PRACE NAUKOWE AKADEMII EKONOMICZNEJ WE WROCŁAWIU
Nr 1099 — 2006
Spójność społeczna, gospodarcza i terytorialna w polityce Unii Europejskiej

Giuseppe Calzoni, Cristiano Perugini, Marcello Signorelli
University of Perugia

REAL CONVERGE AND EMPLOYMENT INTENSITY OF GROWTH
AN EMPIRICAL ANALYSIS FOR THE EU COUNTRIES AND REGIONS

1. Introduction

In the last decades an increasing part of the theoretical and empirical economic literature has been dedicated to the real convergence process and to the relationship between growth and (un)employment.

Obviously, the existence of a real dynamic convergence is crucial for the studies of "development economics", but it is also important for the (enlarged) European Union, especially considering the regional level. As is well-known, in the case of the European Union the convergence among regions is a policy priority [European Union Treaty: "...the Community shall aim at reducing the disparities between the levels of development of the various regions and the backwardness of the least-favoured regions...", 1992][1].

Economic growth and (un)employment have been key issues in the European policy debate in recent years. The European Union started to explicitly address (jointly) the two issues with the *White Paper on Growth, Competitiveness and Employment* (European Commission, 1993) and the *Green Paper on Innovation* (European Commission, 1995); continuing with the launch of the *European Employment Strategy* (Amsterdam Treaty and Luxembourg European Council, 1997) and the *Lisbon Strategy* (European Council, 2000)[2]; until the recent *Sapir Report* (European Commission, 2004), *Working together for Growth and Jobs. Next Step in Implementing the Revised Lisbon Strategy* (EU Commission Staff Working Pa-

[1] See Title XIV (Economic and social cohesion), article 130a of the EU Treaty.

[2] As is well-known, 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".

per, April 2005) and the reform of the *Stability and Growth Pact* (European Council, Brussels 2005).

Regardless of the degree of implementation (at European and national/regional levels) of the above documents and policy recommendations, it is obvious that they are the consequence of an unsatisfactory comparative situation of the European Union as regards (i) GDP growth and (un)employment performance[3] and (ii) regional disparities in *per capita* income levels.

With reference to the co-movements between growth and (un)employment at European level, we can roughly distinguish four periods: (i) from the beginning of 1950s to the early 1970s high rates of economic growth have been accompanied by low level of unemployment (*catch-up growth*); (ii) during the 1970s and the first half of 1980s growth stagnated and unemployment rate increased dramatically (*eurosclerosis*); (iii) during the decade between mid-1980s and mid-1990s growth rates partly improved but unemployment remained high (*jobless growth*); and, finally, during the period 1995-2004 a decreasing trend in growth rates has been accompanied by a gradual reduction in unemployment and a significant increase in employment (*job-rich low-growth*).

Before focusing our empirical investigation on the most recent period, in this paper we first present a brief review of the theoretical and empirical literature on real convergence and on the relationship between growth and (un)employment (Section 2). We then produce new empirical evidence on growth and employment levels, convergences, co-movements and elasticity in some (aggregations of) EU countries and regions (Section 3).

2. A Brief Review of the Economic Literature

The topic of economic convergence/divergence in *per capita* GDP across countries and regions has been largely analysed from both the theoretical and empirical point of view. The theoretical result of "convergence" is derived from traditional neoclassical growth models[4] (e.g. Solow, 1956 and Swan, 1956) based on the

[3] The latter is supported by the idea of a systematic relationship between growth and (un)employment.

[4] The neoclassical theory, considering a situation of perfect competition, uses a simple growth model with one sector aggregate function and the aggregate marginal productivity theory of distribution. In particular, the neoclassical growth model is based on the following main assumptions: (i) labour force and labour saving technical progress grow at constant exogenous rate (and all economies benefit from the exogenously given technical progress); (ii) all saving is invested (the existence of independent investment function is derived from Say's Law); (iii) output is a function of capital and labour, with the production function characterised by constant returns to scale and diminishing returns to individual factors of production. In particular, in the steady-state, given the hypothesis of diminishing returns to capital, the long-run growth of output is determined by the rate of growth of labour force plus the rate of labour augmenting technical progress. In the long run, a higher level of saving

crucial assumption of diminishing returns to reproducible capital[5]. Starting from the hypothesis of identical preferences and technologies across countries, a long--run tendency towards the equalisation of *per capita* GDP and productivity should be expected and has empirically emerged (e.g. Abramovitz, 1986). So, according to the neoclassical growth theory, poor countries will tend to grow faster than richer ones.

The dynamic implication of the above theoretical framework has been empirically investigated, across countries and regions, through both sigma-convergence and absolute beta-convergence[6]. Sigma-convergence emerges when the dispersion of *per capita* GDP levels declines over time. This type of dispersion is usually measured by the standard deviation of the variable transformed into natural logarithms. Absolute beta-convergence is supported when there is a systematic tendency for countries (or regions) with initially lower levels of *per capita* GDP to grow faster than those with initially higher level of *per capita* GDP. In particular, absolute beta-convergence can be estimated using parametric and non-parametric techniques, in order to verify the negative relation between initial *per capita* incomes and their rates of growth (e.g. Barro, 1991 and Barro, Sala-i-Martin, 1992). From a theoretical point of view, the concept of absolute beta-convergence requires a unique steady-state which can be obtained assuming that technology, saving rate, population growth and depreciation rates are equal across countries. In this framework, the mobility of production factors (capital and labour) across countries (and regions) accelerates the process of absolute beta-convergence on *per capita* GDP and productivity levels (e.g. Borts, 1960)[7]. So, in the neoclassical framework the role of government policy is (substantially) limited to the promotion of market forces and the provision of macroeconomic stability. In this context, given perfect competition, growth is essentially a reallocative process (Borts, Stein, 1964).

(and investment) is offset by a higher capital-output ratio (or a lower productivity of capital) and, finally, the steady-state of output is determined by the growth of labour force and technical progress. So, in the long-run, all economies converge to a common long-run steady-state growth of labour augmenting technical progress.

[5] In fact, poor countries with low capital-labour ratios are supposed to have a higher marginal productivity of capital and hence they will grow faster than richer ones, given the same level of saving and investment.

[6] It can be demonstrated that the existence of beta-convergence is a necessary but not sufficient condition for the existence of sigma-convergence (e.g. Islam, 2004).

[7] If wages are too high in richer countries (or regions), labour will migrate from the poor countries (or regions). Then, labour will become abundant in the former and scarce in the latter, producing wage adjustments (down-ward and up-ward movement, respectively). Indeed, the wages and the marginal product of capital are inversely correlated and therefore capital will move to labour-intensive sector in low wage (poor) countries (or regions), diminishing the labour migration. The above inflow of capital will generate faster GDP growth in poorer countries (or regions) than in the richer ones. In the long-run, lower factor costs and higher profit opportunities in poor countries favour the convergence process.

After some ambiguous empirical results on the investigation of absolute beta-convergence in *per capita* income across countries (Baumol, 1986)[8], many econometric studies tried to test the existence of conditional beta-convergence in addition to absolute beta-convergence (e.g. Barro, 1991; Mankiw, Weill, Romer, 1992). In the conditional beta-convergence analysis, the negative relation between initial *per capita* incomes and their rates of growth holds only controlling for the different rates of saving (and investment), for the different endowment of human capital across countries[9] and/or considering other variables.

The research on club convergence has been related to conditional convergence and to the theoretical models of multiple equilibrium.

The empirical studies on convergence have been conducted also at the regional level. Sala-i-Martin (1996) presents a comprehensive study of convergence across regions of Japan, Germany, the UK, France, Italy, Spain, Canada and among the US states.

The theoretical and empirical debate on real convergence (e.g. George, Oxley, Carlaw, 2004; Islam, 2004) produced different interpretation of convergence that can be summarised in the following dichotomies: (i) beta-convergence vs. sigma-convergence; (ii) absolute convergence vs. conditional convergence; (iii) global convergence vs. local or club convergence; (iv) convergence within an economy vs. convergence across economies; (v) *per capita* GDP-convergence vs. productivity-convergence; (vi) deterministic convergence vs. stochastic convergence; (vii) linear convergence vs. non-linear (complex) convergence.

So, research on convergence has proceeded in many directions, using many different definitions and methodologies. In our opinion, the original idea of using convergence analysis as a test for validity of alternative growth theories has not been very fruitful. On the contrary, convergence studies produced many different interesting empirical results and theoretical stimulus (i) supplying new stylised facts regarding cross-countries (and regions) regularities, such as "persistence" and "bi-modality", and favouring, for example, the use of new models of multiple equilibrium; (ii) highlighting the existence of remarkable productivity or technological differences across countries (and regions), and thus increasing the theoretical studies on the determinant of technology differences and diffusion; (iii) providing further evidence on the importance of institutional factors, so stimulating the theoreti-

[8] Baumol (1986) produced a first analysis based on a sample of 16 OECD countries and he obtained a significant negative (absolute) β coefficient, deriving strong evidence in favour of convergence. However, in a second empirical analysis, Baumol considered a larger sample of 72 countries and he did not find any evidence of convergence. He suggested that, while there is no convergence in the larger sample of countries, there exists „club" of countries within which evidence of convergence can be recorded.

[9] Barro (1991) finds that when the initial measures of human capital are included in the regression model, the β coefficient turns negative and significant.

cal research on the role of institutions and the determinants of institutional changes; (iv) stressing the importance of investment, especially human capital an R&D investment, so favouring the improvement of the (initially too simple) aggregate growth models.

