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**Growth under strain in the European Union:
A long run perspective**

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Growth under strain in the European Union: A long run perspective

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This paper interprets the GDP growth experienced by the economies of the European Union in the perspective of the growth and the agglomeration models. The objective consists in understanding to what extent the growth and convergence paths followed by Europe during the last decades of economic integration process have been affected by the evolution of the exchange rate regime and by increasingly constraining monetary and fiscal policies.

KEYWORDS: growth, beta and sigma convergence, human capital, European Union

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1. Introduction

In the words of Gary Becker (2002), “(t)echnology may be the driver of a modern economy, especially of its high-tech sector, but human capital is certainly the fuel”. I will argue that Europe has overlooked this matter of fact. During the 1990s, labour productivity in the EU-15 joined per capita income in loosing ground with respect to the United States. The view is widely shared that the main reason was a disappointing TFP growth. Moreover, the rupture provoked by the present crisis in the growth process of the EU-27 economies, and the huge trade imbalances which has opened during the first ten years of the European Monetary Union (hereafter, EMU) between the Core and the Periphery countries, adds further clouds in the picture of almost two decades of slow increases in per capita income.

The paper is organized as follows. In section 2, the per capita income gap of the European Union *vis-à-vis* the United States (hereafter, US) is scrutinized. Section 3 evaluates to what extent the convergence paths followed by the Western and the Central and Eastern European countries match with the predictions of the Solow growth model. Section 4 examines the heterogeneous evolution of per capita income across the European nations and regions, according to the analytical instruments provided by the theories of endogenous growth. Section 5 concerns the real divergence problem which the EMU countries are facing. Section 6 concludes.

2. Fifty years of economic growth in the European Union and the United States

As well-known, the formalisation of economic growth theory was started by the neoclassical model set up by Solow (1956) based on the assumption of diminishing returns. Once the saving rate can no longer sustain the accumulation of capital and labour, each economic system is supposed to converge to the stationary state where growth is nil. By virtue of their initially smaller capital-labour ratio, the low-per-capita-income economies, expand at a faster rate than the high-per-capita-income economies, and eventually catch-up the most advanced economies.

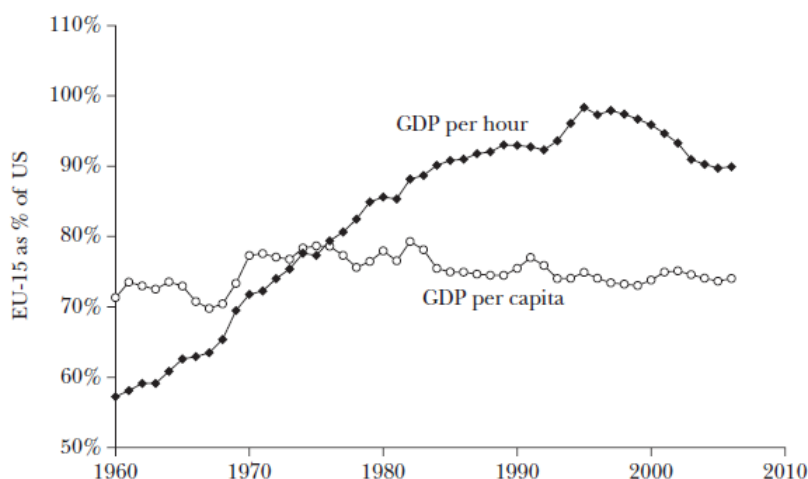
Empirical evidence does not support the conception of the growth process put forward by the Solow model. Figure 1 clearly portrays the lack of a pattern of convergence of the European Union *vis-à-vis* the United States per capita income since 1960¹. Figure 1 also shows that the productivity

¹ The acronym for the various groupings of the European Union are the following: for the 15 Member States before 1 May 2004 (BE, DK, DE, EL, ES, FR, IE, IT, LU, NL, AT, PT, FI, SE and UK) it is EU-15; for the ten countries that joined the EU on 1 May 2004 (CZ, EE, CY, LT, LV, HU, MT, PL, SI, SK) it is EU-10; adding to this group BG and RO, that joined the EU on January 1, 2007 it is EU-12; for the whole European Union it is EU-27; for the European

gap between the two narrowed from 25% in 1973 to 2% only in 1995, by virtue of an average annual labour productivity growth in the European Union (2.4%) twice as fast as in the United States (1.2%). The gap then widened again to almost 10% in 2008 (see Table 1).

Figure 1

Total Economy GDP per Hour Worked and GDP per Capita in EU-15, 1960–2006
(relative to the United States)



Source: The Conference Board and Groningen Growth and Development Centre, Total Economy Database.

