-time jobs (31% new jobs, 24% females, 7% males) (EU, 2003 and 2004).

[11] Obviously the transition process regards 8 out of 10 new EU members.

The regional dimension seems also crucial with reference to the set of development policies. In particular, the low GDP growth in the EU is the main macroeconomic problem of the last years. In order to adequately face this situation, an effective implementation of the "Lisbon Agenda" (2000) and the revision of the "Stability Pact" (1997) seem inescapable. As for the new EU members, membership gives the opportunity to benefit from a regional development policy that will largely benefit regions with poorer employment performances.

Finally, a closer integration between employment policies and development policies should be strongly encouraged at all the different institutional levels of policy implementation, in order to "increase growth and employment"[12].

[12] See the title and content of the "Economic Policy Committee – Annual Report" (11 January 2005).

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STATISTICAL ANNEX

Table A1. Total Employment Rate (2001)

	> 70 (PL=0) (I=0)
PL-Mazowieckie, PL-Lubelskie. I-Emilia Romagna, I-Trentino Alto Adige, I-Valle d'Aosta, I-Veneto, I-Lombardia, I-Marche, I-Piemonte, I-Friuli Venezia Giulia, I-Toscana, I-Umbria.	**60 – 70** (PL=2) (I=12)
PL-Malopolskie, PL-Podlaskie, PL-Wielkopolskie, PL-Podkarpackie, PL-Lodzkie, PL-Opolskie, PL-Swietokrzyskie, PL-Pomorskie, PL-Kujawsko-Pomorskie, PL-Zachodniopomorskie, PL-Dolnoslaskie, PL-Warminsko-Mazurskie. I-Liguria, I-Abruzzo, I-Lazio, I-Molise.	**50 – 60** (PL=12) (I=4)
PL-Lubuskie, PL-Slaskie. I-Sardegna, I-Basilicata, I-Puglia, I-Sicilia, I-Calabria, I-Campania.	**< 50** (PL=2) (I=6)

Source: Eurostat 2001, 2002

Table A2. Female Employment Rate (2001)

(calculated on working age population 15-64)

	> 60
PL-Lubelskie, PL-Mazowieckie, PL-Malopolskie, PL-Podkarpackie, PL-Lodzkie, PL-Podlaskie. I-Emilia Romagna, I-Valle d'Aosta, I-Trentino Alto Adige, I-Marche, I-Piemonte, I-Friuli Venezia Giulia, I-Lombardia, I-Toscana, I-Veneto.	**50 – 60** (PL=6) (I=9)
PL-Wielkopolskie, PL-Swietokrzyskie, PL-Opolskie, PL-Kujawsko-Pomorskie, PL-Dolnoslaskie, PL-Zachodniopomorskie, PL-Pomorskie, PL-Warminsko-Mazurskie, PL-Lubuskie, PL-Slaskie. I-Umbria, I-Liguria, I-Lazio.	**40 – 50** (PL=10) (I=3)
I-Abruzzo, I-Molise, I-Sardegna.	**30-40** (PL=0) (I=3)
I-Basilicata, I-Puglia, I-Calabria, I-Sicilia, I-Campania.	**< 30** (PL=0) (I=5)

Source: Eurostat 2001, 2002

Table A4. Older workers (55-64) Employment Rate (2001)
(calculated on working age population 15-64)

	> 50 (PL=0) (I=0)
PL-Lubelskie, PL-Podlaskie.	40 – 50 (PL=2) (I=0)
PL-Podkarpackie, PL-Mazowieckie, PL-Malopolskie, PL-Opolskie. I-Calabria, I-Abruzzo, I-Campania, I-Lazio, I-Molise, I-Puglia, I-Basilicata.	30 – 40 (PL=4) (I=7)
PL-Pomorskie, PL-Swietokrzyskie, PL-Lodzkie, PL-Wielkopolskie, PL-Dolnoslaskie, PL-Zachodniopomorskie. I-Sicilia, I-Trentino Alto Adige, I-Marche, I-Valle d'Aosta, I-Toscana, I-Emilia Romagna, I-Liguria, I-Sardegna, I-Umbria, I-Veneto, I-Friuli Venezia Giulia, I-Piemonte, I-Lombardia.	20 – 30 (PL=6) (I=13)
PL-Kujawsko-Pomorskie, PL-Lubuskie, PL-Slaskie, PL-Warminsko-Mazurskie.	< 20 (PL=4) (I=0)

Source: Eurostat 2001, 2002

Table A5. Agriculture and Fishing Employment Rate (2001)
(calculated on working age population 15-64)

PL-Lubelskie, PL-Podlaskie.	20 – 30 (PL=2) (I=0)
PL-Podkarpackie, PL-Swietokrzyskie, PL-Malopolskie, PL-Opolskie, PL-Mazowieckie PL-Wielkopolskie.	10 – 20 (PL=6) (I=0)
PL-Kujawsko-Pomorskie, PL-Lodzkie, PL-Warminsko-Mazurskie, PL-Pomorskie, PL-Dolnoslaskie, .PL-Lubuskie, PL-Zachodniopomorskie, PL-Slaskie. All Italian regions	< 10 (PL=8) (I=20)

Source: Eurostat 2001, 2002