Concluding the first part of this Section, it is useful to mention some recent studies where some instruments of the (traditional) empirical convergence analysis (sigma- and beta-convergence) have been used for investigating national and regional dynamics in employment variables (Marelli, 2000 and 2004; Perugini, Signorelli, 2004).

The joint analysis of the results of convergence investigations (across countries, across regions and for some European club of countries/regions) on both *per capita* GDP and employment can be useful for producing evidences inclusive of a second important "real" variable, i.e. employment, with possible interesting consequences from the theoretical point of view.

In the period 1995-2004 EU-15 countries have been characterised by lower GDP growth rates compared to the US, with a worsening in the second half of the period, accompanied by a remarkable and generalised net job creation[10] (*rich-job low-growth*) and a relevant reduction in unemployment rates. It should be noted that in the previous 25 years the European countries experimented a worsening of employment performance (increase and persistence of unemployment), also during the more favourable economic cycles (*job-less growth*). In order to put into a theoretical framework the investigation of the recent increase in the "employment intensity" of European growth, we briefly review the theoretical and empirical literature on the existence and stability of a relationship between growth and (un)employment.

First of all, it should be noted that an increase in employment could be accompanied by both decrease and increase in unemployment: the latter will occur when the labour participation grows faster than employment. Symmetrically, a decrease in employment can be accompanied by both increase and a decrease in unemployment: the latter will occur when the labour participation decreases more than employment[11]. So, also the relation between employment and unemployment is not simple and stable and we cannot use indifferently the two variables[12].

Some preliminary questions are related to the definition of the (main) direction of causality: (i) is it the *per capita* GDP growth (for example over a certain thre-

[10] The employment growth in EU-15 during the period 1997-2002 consisted in the net job creation of more than 12 million new jobs. It should be noted that the above increase was largely made up of permanent contracts (79% of total net job creation).

[11] For the same reasons, also a decrease in unemployment can be accompanied by both increase or decrease in employment, as an increase in unemployment can be accompanied by both decrease and increase in employment.

[12] For a theoretical and empirical discussion on the use of unemployment rate versus employment rate, see: Roncaglia (2004) and Perugini, Signorelli (2005).

shold) that increases employment (or reduces unemployment)? Or (ii) is it the employment growth (or the reduction in unemployment) that increases the *per capita* GDP growth? Or (iii) both *per capita* GDP and (un)employment changes depend (mainly or exclusively) on many other variables and a (simple and direct) causal relationship does not exist[13]?

As is well known, the theoretical discussion of the (implicit or explicit, direct or indirect, simple or complex) causal link between output (or effective demand) and unemployment (or employment) has been particularly important in the history of economic research[14]. Considering the aim of this paper, we just present a brief review regarding the last three decades.

Okun (1970) defines a coefficient corresponding to the rate of change of real output associated to a given change in the unemployment rate, focusing on an estimation of potential GDP. So, in this seminal paper unemployment was seen as the exogenous and real GDP as the dependent variable. In many empirical researches estimating the Okun coefficient the causality is mostly assumed to be in the opposite direction, i.e. changes in output may explain the variation of employment or unemployment. Prachowny (1993) considers the theoretical foundation of the Okun's law and derives empirical evidences for the US, supporting the view that the Okun equation is a useful proxy in macroeconomics. Erber (1994) estimates the Okun equation for a number of OECD countries, finding a significant negative correlation between unemployment and growth. Padalino and Vivarelli (1997) find that the Okun relation is still valid in G-7 countries and that the growth-employment link in manufacturing is stronger than for the total economy. Blinder (1997) counts the relation between unemployment and growth among the principles of macroeconomics in which "we should all believe", but he also argued that a simple relation between the percentage change of output and the absolute change in the unemployment rates is "atheoretical, if not indeed antitheoretical". Baker and Schmitt (1999) estimated Okun coefficient for a panel of OECD countries and they found that (i) employment intensity of growth has been in the 1990s higher than in previous periods, and (ii) foreign growth is a determinant variable for domestic employment dynamic. Lee (2000) estimated Okun equation for all OECD countries and stressed that the relationship is not stable over time and is different across countries, but he concluded that the impact of growth on employment is still valid. He also used several methods to calculate the output elasticity of employment or unemployment. Solow (2000) argued that a good deal of the European unemployment is due to lack of demand: he used the Okun relation and quantified the recent output gap for Germany close to –6%. Flaig and Rottman (2000) criticize the Okun

[13] See the well-known (extreme) case of spurious correlation.

[14] Rodano (2004) carried out an analysis of the labour market in the history of economic thought, focusing on some of the above questions.

coefficient literature for neglecting the influence of relative prices. In fact, they argue that the employment intensity of growth is strongly related to real labour cost and, hence, estimating a simple Okun equation is not appropriate due to not correct specification. Revenga and Bentolila (1995) explained that different employment intensity of growth could partly depend on differences in labour market institutions. Gabrisch (2005) applied Okun's law for testing the unemployment-output relationship in the 8 new EU countries and he found a systematic relationship (only) in the later stages of transition.

Notwithstanding the different empirical results, all the various studies suggest that the link between (un)employment and growth is still a useful macroeconomic rule of thumb[15].

3. Growth and Employment: Evidences for European Countries and Regions

In this Section we present empirical evidences and results on (i) long-run dynamics in *per capita* GDP and employment in Europe compared to the United States, (ii) compared performance and convergence dynamics on *per capita* GDP and employment in EU-25 countries and regions, (iii) employment intensity of growth in EU-15 countries.

3.1. Europe vs. United States: Long-run Dynamics in GDP Growth and Employment

Comparing the average annual changes in *per capita* GDP (PPP) in Europe and in the United States, and dividing the long period 1870-2000 into five periods (Fig. 1), the lower European growth emerges as relatively recent evidence (period 1992-2000), already occurring in the first two periods (1870-1913 and 1913-1950) but not resulting for the other two post-War periods (1950-1973 and 1973-1992). In particular, in the second post-War period the annual average growth rate of Western Europe was higher than US rate by +1.7; it declined to a still positive +0.4 after the 1973 oil shock and, finally, it became a gap of –0.9 in the most recent years 1992-2000[16].

[15] In final part of Section 3 some preliminary evidences on *per capita* GDP growth elasticity of employment are presented, with a particular attention to differences across countries and over time in recent years.

[16] It is obvious that a partial dependence of the results on the arbitrary distinction in periods exist. However, the long-run trend is not significantly modified by this periodisation.

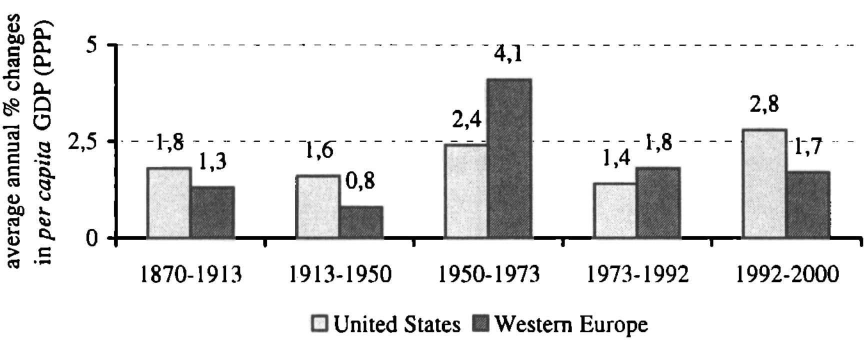


Fig. 1. Long-run *per capita* GDP growth in Europe and the United States (1870-2000)

Source: Valli (2002), p. 20. Valli elaborates data mainly produced by Maddison (1995 and 2001), GGDC (2001), IMF and World Bank. Western Europe includes also Ireland, Spain, Portugal and Greece.

The differences and changes in *per capita* GDP and employment can be investigated by distinguishing the level of *per capita* GDP in the following components.

$$\frac{GDP}{P} = \frac{GDP}{H} \times \frac{H}{E} \times \frac{E}{WAP} \times \frac{WAP}{P},$$

where: $\frac{GDP}{P}$ – GDP/population = *per capita* GDP,

$\frac{GDP}{H}$ – GDP/hour worked = labour productivity,

$\frac{H}{E}$ – hour worked/employment = annual average in working hour per employed,

$\frac{E}{WAP}$ – employment/working age population (15-64) = employment rate,

$\frac{WAP}{P}$ – working age population/population.

In order to produce an immediate and simple comparison between EU-15 and the US, all the variables are expressed as percent of US values in the two years 1970 and 2000 (Fig. 2). In this period the *per capita* GDP convergence between the two areas was very weak and the European *per capita* GDP remained around 70% of that of US. Remarkable changes occurred in the compared labour productivity measured by the GDP divided by the total hour worked: EU-15 productivity increased from 65%

to more than 90% of United States productivity. In the same time, the average working hours per employed (initially similar between EU-15 and US) experienced a significant relative drop in EU-15 up to 85% (of that of the US). A third remarkable relative change occurred in the employment rate: starting from a situation of better performance in EU-15 in 1970 (an employment rate of 3.6% higher than in the US), the EU-15 evidences in 2000 an employment rate of 87.6% of that of US, highlighting the well-known much higher net job creation of the US economy.