The origin of this break experienced by the European growth process has been carefully investigated (Blanchard, 2006). The exceptional growth rates of post-war Europe were due to high investment rates imitating and developing innovations mainly from the US, which rapidly decreased unemployment rates and lifted both productivity and wage levels. The distributive conflict between capital and labour, following the 1973-74 enormous rise in oil price, negatively impinged on investment projects. During the 1975-85 decade of high inflation created by the wage-price spiral, capital intensity increased due to the introduction of labour-saving techniques. During the 1985-95 decade, the agreement to abolish competitive devaluations and pursue a process of monetary integration aimed at achieving the “common good” of convergence to low inflation required a switch to anti-inflationary monetary policies. Due to the long period of high real interest rates, firms slowed down the implementation of investment projects, so that the introduction of technical progress in the manufacturing sectors was severely delayed. In the European Union prior the last

Monetary Union, the today fifteen Member States having adopted the single currency, (BE, DE, EL, ES, FR, IE, IT, CY, LU, MT, NL, AT, PT, FI, SL), it is EMU.

two enlargements (hereafter, EU-15) the rate of expansion of output progressively reduced, so that the catching-up process was stuck since the 1990s at around 70% of the US level (see Figure 1).

The failure of the Solow model to account for these developments is easy to explain. The “residual”, that is the share of per capita GDP growth that in the growth accounting of real economies cannot be attributed to the contribution of the capital and labour factors has been named total factor productivity (hereafter, TFP), the improved efficiency in the combination of factors of production. The new generation of “endogenous growth” models was dedicated to move the theoretical research from the convergence process towards the stationary state towards the consideration of increasing returns to scale, whereby technical progress growing at the same rate of labour efficiency allows the capital per unit of labour efficiency to remain constant. Knowledge and human capital² are then supposed to feed the growth in total factor productivity (hereafter, TFP) through the discovery and adaption of new ideas and innovations capable to endogenously propagate capital accumulation. According to this rationale, innovations push the leading economies to continuously move the technological frontier forward, thus defeating the Solovian view of a smooth catching-up process by the backward economies.³

This analytical framework applies to the US better than to the European economy. In fact, the three knowledge economy components summarised in last row of Table 1, respectively expressing high-skill to low-skill workers ratio, investment in ICT, and TFP growth, witness that the EU-15 does not favourably compare with the United States. In the decade 1995-2004, the resurgence of productivity growth in the United States was a combination of high levels of investment in ICT starting from mid-1990s and of the rapid productivity growth in the market services sector starting during the 2000s. In the EU-15, instead, a much weaker growth in TFP in the whole period 1980-2004 – as well as the ICT investments and the ratio of high-skill to low-skill workers exhibiting much lower growth rates than in the US after 1995 - make it clear that a labour productivity growth higher-than-in-the-US in the 1980-1995 period had not been due to a more educated labour force combined with more innovative physical capital. Quite on the contrary, it was the effect of a structurally low participation rate combining with the declining employment rate provoked by the excessively restrictive macroeconomic policies of the two decades in which the European monetary

² Human capital consists of a further input to the production process along with physical capital and unskilled labour, or as the increase in the number of high-education workers, employed as researchers in R&D laboratories, with respect to those employed in the production sites (Mankiw, Romer and Weil, 1992, Romer, 1986 and 1990; Aghion and Howitt, 1992)

³ Economic growth is obviously at the cross-road of the most important interconnections among economic variables. In particular, the fundamental role played by political institutions (Acemoglu et al., 2008, Hausmann et al., 2006), trade (Helpman, 2010), and undervalued exchange rates (Rodrik, 2008), in accelerating growth in low-per-capita-income countries, should not be overlooked.

integration (1979-99) was carried out.⁴ Job creation revived from mid-1990s onwards - mainly, in Spain and in Italy - because the softening in labour market regulation allowed an increase in temporary contracts. However, the EU-15 growth rates have continued to be unsatisfactory: the unemployment rates were substantial also before the present crisis, and a hourly productivity higher in EU-15 than in the US was almost completely offset by the reduction in the number of hours worked.⁵

These developments explain why the contribution of capital deepening to labour productivity growth, in particular of information and communications technology per working hour, has been lower in the EU-15 than in the US. The depressing performance of Europe as for TFP growth was not only the consequence of little innovation in sectors specialised in technology, but also of the lack of the diffusion of new technologies in the user manufacturing sectors (von Ark *et al.*, 2008). Being short of a significant impact of innovative capital on labour productivity growth, the EU-15 economies are also more vulnerable to negative shocks. In fact, starting from the mid-1990s the impact of technological progress on the TFP in the United States consisted into increases both in labour productivity and in employment. On the contrary, in the EU-15 a negative business cycle causes an enduring decline in labour productivity, as the market adjustment through job cuts is prevented by employment protection legislation, and the employment and output recovery after a recession often reflects a lower labour productivity.

A recent line of research in endogenous growth theory nicely mirrors the catching-up process of the Western EU economies followed by the Central and East European countries (hereafter, CEEC). According to these models (e.g., Acemoglu, Aghion, and Zilibotti, 2006), countries closer to the world technology frontier follow an innovation-based strategy characterised by the leading role of science-based companies and by a clever selection of firms and managers. Technologically backward countries instead pursue an investment-based strategy, which relies on capital accumulation through the imitation of innovations and their diffusion in the manufacturing firms. Moreover, these models easily account for the increasing importance that FDI have been gaining in the development of regional currency areas.