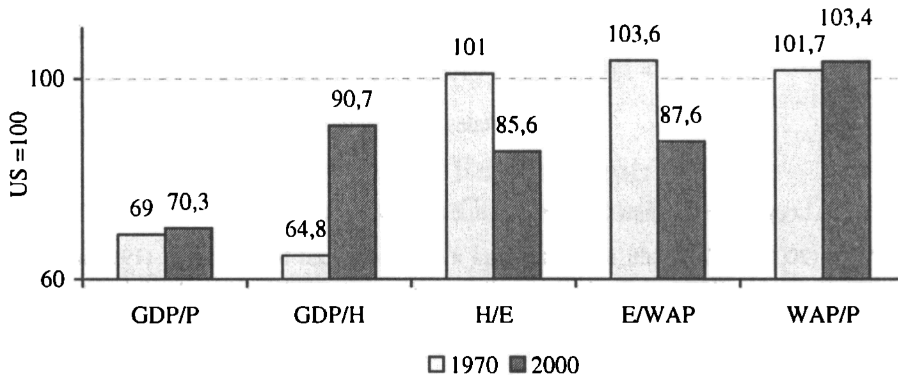


Fig. 2. Compared *per capita* GDP and "employment" in the EU-15 in 1970 and 2000

Source: Annual Macroeconomic Database (AMECO) based on ESA 95 national accounts.

The GDP growth can be divided into two components: changes in the annual number of hours worked (changes in employment and/or in average working hour per employed) and changes in GDP per hour worked (labour productivity changes).

$$\Delta GPD = \Delta H + \Delta \frac{GDP}{H}.$$

During the 1970s, EU-15 experienced an annual GDP growth rate similar to the US rate (3.0 against 3.2), but it was accompanied by a much higher increase in labour productivity (+3.5 against +1.4 of US) and a decrease in "employment" (–0.5 against +1.8 of US).

During the 1980s and the first half of 1990s the European gap in annual GDP growth rate increased, the annual changes in productivity remained higher in EU-15 compared to US, the net job creation of US economy continued while, in the first half of 1990s, the European "job-less growth" of the 1980s became "net job destruction".

As for the more recent period (1995-2003) in the 12 EMU member states the persistence in the gap in annual GDP growth rate has been accompanied, for the first time, by a lower increase in labour productivity (+1.5 against +2.2 of US), while the annual changes in hours worked was similar (+0.7 against +0.9 of US).

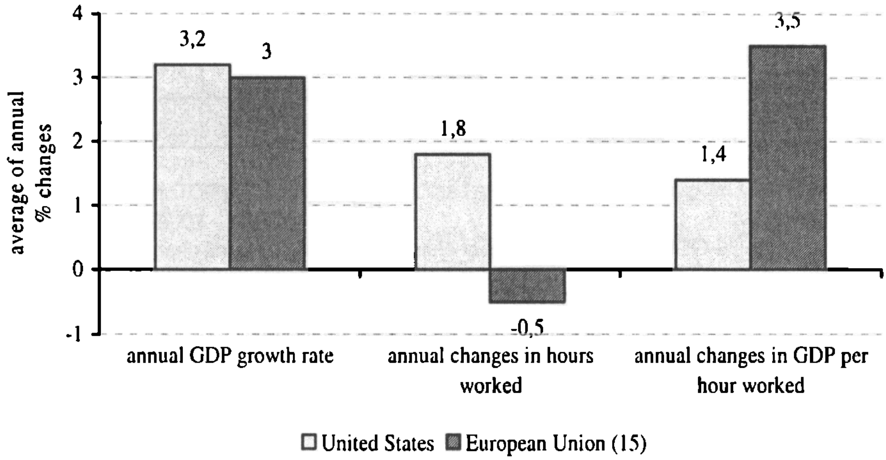


Fig. 3. GDP growth, "employment" and productivity in the United States and European Union (15) in the years 1970-1980

Source: Annual Macroeconomic Database (AMECO) based on ESA 95 national accounts (West Germany included); Employment Outlook, OECD.

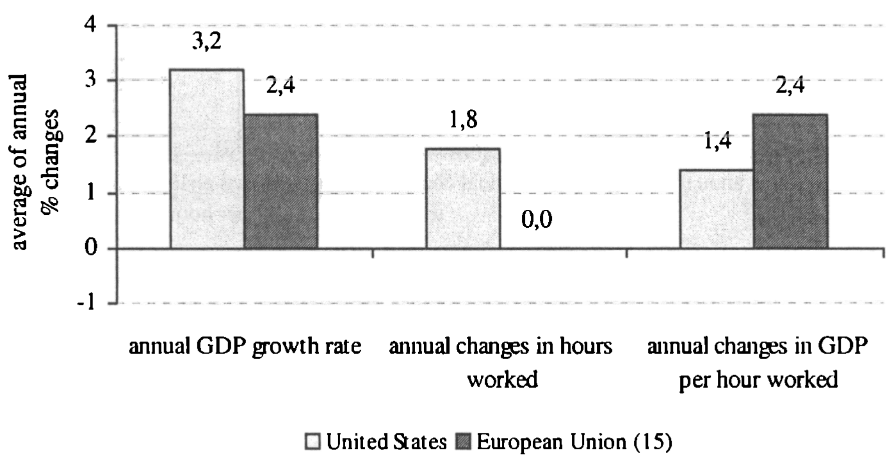


Fig. 4. GDP growth, "employment" and productivity in the United States and European Union (15) in the years 1980-1990

Source: Annual Macroeconomic Database (AMECO) based on ESA 95 national accounts (West Germany included); Employment Outlook, OECD.

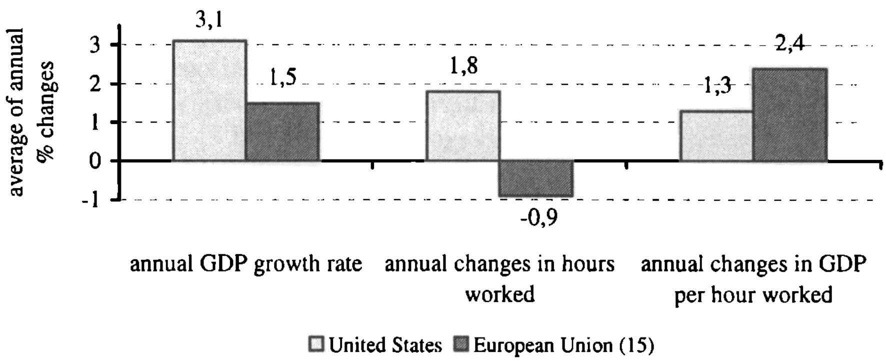


Fig. 5. GDP growth, "employment" and productivity in the United States and European Union (15) in the years 1991-1995

Source: Annual Macroeconomic Database (AMECO) based on ESA 95 national accounts; Employment Outlook, OECD.

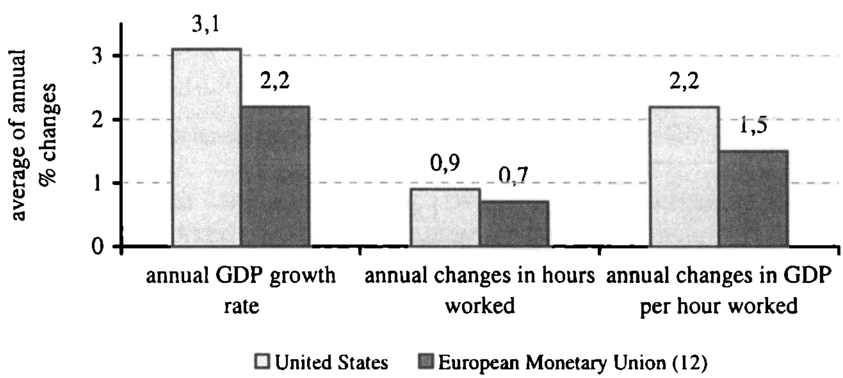


Fig. 6. GDP growth, "employment" and productivity in the United States and European Monetary Union (12) in the years 1995-2003

Source: Annual Macroeconomic Database (AMECO) based on ESA 95 national accounts; Employment Outlook, OECD.

The comparison between the European Union and United States is useful for highlighting some relative (long-run) tendencies and differences between the two areas, but the significant differentiation between European countries cannot be ignored. So, for the period 1995-2003, we also consider the national differences in GDP growth rates, annual changes in hours worked and annual changes in GDP per hour worked, distinguishing the EU-15 countries and maintaining the comparison with US. Five European countries (Ireland, Luxembourg, Greece, Finland and

Spain) had an annual GDP growth rate higher than the US. The annual changes in total hours worked were higher in six EU countries (Luxembourg, Ireland, Spain, Netherlands, Finland and Italy) compared to US. Finally, only four EU countries (Ireland, Greece, Sweden and Finland) had an annual change in GDP per hour worked higher than in the US.

Table 1. Ranking in GDP growth, "employment" and productivity in the European Union (15) and US in the years 1995-2003

Annual GDP growth rates		Annual changes in total hours worked		Annual changes in GDP per hour worked	
Ireland	7.8	Luxembourg	3.4	Ireland	5.0
Luxembourg	5.2	Ireland	2.8	Greece	3.1
Greece	3.6	Spain	2.6	Sweden	2.3
Finland	3.6	Netherlands	2.0	Finland	2.3
Spain	3.3	Finland	1.3	**United States**	**2.2**
United States	**3.1**	Italy	1.0	United Kingdom	2.2
United Kingdom	2.8	**United States**	**0.9**	Portugal	2.1
Netherlands	2.5	Belgium	0.9	France	2.0
Portugal	2.5	Denmark	0.8	Luxembourg	1.8
Sweden	2.5	United Kingdom	0.6	Austria	1.6
Denmark	2.1	Greece	0.5	Germany	1.6
Austria	2.1	Austria	0.5	Denmark	1.3
France	2.1	Portugal	0.4	Belgium	1.2
Belgium	2.1	Sweden	0.2	Spain	0.7
Italy	1.5	France	0.1	Netherlands	0.5
Germany	1.2	Germany	–0.4	Italy	0.5

Source: OECD Productivity Database.