⁴ The participation in the labour market and the employment rate has increased in the US much more than in the EU-15 during the 1990s. This is in part explained by higher population growth in the US (almost three times as much as in the EU). In particular, the employment rates of women, the young and the elderly in the EU-15 are lower than in the US for some decades now. The largest difference can be found in the services sector. This disadvantage affects both high and low skilled workers, but is more pronounced for women and the elderly. However, in the second half of the nineties, the employment rate outgrew US levels in Denmark, the United Kingdom, in Sweden (with the strong increase of high-skilled workers), and in the Netherlands (with the increase of part-time jobs).

⁵ The working hours per employed fell in EU-15 from 100% to 76% of the US level from 1970 to 1995. During the 2000s the increase in working hours was smaller in the US *vis-à-vis* the EU-15, but still the average number of annual worked hours per capita has been fluctuating around 1600 in Europe against 1900 in the US, which was deemed a clue that Europeans have a preference for leisure over the utility of income higher than the US citizens (Blanchard, 2004).

Given the backwardness of the CEEC *vis-à-vis* Western Europe, their adhesion to the EU in 2004 and 2007 has not changed much the overall labour productivity gap between the EU-27 and the US. However, labour productivity of the CEEC has been catching up fairly well (starting from an initial level lower than in any of the EU-15 countries, in Bulgaria and Romania more than elsewhere) also through the technological upgrading of the productive structure following large FDI mainly from neighbour countries. During the decade 1995-2005, the real wage increased in the CEEC by 3,5% per year against a meagre 1% in the EU-15. The employment performance is not as satisfactory, because labour markets are characterised by a lower average participation rate – around 65%, against the 73% for the EU-15 – and a higher structural unemployment level.

Table 1

Contributions to Growth of Real Output in the Market Economy, European Union and the United States, 1980–2004
(annual average growth rates, in percentage points)

		<i>European Union</i>		<i>United States</i>	
		<i>1980–1995</i>	<i>1995–2004</i>	<i>1980–1995</i>	<i>1995–2004</i>
1	Market economy output (2) + (3)	1.8	2.2	3.0	3.7
2	Hours worked	−0.6	0.7	1.4	0.6
3	Labor productivity (4) + (5) + (8)	2.4	1.5	1.5	3.0
Contributions from					
4	Labor composition	0.3	0.2	0.2	0.3
5	Capital services per hour (6) + (7)	1.2	1.0	0.8	1.3
6	ICT capital per hour	0.4	0.5	0.5	0.8
7	Non-ICT capital per hour	0.8	0.5	0.2	0.4
8	Multifactor productivity	0.9	0.3	0.5	1.4
Contribution of the knowledge economy to labor productivity		1.6	1.1	1.3	2.6
(4 + 6 + 8)					

Source: EU KLEMS data base

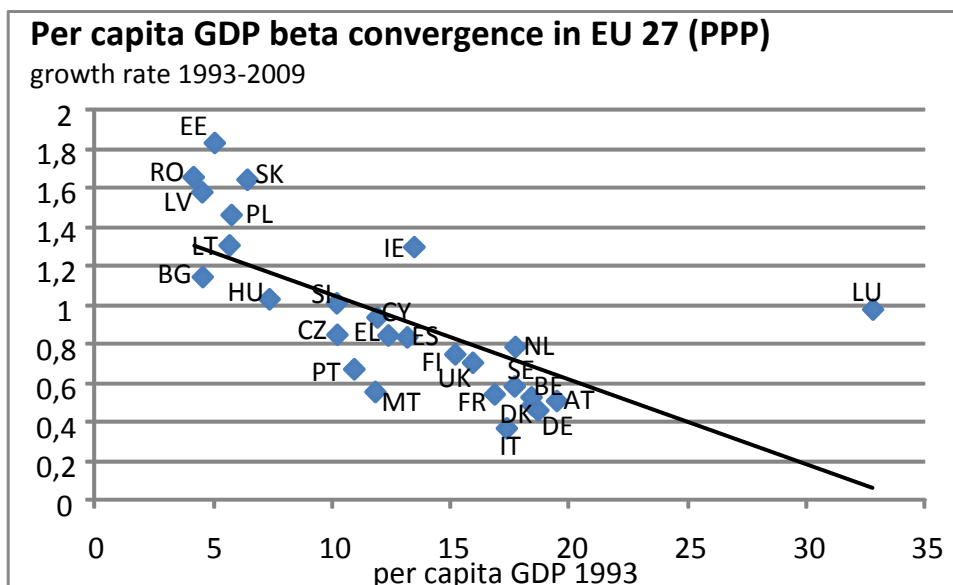
Europe does not favourably compare with the US in the service sector either, especially because of a slower adaption of innovations in the more dynamic sectors of the EU-15 economies. The most important reason is that - being more specific to each firms than innovations embedded in physical capital - innovations in services are more difficult to imitate. In public utilities, where privatisation reforms have been launched by many EU-15 governments with no previous liberalization, efficiency has failed to improve as private monopolies have often replaced public monopolies. Moreover, the passage to more competitive markets and the search for higher productivity are delayed by State aid to domestic public companies. In the market services sector (trade, hotels and

restaurants, transport services, financial and business services, and social and personal services), only the Netherlands and the United Kingdom show increases in productivity growth as large as in the United States (von Ark et al., 2008). In particular, in many of the EU-15 economies, government regulations protecting the small shopkeepers cause the retail sector's productivity growth to lag behind the US.

3. Beta convergence across the EU-15 and the EU-12 economies

In the empirical estimates of economic growth, the Solovian mechanism of catching-up is tested through the so-called Barro regressions, where the per capita GDP of the initial year is regressed on the average per capita GDP growth rate of the following period, and a negative beta coefficient signals that a catching-up process has been going on. In fact, the higher the value of the negative beta coefficient in a Barro regression, the faster convergence. In Figure 2 the Solovian view is reflected by the negative correlation between the EU-27 countries' per capita income growth rates 1993-2009 and their initial per capita GDP at 1993 (in Figures 2,3,4, values on the horizontal axis are expressed in thousand Euros).

Figure 2

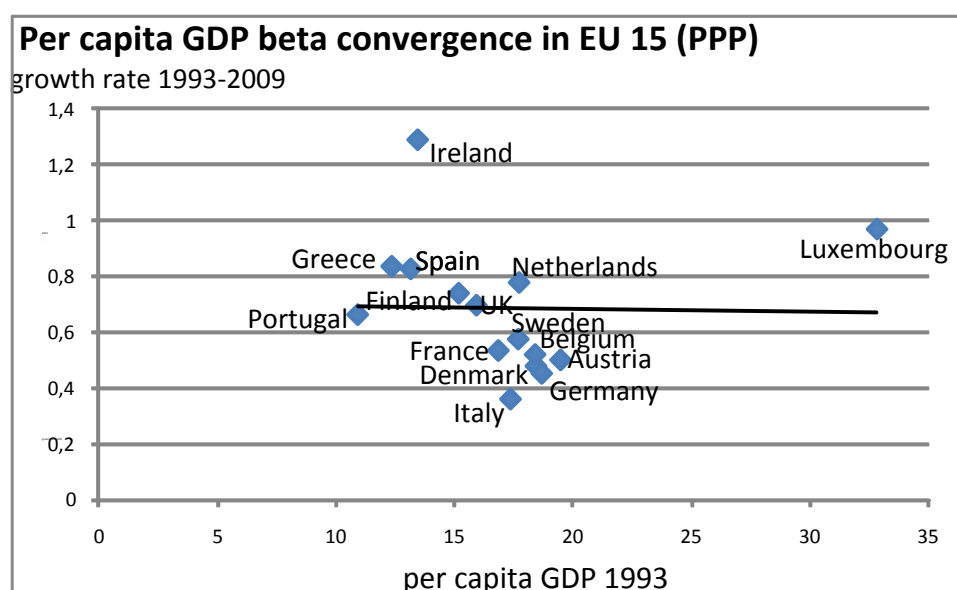


Source: Own calculations on AMECO database.

At a first glance, the Solow model's main insight – the predicted catching-up of the backward economies – would seem to apply to the European integration process. The hint is that after each of the six EU enlargements⁶ an improvement in convergence speed has manifested, possibly because the new entrants often held a per capita income lower than that of the standing member countries.

As for the other main tenet of the Solow model, the convergence of all economies to the stationary state, it has always been clear that this prediction was not going to emerge from the world GDP statistics. The concept of conditional convergence was then introduced, that is different growth paths leading to different Solovian steady states in different clusters of economies, each one representing different initial conditions as for the saving rate or the capital-output ratio.⁷ We may then be interested in detecting what has been the speed of convergence of the cluster of the EU-15 economies, whose growth rate has often been conditioned by the common macroeconomic guidelines devised for the objectives of the single market and the single currency.

Figure 3



Source: Own calculations on AMECO database.

⁶ The European Community was founded in Rome, in March 1957, by (West) Germany, France, Italy, the Netherlands, Belgium and Luxembourg. The first enlargement took place in 1973, when Denmark, Ireland and the United Kingdom entered. In 1981 Greece followed. In 1986 switched to the European Union also the other two nations who have been participating in the EFTA (UK, Ireland, Denmark, Spain, and Portugal). Austria, Finland and Sweden adhered in 1998. The 2004 enlargement saw the accession of five CEEC countries (Poland, Hungary, Slovenia, Czech Republic and Slovakia) plus Malta and Cyprus. Finally, other two CEEC, Romania and Bulgaria, joined the EU in 2007.

⁷ Baumol (1986) was the seminal article. To permit heterogeneity across countries in reaching the Solovian steady state, also a variety of socio-economic and political variables possibly influencing the growth performance have been taken into account (Barro, 1991).

The response is striking. The slope of the beta in Figure 3 is barely negative. The comparison with the beta coefficient for the EU-27 in Figure 2 suggests that the convergence process within the much smaller cluster of EU-15 countries has been very slow. However, it should also be taken into account that the picture is affected by the peculiar growth rate in two outliers, Luxembourg and Ireland. The growth performance of Luxembourg is biased by the disproportionate weight of the financial sector in the GDP, with a huge amount of returns accruing to foreigners. Ireland instead stand out as the best performer for catching-up within the European integration process. During the 1990s this country, whose EU membership dates 1973, manifested growth rates as high as 6-8% per year, so that its per capita income growth rate rocketed to one of the first positions in the EU ranking.