3.2. Compared Performances and Dynamics of *per capita* GDP Growth in the EU

In this part we analyse, across European Union countries, the existing difference, the persistence and the convergence in *per capita* GDP expressed in PPP.

Comparing the situation in 1995 and 2002 for EU-15 countries (Tab. A1 in the Appendix), remarkable is the "relative growth" of Ireland that gained ten positions in the ranking, UK improving by four positions, Finland by two (positions), and Luxembourg that maintained the first position of the ranking. On the contrary, Germany and Italy experienced the highest "relative decline" (loosing six and three positions, respectively) and their *per capita* GDP shifted below the EU-15 average. Excluding the above countries, a weak degree of persistence in the ranking emerged for the remaining ones.

Comparing the situation in 1995 and 2002 for EU-25 countries[17] (Tab. A2), it should be noted that Estonia, Latvia, Hungary, Lithuania, Slovenia, Slovakia and Malta experienced a "relative growth", with respect to EU-25 average. In the opposite situation, Czech Republic and Cyprus had a "relative decline". A generally weak degree of persistence of the initial ranking emerged.

The convergence analysis of *per capita* GDP (PPP) is carried out first across EU countries and than across EU regions, considering the following aggregations: EU-25, EU-15 (before May 2004 enlargement), EMU-12 (adopting euro), 8 CEC-NM (eight out of ten new EU members, i.e. excluding Malta and Cyprus).

As for the analysis at national level, both sigma-convergence and Lowess beta-convergence were considered. Sigma-convergence consists of analyzing the evolution of the dispersion of *per capita* GDP (we use the standard deviation of the variable transformed into natural logarithms), while Lowess (locally weighted scatterplot smoothing) is a non-parametric technique for estimating the relationship between GDP growth rates and initial GDP levels, and can (graphically) reveal the existence of beta-convergences/divergences or more complex relationships.

Considering the period 1995-2002, as for sigma-convergence (Tab. A3), the results show a convergence across EU-25 countries and, especially, across 8 CEC-NM (club convergence), while the degree of dispersion of *per capita* GDP slowly increased in EU-15 and EMU-12.

As for the Lowess technique, with a 0.8 span, we decided to exclude the small Luxembourg (as is well known, characterised by the highest *per capita* GDP level and one of the highest *per capita* GDP growth). As highlighted in Fig. A1, a clear beta-convergence emerged in EU-25 and 8 CEC-NM. As for EU-15 and EMU-12 a weak lowess beta-convergence exists only among the best performing countries.

The convergence analysis across countries may hide different dynamics at regional level. For that reason we produce an empirical investigation of sigma-convergence and parametric beta-convergence for European regions (NUTS II), using the Eurostat-regio database (Tab. A4). A sigma convergence emerged considering all 250 EU-25 regions, while a (weak) convergence across EU-15 and EMU-12 regions can be appreciated only at the end of the considered period. As for 8 CEC-NM the sigma values are quite stable with a tendency toward divergence since 1998.

Different information is supplied by the estimates along the lines of the beta-convergence approach. In the basic formulation for absolute beta-convergence, the regression model shows the link between *per capita* GDP growth rates and initial levels of *per capita* GDP:

$$\Delta GDP_{1995-2002} = \alpha + \beta GDP_{1995} + \varepsilon,$$

[17] In addition to EU-15, we consider ten European countries that became the EU members on May 2004.

where GDP_{1995} are *per capita* GDP levels in 1995 and $\Delta GDP_{1995\text{-}2002}$ are the rates of changes in *per capita* GDP over the interval 1995-2003. Parameter β describes the converging (if negative) or diverging (if positive) trend of regional *per capita* GDP toward the mean[18].

In order to control for sectoral structure, we also consider the conditional beta-convergence, considering the weight, in terms of share on total added value, of the three usual macro-sectors (agriculture, industry and services)[19]. Both absolute and conditional beta-convergence is carried out considering the European regions distinguished in the main EU aggregations: EU-25 regions, EU-15 regions, EMU-12 regions and 8 CEC-NM regions.

Considering the period 1995-2003, a significant absolute beta-convergence emerged across the 250 EU-25 regions (Tab. A5), but also across the regions belonging to EU-15 and EMU-12 (Tab. A6 and A7). The sign of beta is negative also for the 8 CEC-NM regions but the result is not statistically significant (Tab. A8).

As for the conditional beta-convergence, controlling for the sectoral composition of added value in 1995, the main statistically significant results highlighted: (i) the expected permanence of the negative signs of beta-parameters and the significance of the results with the exclusion of 8 CEC-NM regions aggregation; (ii) the significance and negative signs for the industrial sector for all the aggregations, i.e. regions with a higher share of industrial added value in 1995 experienced lower *per capita* GDP growth rates in the period 1995-2003; (iii) the opposite occurred controlling for the initial weight of service sector: regions, belonging to EU-25, EU-15 and 8 CEC-NM, with the higher weight of services in 1995 performed better in terms of *per capita* GDP growth rates in the period 1995-2003 (the result is not significant for EMU-12); (iv) as for agricultural sector, the sign is positive and significant only for EU-15 and EMU-12 regions, i.e. regions belonging to Eurozone and EU-15 that present a higher weight of agricultural sector in 1995 experienced higher *per capita* GDP growth rates in the period 1995-2003 (the not significant results for the other aggregations are accompanied by positive signs for EU-25 and a negative sign for 8 CEC-NM).

3.3. Compared Performances and Dynamics of Employment Rate in the European Union

In this part of the paper we carry out a compared employment performance investigation between European countries and a convergence analysis at both national and regional levels.

[18] To the aim of the paper, we only consider the sign and the significance of the estimates, without any consideration about the levels of the beta-parameters.

[19] Obviously, in these cases another explicative variable is inserted in the regression model.

Traditional economic literature considers unemployment indicators to be the main proxies of labour market performance. Although already in the late 1960s the usefulness of considering also employment dynamics was emphasized (Valli, 1970), only recently many authors have started to prefer the use of employment indicators (e.g. Frey, 1994; Signorelli, 1997; Moro, 1998; Garibaldi, Mauro, 2002; Tronti, 2002; Marelli, 2004). We argue that, for various reasons, employment indicators are preferable to unemployment indicators[20]. Besides, the Lisbon European Council (March 2000) defined the total employment rate (calculated on working age population 15-64) as the crucial objective variable to be improved. In particular, the Lisbon Council defined the following main quantitative objective to be obtained by 2010: an overall EU employment rate of 70%[21].

With respect to the main "Lisbon objective", in 2003 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 (TER) under 60% (Spain, Belgium, Greece, Slovak Republic, Romania, Hungary, Italy, Malta, Bulgaria, Poland). The remaining countries (seven "old" EU-15 and six "new" EU members) have TER between 60 and 70% (Tab. A9).

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)[22], whereas five "new" EU members (Poland, the Slovak Republic, the Czech Republic, Estonia and Lithuania) plus Romania show a negative variation (Tab. A10).

---

[20] This is because, first of all, there are well-known difficulties and (national) differences in defining the unemployed condition, especially as regards the "active search for a job". Second, unemployment rate depends on participation rate (labour supply), which in turn depends on employment rate (job opportunities). In particular, compared evidence shows that similar unemployment rates are compatible with significant differences in employment rates. The weakening of a negative correlation between growth of employment and a rise in unemployment, due to important changes in labour force participation, is, for example, reported by Boeri and Scarpetta (1996) with regard to regional labour markets in some transition economies. In addition, considering the importance of the fiscal wedge on labour (social contributions and labour income tax), total employment rates are also important indicators of the sustainability of national welfare systems. See also: Perugini, Signorelli (2005).

[21] In the same European Council a second quantitative objective has been defined: a female employment rate higher than 60%. In addition, the Stockholm European Council (March 2001) added a third goal: (iii) an employment rate higher than 50% (by 2010) for older (55-64) workers. Another important European objective, not defined in precise quantitative terms, regards the emergence of irregular employment from the shadow economy (see: Perugini, Signorelli, 2004).

[22] 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).

Similarly to *per capita* GDP, as for total employment rate we realised a convergence analysis across European countries and regions. Both sigma-convergence and Lowess beta-convergences were considered, for the period 1997-2003, according to the following groups of countries: Europe-25, Europe-24, EU-15, EMU-12, CEC-10 and 8 CEC-NM.

The sigma-convergence analysis produced the following main results: (i) a remarkable sigma-convergence for the EU-15 and EMU-12; (ii) a diverging trend starting in 1999 for the 8 CEC-NM; (iii) in the other aggregations, the sigma values are quite stable, although a sort of an inverted U-shape emerges for the period 2000-2003 (Tab. A11).

As for the non parametric beta-Lowess technique, a clear beta-convergence emerged in EU-15 and EMU-12 total employment rates (Fig. A2): the countries with the worst initial performances (1997) showed the highest employment growth (in 1997-2003). In the Europe-24 aggregation (1998-2003), only some of the worst performing countries in 1998 tend to converge, whereas, considering the 8 CEC-NM, no significant relationship between initial conditions and employment growth emerged.

Similarly to previous analysis of *per capita* GDP, we carried out empirical investigations of sigma-convergence and parametric beta-convergence on employment rates for European regions (NUTS II level of classification), using the same Eurostat-regio database. As for sigma-convergence, the main results highlighted (i) the absence of convergence/divergence dynamics across Europe-25 regions, (ii) significant sigma-convergence for both EU-15 and EMU-12 regions, (iii) a strongly diverging trend for the regions of the eight new EU member states (Tab. A12).