However, the growth performance of Ireland can be considered an example of successful Solovian convergence up to a point. Looking at the evolution of this country, there are two reasons for being cautious about the common judgement of Ireland as the proof of an inverse correlation between the initial per capital income of a country and its subsequent higher growth relative to the richer countries. First, the Irish growth was triggered by factors different from the ones featured by that model. The strategy of fiscal competition put forward by Ireland, with tax rates as low as 12.5 % on capital, has attracted FDI and financial capital inflows (specifically, in pharmaceuticals, information technology, and service sectors) allowing a very high employment rate of a young and low-wage labour force. Second, Ireland's high per capita income is nowadays rolling back. The euphoria generated by the huge raise in per capita income has triggered a hazardous boom in credit creation. The burst of the housing bubble has led many banks to insolvency. The following severe recession has resulted in wage cuts, a huge rise in unemployment, and in a harsh fiscal restriction to reduce a rapidly rising public deficit / GDP ratio.

Public policies, both at the national and at the Brussels level, may also help clarify why the convergence documented by the negative correlation for the EU-27 economies sketched in Figure 2 is much stronger than the convergence for EU-15 economies presented in Figure 3. The scope for State intervention in the EU economies is fiercely debated among economists.⁸ Whether does a causality nexus between much less “activism” in the EMU than in the US as for macroeconomic policies of stabilization and the growth path of the EU-15 economies is a very debated question,

⁸ Structural rigidities in goods' market as a determinant of the low employment rates in the EU-15 economies (Blanchard and Giavazzi, 2003) has been contended by regressions showing that the positive correlation between an index of product market regulations and EU-average productivity growth is void of statistical significance (De Grauwe, 2009). A popular, but also controversial, hypothesis is that high marginal tax rate on labour, combined with a high elasticity of labour supply to wages (net of taxes), cause the labour supply to fall (Prescott, 2004).

too.⁹ The efficacy of national fiscal policies in output stabilization has been estimated inadequate in the EU-15 and even weaker in the CEEC (Farina and Tamborini, 2003).

As to the impact of the Structural Funds on the growth path of backward economies, a clear path of convergence in the European Union was shown by Ireland, for shorter periods by Spain, and, to a lesser extent, by Greece and Portugal. In the initially relatively poor southern countries, after joining the EU in the 1980s, nearly all regions benefitted from the financing of the EU programmes. It is not easy to assess whether their autonomous catching-up efforts were most valuable, or the support of the European integration policies has been crucial in sustaining the high growth rates enjoyed by these countries. A fair guess is that the success of the financial support provided by the EU budget is conditional on the receptiveness of the economic environment in the backward areas (Cappellen et al., 2003).¹⁰

4. Sigma convergence and divergence across the European nations and regions

The most radical departure from the constant returns to scale paradigm of growth theory was implied by the diminishing returns of the capital and labour inputs stemming from the introduction of imperfect competition markets. The New Economic Geography approach underlines the central role of agglomeration factors (universities, R&D laboratories, etc.) in fostering the territorial concentration of companies attracted by the high level of human capital of workers, researchers and managers (Krugman, 1991). Since technical progress is a not-completely-excludable non-rival public good, the incentive of expected profits is preserved by the appropriability of innovations within networks of firms, through patents and the spreading over of technical progress by the *learning by doing*. Hence, production districts exhibit increasing returns to scale, with social returns to investment exceeding private returns to investment (Vandenbussche, Aghion e Meghir, 2006).

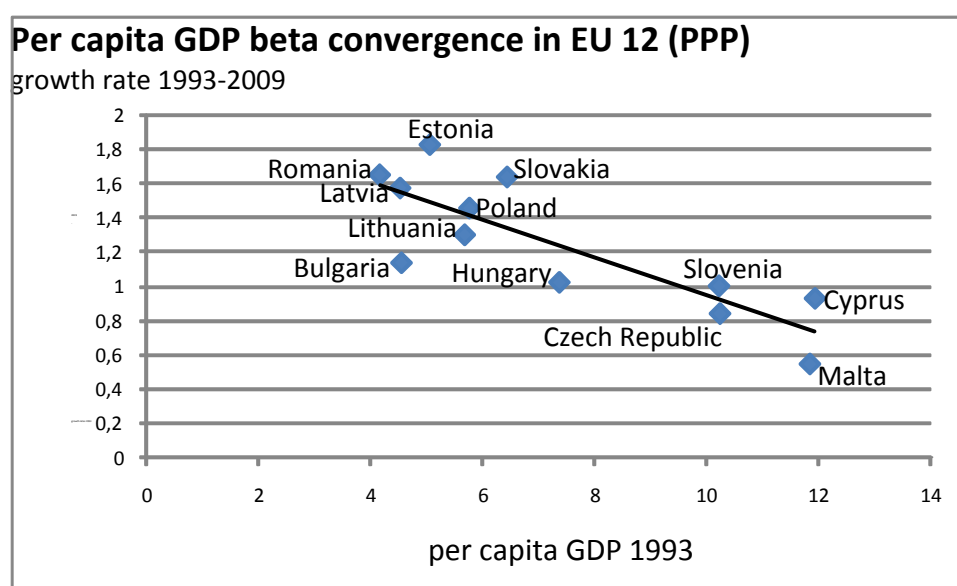
Figure 4 is a case in point. Differently from the EU-15 cluster exhibiting a lack of catching-up, this figure shows a pattern of fast convergence among the EU-12 countries, essentially the CEEC,

⁹ During recessions, the ECB monetary policy is much less accommodating than the Fed, and the Stability and Growth Pact forces national fiscal policies to the stabilization or the decumulation of the public debt thus impeding a prompt and substantial expansionary fiscal impulse (the poor fiscal stimulus decided by almost all EU-15 governments after the recession started in 2008 is a case in point).