The main result of the absolute beta-convergence investigation is that in all European aggregations of regions a remarkable and significant convergence dynamics occurred in the period 1999-2003, with the only exception of the 8 CEC-NM regions that present not statistically significant results. Considering the conditional beta-convergence analysis, based on sectoral employment rates in the initial year (1999), the following main results emerged (Tab. A13 to A17): (i) across Europe-25 regions, the best performer were those with an initial lower weight of agricultural and industrial employment and an initial higher weight of employment in services sector, (ii) in EU-15 the convergence trend is confirmed even though the signs of the sectoral (conditional) variables are not significant; (iii) in CEC-10 regions, the best performing regions had a lower agricultural employment in 1999, (iv) in 8 CEC-NM the signs of the beta-parameters are not significant and as regards the information supplied by sectoral variables, it emerges that where the importance of agriculture was higher, the growth of total ER was weaker.

In order to summarize the outcomes obtained through the convergence analyses of both *per capita* GDP and employment rate levels, we provide the following Tab. 2.

Table 2. Outcomes of convergence analysis for *per capita* GDP and employment rate levels

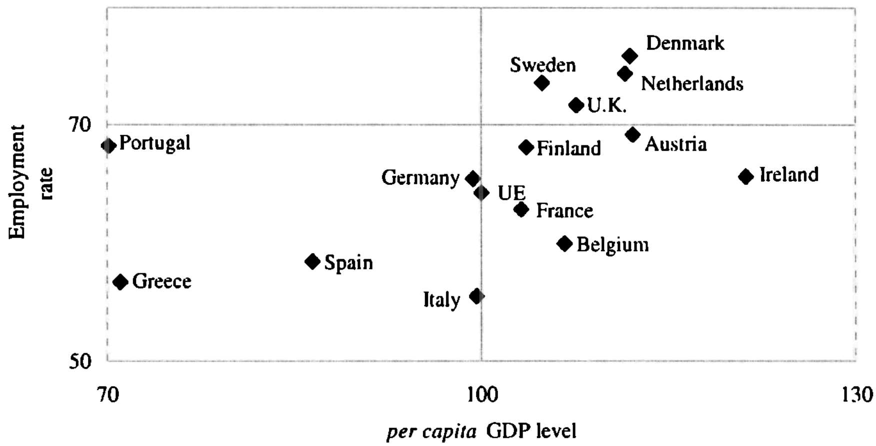
	Per capita GDP						
	Country level (1995-2002)		Regional level (1995-2002)				
	Sigma	Beta (Lowess)	Sigma	Beta			
				Absolute	Conditional[b]		
					Agriculture	Industry	Services
EU-25	C	C	C	C	C (+)[a]	C (-)	C (+)
EU-15	D(w)	C(w)	C(w)	C	C (+)	C (-)	C (+)
EMU-12	D(w)	C(w)	C(w)	C	C (+)	C (-)	C (+)[a]
8 CEC-NM	C	C	P	C[a]	C[a] (-)[a]	C[a] (-)	C[a] (+)
	Employment rate						
	Country level (1997-2003)		Regional level (1999-2003)				
	Sigma[d]	Beta (Lowess)	Sigma	Beta			
				Absolute	Conditional[c]		
					Agriculture	Industry	Services
Europe 25	P	P	P	C	C (-)	C (-)	C (+)
EU-15	C	C	C	C	C (-)[a]	C (+)[a]	C (+)[a]
EMU-12	C	C	C	C	C (+)[a]	C (+)[a]	C (+)[a]
8 CEC-NM	D(w)	P	D	D[a]	D[a] (-)	D[a] (+)[a]	C[a] (+)[a]

Note: C = convergence; C(w) = weak convergence. P = persistence (no clear convergence/divergence). D = divergence; D(w) = weak divergence. [a] = not significant at 10%. [b] = sectoral share of added value (in parentheses the sign of the sectoral variable). [c] = sectoral employment rates (in parentheses the sign of the sectoral variable). [d] = 2000-2003 for Europe 25 and 1998-2003 for 8 CEC-NM. Europe 25 = EU-15 plus 8 CEC-NM plus Romania and Bulgaria. 8 CEC-NM = Countries of Central and Eastern Europe new EU members in 2004.

3.4. GDP and Employment in EU-15 Countries: Levels and Changes

Considering the *per capita* GDP and the employment rate (calculated on working-age population 15-64) with respect to EU-15 average in 2002, the empirical evidences highlight that Greece, Spain and Italy are in the worst situation (both variables below the EU-15 levels), while Denmark, the Netherlands, Sweden, U.K., Austria, Ireland and Finland have both *per capita* GDP and employment rates above the EU-15 average. France and Belgium have per capita GDP higher than EU-15 average and employment rates lower than EU-15 mean. Portugal has an employment rate higher than EU-15 average but with a *per capita* GDP much lower than average. Germany has both variables near to EU-15 average (Fig. A3).

If we use as benchmark the main quantitative objective of the European Employment Strategy (ER higher than 70% of working age population), it should be noted that only four countries (Denmark, Sweden, the Netherlands and U.K.) have already met this goal and all of them have a *per capita* GDP higher than EU average (Fig. 7). As for the other countries, similar employment rates are accompanied by different *per capita* GDP levels (see (i) Italy, Spain and Greece or (ii) Austria, Finland and Portugal or (iii) Ireland and Germany) and countries with similar *per* *capita* GDP levels have different employment rates [see (i) Italy and Germany or (ii) France and Finland or (iii) Greece and Portugal].



Luxembourg is considered in EU-15 average but is not included in the Fig. 10 due to the high *per capita* GDP level (194% of EU-15 average) and the near to average employment rate (63.1).

Fig. 7. *Per capita* GDP (EU-15 = 100) and employment rate levels in 2002

Source: elaboration on Eurostat data.

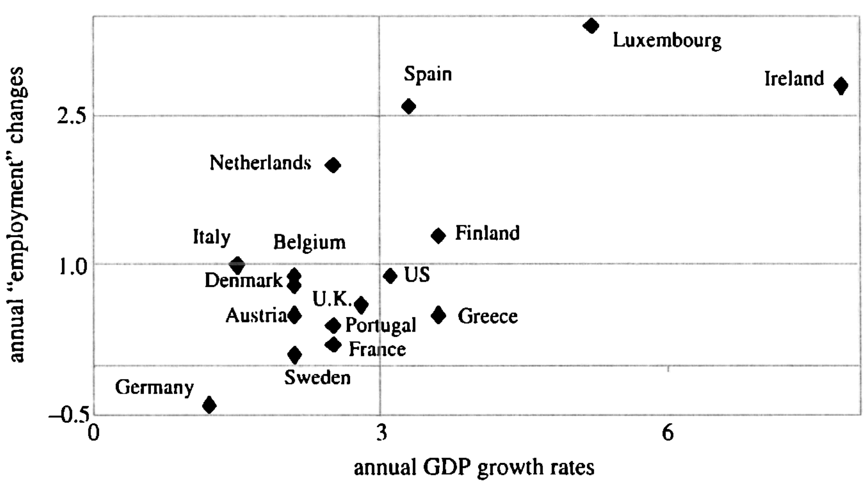


Fig. 8. GDP growth and Employment change in EU-15 (1995-2003)

Source: elaboration on Eurostat data.

Considering the annual GDP growth rates and the annual changes in total hours worked (period 1995-2003), only a weak positive correlation emerged (Fig. 8). In fact, countries with similar annual GDP growth rates experienced very different "employment" increases (see (i) the Netherlands and Sweden or (ii) Spain and Greece) and countries with similar "employment" increases experienced different annual GDP growth rates (see (i) Spain and Ireland or (ii) Austria and Greece).

3.5. Employment Intensity of Growth: Co-movements, Thresholds and Elasticity

As already highlighted, since the *White Paper on Employment Competitiveness and Growth* (1993) the target of increasing the employment intensity of growth has been clearly posed. In this EU document it has also been stated that a GDP growth rate of about 2% would be just enough to keep employment constant. If one takes this statement (GDP growth threshold) as given, the employment increase in EU-15, during the period 1995-2003, must be taken as a surprise. In fact an annual employment growth average of about 1.1% (about 14.7 million new jobs, with an increase in total employment rate from 60.1 in 1995 to 64.3 in 2003) has been obtained with an average annual GDP growth rate of just 2.2%.

It is obvious that the analysis of the determinants of employment intensity of growth is of crucial importance[23] for the possible policy implications. However, as a first stage of a more ambitious research project finalised to shed light on the important question whether the empirical regularity between employment and GDP growth is still valid, we present and briefly discuss some preliminary evidences, across countries and over recent years, on (i) the co-movements of real GDP and employment, (ii) the levels and changes in the "GDP growth threshold" permitting employment increases and (iii) the values and changes in elasticity of employment with respect to GDP growth[24].

The descriptive analysis highlighted the following preliminary results (Tab. 3 and Figs 9-11; Tabs A18 and A19 and Figs A4 to A12): (i) the existence of a strong positive correlation between GDP growth and employment changes is confirmed, especially for EU-15 with respect to US, (ii) a lower threshold of "GDP growth rates permitting employment increases" occurred in EU-15 compared to US (about 0.5 against 2.5 of US), (iii) the employment intensity of growth is still lower in EU-15 compared to US, (iv) the correlation coefficient between GDP growth and employment changes is generally positive in EU-15 countries, with the exception of Italy (negative correlation) and Greece (absence of correlation), (v) the "GDP threshold" is significantly different across EU-15 countries and seems to

[23] Many studies tried to investigate the main determinants of the employment intensity of growth: real wage dynamics, sectoral employment changes, labour market institutions evolution, etc.

[24] The elasticity has been simply calculated dividing the % rate of change of employment by the % rate of change of GDP.

shift downward over time, (vi) the elasticity values of employment with respect to GDP differ remarkably across EU-15 countries and are highly unstable over time.

Table 3. GDP and Employment annual changes in the EU-15 and US (1995-2003)

GDP Employment	1995	1996	1997	1998	1999	2000	2001	2002	2003	Correlation coefficient
EU-15	2.4	1.6	2.5	2.9	2.9	3.5	1.6	1.0	0.7	0.88
	0.8	0.6	0.9	1.8	1.7	2.0	1.2	0.5	0.3	
US	2.5	3.7	4.5	4.2	4.5	3.7	0.5	2.2	3.1	0.76
	2.1	1.7	2.1	2.2	2.0	2.0	-0.2	-0.9	0.9	

Source: elaboration on Annual Macroeconomic Database (AMECO) based on ESA 95 national accounts; Employment Outlook, OECD.

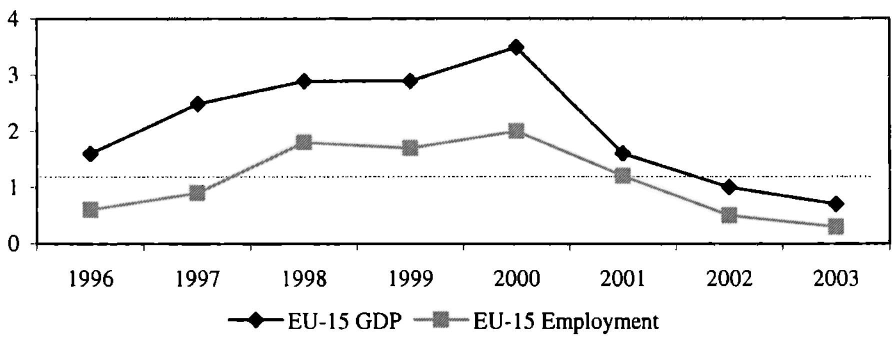


Fig. 9. GDP and employment annual changes in the EU-15 (1995-2003)

Source: Annual Macroeconomic Database (AMECO) based on ESA 95 national accounts.

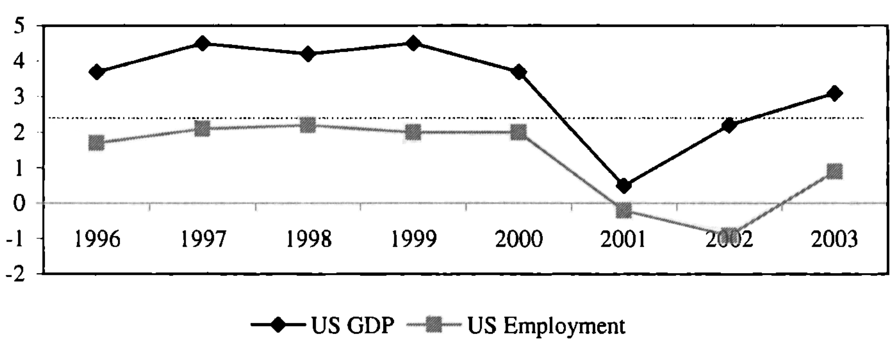
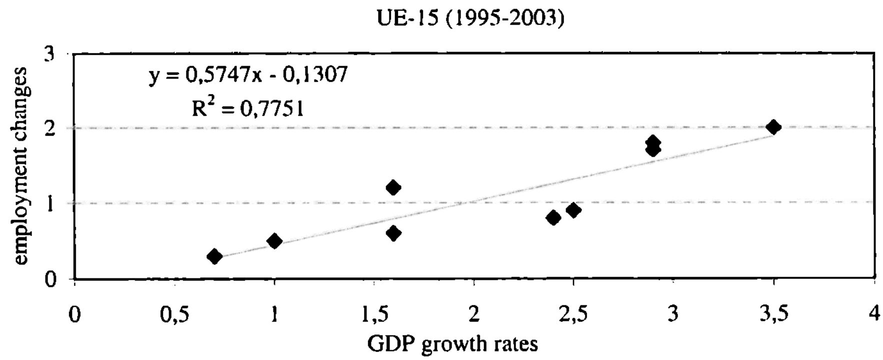


Fig. 10. GDP and employment annual changes in the US (1995-2003)

Source: elaboration on Annual Macroeconomic Database (AMECO) based on ESA 95 national accounts.



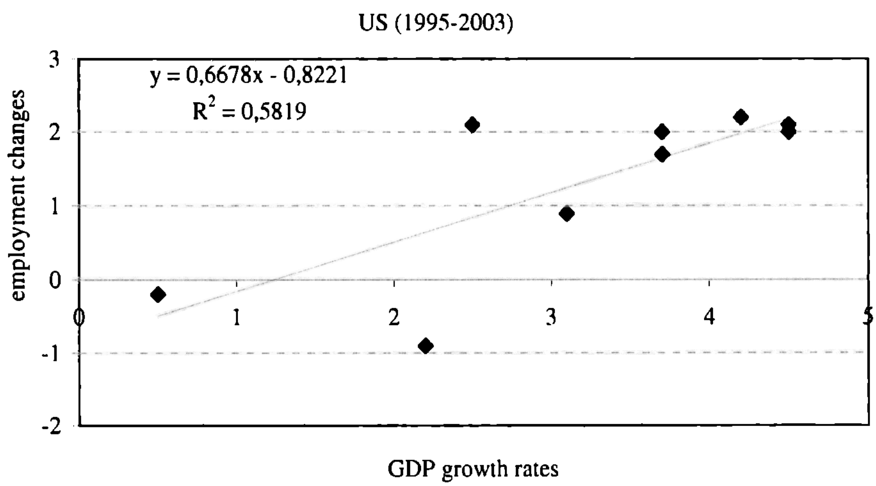


Fig. 11. The correlation between GDP growth and employment changes: UE-15 and US

Source: elaboration on Annual Macroeconomic Database (AMECO) based on ESA 95 national accounts.

4. Final Remarks

The main objective of this paper was to provide new empirical evidence and results about some questions of economic dynamics largely debated in recent years: is there evidence of a convergence process, across countries and/or regions, of basic real economic variables (*per capita* GDP and employment rates)? Is the relationship between real GDP growth and employment changes progressively vanishing or is rather changing its strength?

After having recalled some results of the recent theoretical and empirical literature, we first compared the GDP performance over the long-run of US and Europe. Considering the post-War periods, European growth rates have been below the US rates only in the most recent period 1992-2000. However, the faster EU economic growth in the previous period 1973-1992 has not been sufficient to lead to relevant convergence of European *per capita* GDP level with respect to the US standard. In the three decades (1970-2000) a strong convergence trend emerged with reference to productivity, largely compensated by the drop in the average of hours worked and in the employment rates. Looking at the most recent data (1995-2003), the productivity growth in the EU shifted below the US rate (where also the hours worked increased more), but showing a very diversified scenario across European Union countries.

As regards the real convergence processes, we highlighted a progressive reduction of the across countries disparities in per capita GDP during the period 1995-2002 among the EU-25 countries and 8 CEC-NM, while the diversification does not decrease for the restricted group of EU-15 and for the 12 monetary union members. The same outcomes emerged with regard to the catching up process (beta-convergence) where the EU-15 and EMU-12 show a convergence trend only among the richest countries. The regional level of analyses suggested diffused sigma- and beta-convergence trends (except inside the regions of the 8 new EU members of Eastern Europe), with the sectoral structure of the regional economies still playing a relatively relevant role.

As for the employment rate, a generalised improvement in the period 1997-2003 emerged for the large majority of the European countries, the only exceptions being some of the eastern European States still completing their long transition. Although the ER levels and dynamics should be considered also in the light of the importance of the hidden economy (Tab. A20) in the different countries, the outcomes represent an interesting feature considering the low growth rates of the period considered. In addition, a generalised sigma-convergence resulted for the EU-15 and EMU-12 (at both country and regional level), accompanied to a diverging trend starting in 1999 for the 8 CEC-NM (reinforced for the regional level). The catching up process (beta-convergence) occurred across the EU-15 countries (and their regions), while in the eight eastern countries the restructuring process (as witnessed by the conditional convergence estimates) still negatively affects their capacity to converge towards the average EU level.

With regard to the relationship between the two real variables, a strong (and persistent) positive correlation (co-movements) between employment change and GDP growth emerged in the EU-15 and the US areas. The (lower) EU growth in the period 1995-2003 has been significantly more effective in creating new jobs with respect to previous periods, but not compared to the US employment intensity of growth. The threshold of job-augmenting economic growth is, however, very diversified across European countries, as well as the employment elasticity to GDP growth.

The above empirical results suggested that, although the various growth and employment objectives established by the EU could be considered still very far, some recent European policy innovations cannot be considered neutral to the performance observed.

In particular, although a clear causal link is difficult to determine, the remarkable employment increases observed during the recent years of low EU economic growth have been (probably) favoured by the implementation of the European Employment Strategy (EES), an "open-method of co-ordination" characterised by the definition of quantitative objectives, with greater emphasis on net employment creation rather than unemployment reduction, and by the supply and updating of (general and specific) Employment Guidelines addressed to EU countries encouraging also "institutional" reforms regarding (i) the public and private employment services, (ii) the human capital investments (on-the-job training, life-long learning, etc.), (iii) the level(s) of employment policy implementation and of collective bargaining (decentralisation), (iv) the involvement of social parts and civil society (at national, regional and local level) and so on.