¹⁰ According to the European Commission, cohesion policies should be reformed according to the subsidiarity principle that is entrusting to the EU countries the equalization among the regions of the European Union. Two are the main reasons for this change. First, national governments are asked to resume responsibility for distributing the Structural Funds to their developing regions, so to better monitor and prevent the phenomenon of “moral hazard” in the utilization of these financial resources (Boldrin and Canova, 2001). Second, the new member countries are going to receive the largest part of these transfers, so that the conflict on the fewer available funds is bound to intensify as many developing regions of the EU-15, that currently benefit from the Structural Funds, will exit from the programme (Sapir et al., 2004).

of the last two enlargements. The scale on the vertical axis in Figure 4 makes it clear that the slope for the EU-12 is steeper than that for the EU-27 in Figure 2. A higher value of the negative correlation between the initial per capita GDP and the subsequent average per capita GDP growth rate for the CEEC economies probably reflects strong similarities in both their productive structures and institutional characteristics. The concept of conditional convergence then seems to be appropriate for insulating the CEEC cluster's catching-up within the overall EU-27 growth path, as it was previously observed also for the overall convergence among the EU-27 economies.

Figure 4



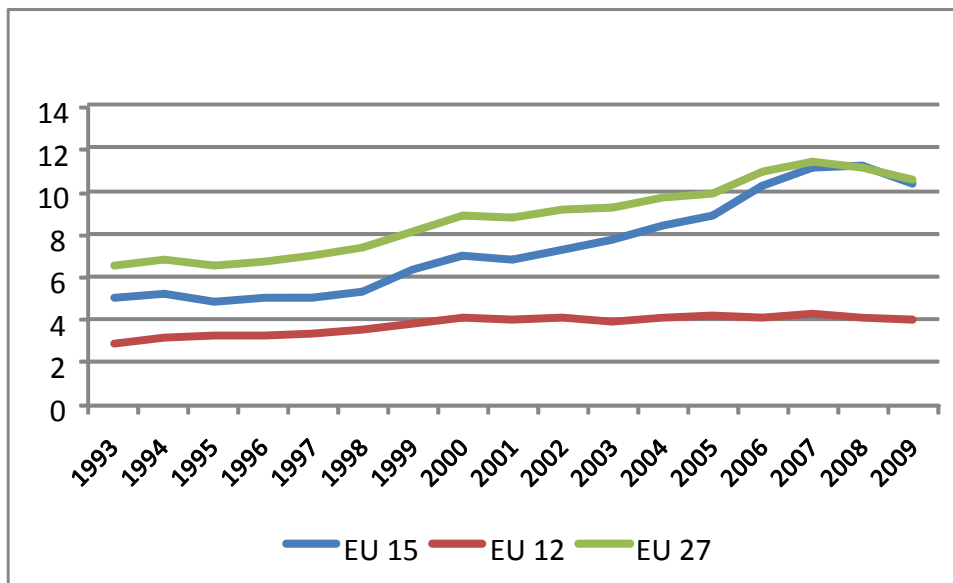
Source: Own calculations on AMECO database.

A further clue in the same direction emerges from Figure 5. This graph presents - for the EU-27, as well as for EU-15 and EU-12 subgroups - the evolution of sigma convergence, that is the year by year standard deviation across per capita GDP, indicating whether business cycle cohesiveness favours a similar pattern of growth in a cluster of economies. In the period from 1993 to 2008, the standard deviation progressively increases for the EU-15, while remains on the average constant for the EU-12 after an initial decrease. The much flatter index of dispersion of per capita GDP exhibited by the CEEC suggests that the effort to catch-up with the richer EU-15 did not affect the growth paths of the CEEC through smaller or larger distances among their GDP year by year variations. From this evidence of an almost constant sigma convergence (Figure 5) and a beta convergence (figure 4) faster among the national economic systems of the CEEC than within the

whole European Union, one could be tempted to conclude in favour of a appraisal of growth in terms of conditional convergence across European economies.

Figure 5

Per capita GDP sigma convergence EU 27 (PPP):EU-27,EU-15,EU-12



Source: Own calculations on AMECO database.