As for the other objective variable (GDP growth rates), the compared analysis highlighted that the poor EU performance in recent years is above all a matter of (labour) productivity, whose weak dynamic had remarkable consequences on competitiveness, especially when important economic actors (like China and India) speeded their integration into the world economy (globalisation). From the (European) economic policy point of view, the above situation calls for the set of instruments aimed at fostering productive and organisational innovations (i.e. R&D and human capital investment) and at improving the "external conditions" (i.e. material and non-material infrastructures) able to favour an increase of (total factor) productivity. In this sense, a more effective implementation of the "Lisbon Strategy", launched in 2000 and updated in 2005, is of crucial importance[25]. In fact, until now, the "Lisbon Agenda" has been implemented too slowly, especially in some countries[26] (Tab. 4).

Besides, it should be noted that the macroeconomic direct impact of the European-level economic policy interventions is conditioned by the weight and composition of EU budget: about 1% of European GDP, of which 0.4% still dedicated to agricultural sector[27]. So, it is important to achieve an improvement in the complex governance of the European multi-level economic policies, passing through a more effective implementation of the "open-method of co-ordination" according to the (vertical and horizontal) subsidiarity principle.

---

[25] In order to do that, the implementation of the recent reform of the "Stability and Growth Pact" (March 2005) should be linked to the national progresses towards the Lisbon objectives.

[26] An assessment of the national progresses on the implementation of the "Lisbon Agenda" is contained in: Murray, Wanlin (2005).

[27] Considering the positions of the main EU countries, a future increase of the EU budget is not expected. As for the changes in the composition of EU budget, the direction is quite clear, but the progresses are too slow.

Table 4. Number of Lisbon targets met in 2005 ("structural Indicators")*

15 "old" EU countries					
Sweden	12	Austria	5	Ireland	3
Denmark	9	Portugal	5	Italy	2
United Kingdom	7	Germany	3	Belgium	1
Finland	7	France	3	Luxembourg	1
Netherlands	6	Spain	3	Greece	0
10 "new" EU countries					
Cyprus	5	Czech Republic	2	Malta	1
Estonia	4	Slovakia	2	Hungary	1
Lithuania	4	Poland	2		
Latvia	2	Slovenia	2		

* Out of 17 quantifiable Lisbon targets.

Source: Centre for European Reform (2005).

Finally, with regards to the co-movements between GDP growth and employment changes, to the (across countries and over time) differences in "GDP growth threshold increasing-employment", and to the employment intensity of growth, further theoretical and empirical progresses are necessary in order to better understand the relationships and to depict the recent phenomenon of "job-rich low-growth" as structural or cyclical. In any case, some preliminary results address towards a closer integration between employment policies and development policies (especially as regards human capital investment) at all the different institutional levels of policy implementation (European, national, regional and local).

References

Abramovitz M. (1956), "Resource and Output Trends in the US since 1870", *American Economic Review*, 46: 5-23.

Abramovitz M. (1986), "Catching Up, Forging Ahead and Falling Behind", *Journal of Economic History*, 46, 2: 385-406.

Acocella N. (2001), *La politica economica nell'era della globalizzazione*, Carocci, Rome.

Barro R.J. (1991), "Economic Growth in a Cross Section of Countries", *Quarterly Journal of Economics*, 106: 407-443.

Barro R.J. (1997), *Determinants of Economic Growth*, Cambridge, MIT Press.

Barro R.J., Sala-i-Martin X. (1992), "Convergence", *Journal of Political Economy*, 100: 223-251.

Barro R.J., Sala-i-Martin X. (1995), *Economic Growth*, New York, McGraw Hill.

Barro R.J., Sala-i-Martin X. (1997), "Technological Diffusion, Convergence and Growth", *Journal of Economic Growth*, 2: 1-27.

Baker D., Schmitt J. (1999), *The Macroeconomic Roots of High Unemployment: The Impact of Foreign Growth*, Economic Policy Institute, http://www.epinet.org.

Baumol W.J. (1986), "Productivity Growth, Convergence and Welfare: What the Long Run Data Show?", *American Economic Review*, 76: 1072-85.

Bianchi M., (1997), "Testing for Convergence: Evidence from Non-parametric Multimodality Test", *Journal of Applied Econometrics*, 12, 393-403.

Blanchard O. (2004), "The Economic Future of Europe", *Journal of Economic Perspective*, 18, 4: 3-26.

Blinder A.S. (1997), "Is there a Core of Practical Macroeconomics that we Should all Believe?", *American Economic Review*, 87: 240-246.

Boeri T., Scarpetta S. (1996), "Regional Dimension of Unemployment in Central and Eastern Europe and Social Barriers to Restructuring", *Working Paper in Economics*, n. 95/17, Florence, European University Institute.

Boldrin M., Canova F. (2001), "Inequalities and Convergence in Europe's Regions: Reconsidering European Regional Policies", *Economic Policy*, 32: 205-245.

Borts G.H. (1960), "The Equalization of Returns and Regional Economic Growth", *American Economic Review*, 50: 319-47.

Borts G.H., Stein J.L. (1964), *Economic Growth in a Free Market*, Columbia University Press, New York.

Brasili C., Oppi M. (2003), "Convergenza economica delle regioni europee ed allargamento ad est", *Politica Economica*, n. 3.

Canova F., Marcet A. (1995), "The Poor Stay Poor: Non-convergence across Countries and Regions", *Discussion Paper* n. 1265, CEPR, London.

Caroleo F.E., De Stefanis S. (eds) (2005), *Regions, Europe and the Labour Market: Recent Problems and Developments*, Physica-Verlag, Heidelberg.

Caselli F., Esquivel G., Lefort F. (1996) "Reopening the Convergence Debate: A New Look at Cross Country Growth Empirics", *Journal of Economic Growth*, 1: 363-389.

CORIPE-IUSE (1999), *Rapporto sull'Unione Europea. L'Unione Europea: convergenza reale, integrazione e allargamento*, Department of Economics, University of Turin, Turin.

Crafts N.F.R., Toniolo G. (1996) (eds), *Economic Growth in Europe Since 1945*, Cambridge University Press, Cambridge (UK).

Dallago B., Brezinski H., Andreff W. (1990), *Convergence and System Change: The Convergence Hypothesis in the Light of Transition in Eastern Europe*, Dartmouth, Aldershot (UK).

Daveri F. (2003), "Europe's Productivity Slowdown Stems form Manufacturing, not from IT", *Working Paper*.

Durlauf S., Quah D. (1999), "The New Empiric of Economic Growth", in: J.B. Taylor and M. Woodford (eds), *Handbook of Macroeconomics*, North Holland Elsevier Science, Amsterdam.

Decressin J., Fatas A. (1995), "Regional Labour Market Dynamics in Europe", *European Economic Review*, 39: 1627-1655.

Dopke J. (2001), "The Employment Intensity of Growth in Europe", *Kiel Working Paper*, Kiel Institute of World Economics, n. 1021.

Erber G. (1994), "Verdoorn's or Okun's Law?", *German Institute for Economic Research Discussion Paper*, n. 98, Berlin.

European Commission (1993), *White Paper on Employment, Competitiveness and Growth*, Brussels.

European Commission (1995), *Green Paper on Innovation*, Brussels.

European Commission (2003), *Employment in Europe 2003*, Brussels.

European Commission (2004), *Employment in Europe 2004*, Brussels.

European Commission (2004), *Sapir Report*, Brussels.

EU Commission Staff Working Paper (2005), *Working Together for Growth and Jobs. Next Step in Implementing the Revised Lisbon Strategy*, Brussels.

European Union (1992), *Maastricht Treaty*, Maastricht.

European Union (1997), *Amsterdam Treaty*, Amsterdam.

European Union (1997), *Luxembourg European Council*, Luxembourg.

European Union (2000), *Lisbon European Council*, Lisbon.

European Union (2001), *Stockholm European Council*, Stockholm.

European Union (2005), *Brussels European Council*, Brussels.

Eurostat (various years), *Employment and Labour Market in Central European Countries*, Detailed Tables, Brussels.

EU (2004), "Delivering Lisbon. Reforms for the Enlarged Union", *Report of the Commission to the Spring European Council*, Brussels.

Faini R. (2004), "Europe: A Continent in Decline?", mimeo.

Flaig G., Rottmann H. (2000), "Input Demand and the Short- and the Long-Run Employment Thresholds. An Empirical Analysis for the German Manufacturing Sector", *CESifo Working Paper*, n. 264.

Frey L. (1994), "Lavoro e eenessere. La costruzione di indicatori sociali", *Quaderni di Economia del Lavoro*, 49-50.

Gabrisch H. (2005), "The Employment-GDP Intensity in New Member Countries and Its Causes. An Empirical Analysis", mimeo.

Garibaldi P., Mauro P. (2002), "Anatomy of Employment Growth", *Economic Policy*, 1: 67-113.

George D.A.R., Oxley L., Carlaw K.I. (eds) (2004), *Survey in Economic Growth. Theory and Empirics*, Blackwell Publishing, Oxford.

Grossman G.M., Helpman E. (1991), *Innovation and Growth in the Global Economy*, MIT Press, Cambridge (Mass).

Haltiwanger J., Lehmann H., Terrel K. (2003), "Symposium on Job Creation and Job Destruction in Transition Countries", *Economic of Transition*, 11: 205-219.

Islam N. (2004), "What Have we Learnt from the Convergence Debate?", in: D.A.R. George, L. Oxley, K.I. Carlaw (eds), *Survey in Economic Growth. Theory and Empirics*, Blackwell Publishing, Oxford.