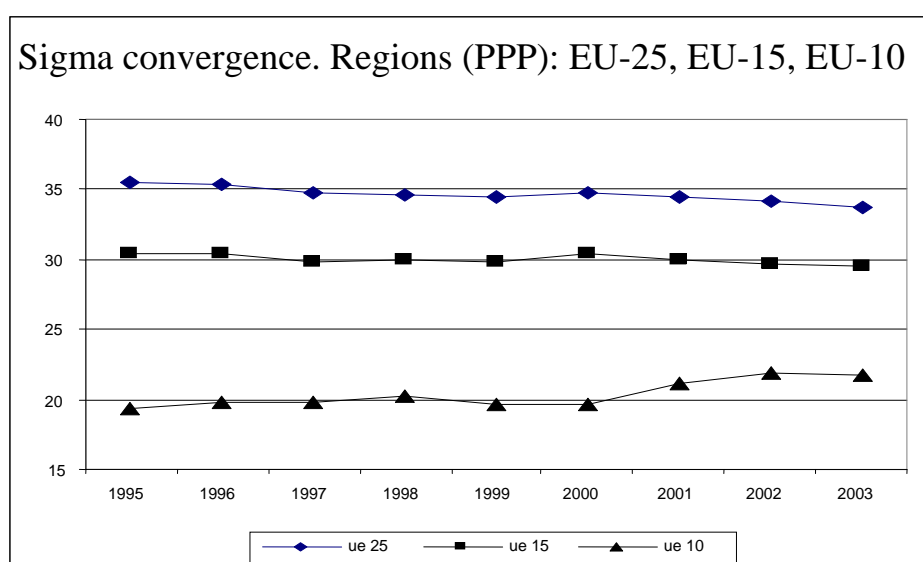
However, by looking at Figure 6, where the sigma convergence of the EU-10 (the countries of the 2004 enlargement, i.e. 8 CEEC plus Malta and Cyprus) per capita income is computed at the regional level, the evolution of the standard deviation conveys the impression of more complex growth trajectories. In fact, the evidence in Figure 6 shows a soaring standard deviation among the per capita income of the CEEC regions from 2000 to 2003 that is just in approaching their accession to the European Union.

The sigma divergence shown by the rising dispersion of per capita income across the regions of the CEEC in Figure 6 is easily reconciled with the sigma convergence shown by the almost constant standard deviation at the country level in Figure 5. As well-known, the demise of the Comecon, the socialist economic block where the CEEC economies were deeply interwoven with the URSS productive system, resulted in the establishment of increasing trade flows and new economic and financial ties with the EU-15 economies¹¹. These developments are likely to have prompted growth

¹¹ Granted the rapid liberalization process of these economies, the FDI, mostly from companies of the EU-15 countries, were a source not only of foreign capital technology, but also of efficient management and access to markets, which are

by increasing cross-country capital and labour mobility in the CEEC regions, mainly at the border with Germany, Austria and Italy. The sigma divergence across the CEEC regions is then likely to reflect the attraction exerted by the border regions of the EU-15 on the border regions of the CEEC with Western Europe, thus provoking their per capita income divergence from the rest of the country. The concept of conditional convergence fails to take into account that spillovers are likely to depart at the boundaries between advanced and backward cluster of countries, as strong similarities among the national economic structures of the CEEC by no means preserve cohesiveness among their regions along the integration process with the EU-15.

Figure 6



Source: Own calculations on AMECO database.

The evidence presented in Figures from 2 to 6 could then be interpreted in the light of the theoretical modelling and simulations describing the phenomenon of *churning*¹²(Quah, 1996a and 1996b). The beta convergence could have increased *between* the EU-27 due to the economies of the CEEC catching-up the EU-15 economies, but the attraction exerted by the closest Core countries on

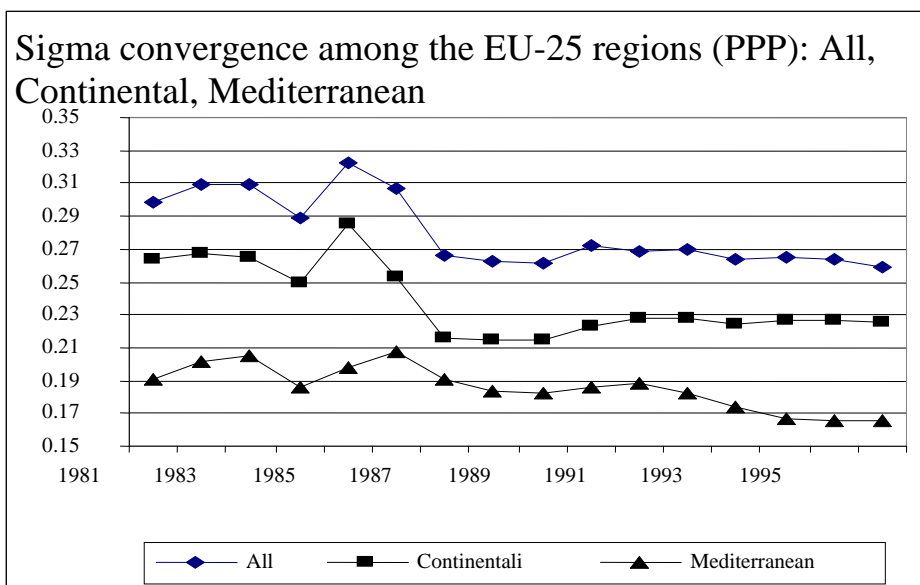
crucial for the CEEC economies' technological upgrading. Moreover, merger and acquisition led by Western European banks have improved capacity of the CEEC domestic banks to co-finance investments by foreign firms that bring local firms closer to the industry frontier. This evidence confirms that after the economic reforms which led to the privatization of the State-owned firms, the establishment of the market economy, and the restructuring of their productive system, in the years preceding the accession the catching-up of the CEEC economies turned towards within-country divergence, as the western regions started detaching from the growth path of their national economy.