Kaldor N. (1957), "A Model of Economic Growth", *Economic Journal*, December.

Lee J. (2000), "The Robustness of Okun's Law: Evidence from OECD Countries", *Journal of Macroeconomics*, 22: 331-356.

Leonardi R. (1998), *Coesione, convergenza e integrazione nell'Unione Europea*, Il Mulino, Bologna.

Malinvaud E. (1996), "Growth and Employment in the European Perspective", *Finish Economic Papers*, 9: 6-17.

Mankiw N.G., Romer D., Weil D. (1992), "A Contribution to the Empirics of Economic Growth", *Quarterly Journal of Economics*, 107: 407-437.

Maddison A. (1982), *Phases of Capitalist Development*, Oxford University Press, Oxford.

Maddison A. (1987), "Growth and Slowdown in Advanced Capitalist Economies: Techniques of Quantitative Assessment", *Journal of Economic Literature*, 25: 649-698.

Maddison A. (2001), *The World Economy. A Millennium Perspective*, OECD, Paris.

Marelli E. (2000), "Convergence and Asymmetries in the Dynamics of Employment: The Case of European Regions", *Jahrbuch für Regionalwissenschaft/Rev. Reg. Res.*, 20: 173-200.

Marelli E. (2004), "Evolution of Employment Structures and Regional Specialisation in the EU", *Economic Systems*, 28: 35-59.

Marelli E. (2005), "Regional Employment Dynamics in the EU: Structural Outlook, Co-movements, Clusters and Common Shocks", in: F.E. Caroleo, S. De Stefanis (eds), *Regions, Europe and the Labour Market: Recent Problems and Developments*, Physica-Verlag, Heidelberg.

Martin R., Tyler P. (1995), "Regional Employment Evolutions in the European Union: A Preliminary Analysis", *Regional Studies*, 34: 601-616.

Molle W. (1997), "The Regional Economic Structure of the European Union: An Analysis of Long Term Developments", in: K. Peschel (ed.), *Regional Growth and Regional Policy within the Framework of European Integration*, Physica-Verlag, Heidelberg, pp. 66-86.

Moro B. (1998) (ed.), *Sviluppo economico e occupazione*, Franco Angeli, Milan.

Murray A., Wanlin A. (2005), *The Lisbon Scorecard V. Can Europe Compete?*, Centre for European Reform, London.

Nelson R.R., Phelps E.S. (1966), "Investment in Humans, Technological Diffusion and Economic Growth", *American Economic Review*, 56: 69-75.

OECD (various years), *Employment Outlook*, Paris.

Okun A. (1970), "Potential GDP: Its Measurement and Significance", in: A. Okun (ed.), *The Political Economy of Prosperity*, Washington D.C.

Overmans H.G., Puga D. (2002), "Unemployment Clusters across Europe's Regions and Countries", *Economic Policy*, 34: 115-147.

Prachowny M.J.F. (1993), "Okun's Law: Theoretical Foundations and Revisited Estimates", *The Review of Economics and Statistics*, 30: 331-336.

Padalino S., Vivarelli (1997), "The Employment Intensity of Growth in the G-7 Countries", *International Labour Review*, 136: 199-213.

Palley T.A. (1993) "Okun's Law and the Asymmetric and Changing Cyclical Behaviour of the USA Economy" *International Review of Applied Economics*, 7: 144-162.

Perugini C., Polinori P., Signorelli M. (2005) "GDP Growth and Employment in EU Members' Regions: Convergence Dynamics and Differences for Poland and Italy", *EACES Working Papers*, n. 2.

Perugini C., Signorelli M. (2004), "Employment Performance and Convergence in the European Countries and Regions", *European Journal of Comparative Economics*, n. 2.

Perugini C., Signorelli M. (2005), *Employment and Unemployment in the Italian Provinces*, AISRe, Naples.

Prachowny M.J.F. (1993), "Okun's Law: Theoretical Foundations and Revisited Estimates", *The Review of Economics and Statistics*, 30: 331-336.

Quah D., (1996a), "Regional Convergence Cluster across Europe", *European Economic Review*, 40: 951-958.

Quah D., (1996b), "Empiric for Economic Growth and Convergence", *European Economic Review* 40: 1353-1375.

Raspadori F., Signorelli M. (2005), "L'Unione Europea tra Allargamento e Trattato Costituzionale", April, Giappichelli Editore, Turin.

Revenga A.L., Bentolila S. (1995), "What Affects the Employment Intensity of Growth?", *Discussion Paper Bank of Spain*, n. 9517.

Rodano G. (2004), "Il mercato del lavoro nella storia del pensiero economico", mimeo.

Roncaglia A., (2004), "Tasso di disoccupazione e tassi di occupazione: categorie statistiche o costruzioni teoriche?", mimeo.

Sala-i-Martin X. (1996), "Regional Cohesion: Evidence and Theories of Regional Growth and Convergence", *European Economic Review*, 40: 1325-1352.

Sapir A. (ed.) (2004), *An Agenda for Growing Europe: The Sapir Report*, Oxford University Press, Oxford.

Scarpetta S. (1995), "Regional Economic Structures and Employment in Central and Eastern Europe: An Attempt to Identify Common Patterns", in: S. Scarpetta, A. Worgotter (eds), *The Regional Dimension of Unemployment in Transition Countries: a Challenge for Labour Market and Social Policy*, Paris, OECD.

Signorelli M. (1997), "Uncertainty, Flexibility Gap and Labour Demand in the Italian Economy", *Labour*, 1: 141-175.

Solow R.M. (1956), "A Contribution to the Theory of Economic Growth", *Quarterly Journal of Economics*", 70: 65-94.

Solow R.M. (1970), *Growth Theory: An Exposition*, Cambridge University Press, London.

Solow R.M. (1994), "Perspectives on Growth Theory", *Journal of Economic Perspectives*, 8: 45-54.

Solow R.M. (2000), "Unemployment in the United States and in Europe: A Contrast and the Reasons", *CESifo Working Paper.*
Svejnar J. (1999), "Labor Markets in the Transitional and Central Eastern European Economies", in: O. Ashenfelter and D. Card (eds), *Handbook of Labor Economics*, vol. 3, North-Holland.
Swan T.W. (1956), "Economic Growth and Capital Accumulation", *Economic Record*, 32, 63: 334-361.
Schneider F., Enste D. (2000), "Shadow Economies: Size, Causes and Consequences", *The Journal of Economic Literature*, 38: 77-114.
Tronti L. (2002), "Fruitful or Fashionable? Can Benchmarking Improve the Employment Performance of National Labour Markets?", in: E. Best, D. Bossaert (eds), *From Luxembourg to Lisbon and Beyond: Making the Employment Strategy Work*, EIPA, Maastricht.
Valli V. (1970), *Programmazione e sindacati in Italia*, Franco Angeli, Milan.
Valli V. (2002), *L'Europa e l'economia mondiale*, Carocci, Rome.

KONWERGENCJA REALNA I EFEKTYWNOŚĆ ZATRUDNIENIA A WZROST GOSPODARCZY. ANALIZA EMPIRYCZNA KRAJÓW I REGIONÓW UNII EUROPEJSKIEJ

Streszczenie

Począwszy od *Białej księgi* na temat wzrostu, konkurencyjności zatrudnienia (1993) poprzez europejską strategię zatrudnienia (1997) oraz strategię lizbońską (2000) wskazuje się dwa zasadnicze cele określane na poziomie europejskim: wzrost PKB oraz wzmocnienie działań dotyczących zatrudnienia i wzrostu.

W pracy omówiono zagadnienie konwergencji i relacji PKB *per capita* (poziom i dynamika) oraz wskaźnika zatrudnienia (poziom i dynamika) w krajach i regionach Unii Europejskiej.

W ostatnim dziesięcioleciu znacznie zwiększyła się liczba prac teoretycznych i empirycznych poświęconych zagadnieniom realnej konwergencji. W celu lepszego prześledzenia sytuacji w ostatnich latach przedstawiono najpierw krótki przegląd literatury z zakresu teoretycznych i empirycznych zagadnień realnej konwergencji oraz relacji wzrostu gospodarczego i zatrudnienia (bezrobocia) (cz. 2). W części 3 opracowania, wykorzystując dane Eurostatu dotyczące sytuacji w regionach w latach 1995-2003, dokonano analizy porównawczej poziomu i zmienności PKB *per capita* oraz wskaźnika bezrobocia w UE 25 oraz analizy konwergencji w ujęciu EU 25, UE 15, EMU 12 oraz w 8 nowych krajach członkowskich – w odniesieniu do regionów statystycznych zdefiniowanych na poziomie NUTS 1 (wskaźnik konwergencji sigma oraz najmniejszej – beta) i na poziomie NUTS 2 (wskaźnik konwergencji sigma oraz absolutny i warunkowy wskaźnik beta). Poza tym w odniesieniu do krajów UE 15 przeprowadzono wstępną analizę korelacji między PKB i zatrudnieniem oraz między intensywnością zatrudnienia i wzrostem gospodarczym w tym samym okresie, czyli w latach 1995-2003.

Niektóre najważniejsze wnioski wskazują na (1) duże zróżnicowanie sytuacji w UE (pod względem poziomu PKB, wskaźnika wzrostu PKB, poziomu i wskaźnika zatrudnienia), (2) istnienie wśród krajów i regionów grupy krajów i regionów podobnych oraz zróżnicowanych, (3) zauważalne różnice między wzrostem PKB i zmianami zatrudnienia oraz między intensywnością zatrudnienia i wzrostem gospodarczym.