¹² The *churning* consists in a declining sigma convergence (a decreasing standard deviation) among countries year by year along a process of beta convergence, and a subsequent increase in standard deviation among those same countries as the catching-up countries keep growing at a faster rate also after the catching-up has been completed.

some more dynamic regions of the CEEC could have prompted their faster growth *vis-à-vis* the more eastern CEEC regions and a consequent tendency to sigma divergence *within* the CEEC economies.

As stressed by the New Geography Economics, however, distance matters the most when increasing returns apply. Sigma divergence within countries between dynamic and static regions can stem from technology spillovers induced by countries with a higher level of investment in R&D through their trade with backward economies (Coe and Helpman, 1991), or by their out-sourcing of stages of production from advanced towards backward regions (Coe and Helpman, 1995). As it was pointed out earlier, one of the shortcomings of the Solovian approach is the fact that the main determinant of long-run growth – technical progress – is kept outside of the model. In fact, increasing trade and factor mobility among border regions are bound to promote innovation flows, thus augmenting over time the dispersion across output growth within countries. Many endogenous growth models describe how the divide of per capita income across economies can enlarge, instead of shrinking, just as an effect of the combined impact of technical progress and of the spatial phenomena studied by the models of the New Geography Economics. The most important analytical tool consists in the “agglomeration factors” located in the Core of an economic area, which are alleged to play a central role in introducing firms in innovative production and organizational trajectories and provide them with researchers and workers with high human capital.

Figure 7



Source: Own calculations on AMECO database.

A clue of how important is the link between cross-border spillovers and technical progress in Europe is given by the computation of sigma convergence among the regions of the EU-15 in Figure 7. Here, the EU-15 are not grouped according to the traditional division between Core¹³ and Peripheral¹⁴ countries, but in two clusters of Continental and Mediterranean countries, depending on the distance of some regions of the Core and the Periphery from the Continental European nations where the agglomeration factors are concentrated¹⁵. The way in which the two clusters have been formed allows to cast light on the structural break happened during the European monetary integration process in the period following the 1992-93 collapse of the “hard EMS” (as the European Monetary System of fixed - but adjustable - exchange rates came to be called, till the renounce in 1993 to tight bands for the bilateral parities). While Continental European regions exhibits sigma divergence, Mediterranean European regions exhibits sigma convergence. This evidence suggests that the acceleration in the dispersion across the regional per capita incomes of the latter cluster should be traced back to the divide between more and less dynamic European economic areas opening by the steps towards the single currency devised by the Maastricht Treaty (Farina and Tamborini, 2004).

5. Widening real divergences across European economies

The economic space of the European Union is the first performer worldwide. In 2009, the EU-27 share of the world GDP was 28.2%, while the United States accounted for a share of 24.3%. However, differently from the fully unified economic system of the United States, the European GDP still consists of the sum of the GDP of 27 different economies.

The monetary integration process in Europe was conceived to foster convergence, even at the cost of a growth slowdown (Sapir, 2004). It was not expected that the divide across EU-15 economies would have started widening faster during the first ten years of the Eurozone. The convergence process within the EU-15 is more and more threatened by the lack of exchange rate adjustments in the countries participating in the monetary union. The huge imbalances between some Core economies (Germany and, to a lesser extent, Austria) accumulating current account surplus and the Peripheral countries (among which Ireland is reckoned again) burdened by rising current account deficits is heavily hindering the EU-15 growth prospects (Crocì Angelini and

¹³ Austria, Belgium, Finland, France, Germany, and the Netherlands.

¹⁴ Greece, Ireland, Italy, Portugal, and Spain .

¹⁵ Due to their geographical proximity with Southern Europe, the southern French regions have been excluded from the Continental cluster and aggregated to Medit one; likewise, the Northern Italy regions have been excluded from the Medit cluster and aggregated to the Continental one.

Farina, 2011). Germany, the leader country of the EMU, traditionally benefits from the boosts given by real depreciation (progressively enlarging after the end of the era of currency devaluations) to its exports in Europe, while the remaining European economies suffer from the loss of competitiveness due to the real appreciation (i.e., their faster increase in unit labour costs). This scenario is further worsened by the intrinsic weakness stemming from the divide between five large economies¹⁶ and the small size of the other 22 economies of the European Union. This is a problem for the ECB monetary policy – due to the well-known “one size does not fit all” issue – and also for the national fiscal authorities, as the SGP rules are bound to penalise the “national interest” of the large economies, whose stabilization policies rely on expansionary budgetary stances to a much large extent than the more export-oriented small economies.

A widening real divergence within Europe exemplifies how the smooth convergence path envisaged by Solow can be jeopardised by asymmetric advantages originating from the spillovers developing in an economic and monetary integration process. To contrast huge current account and/or public debt deficits, Greece, Spain, and Ireland are resorting to a drastic wage and price deflation and fiscal restriction. This will further dampen their growth perspective, with the danger of a self-aggravating accumulation of private and public debt.

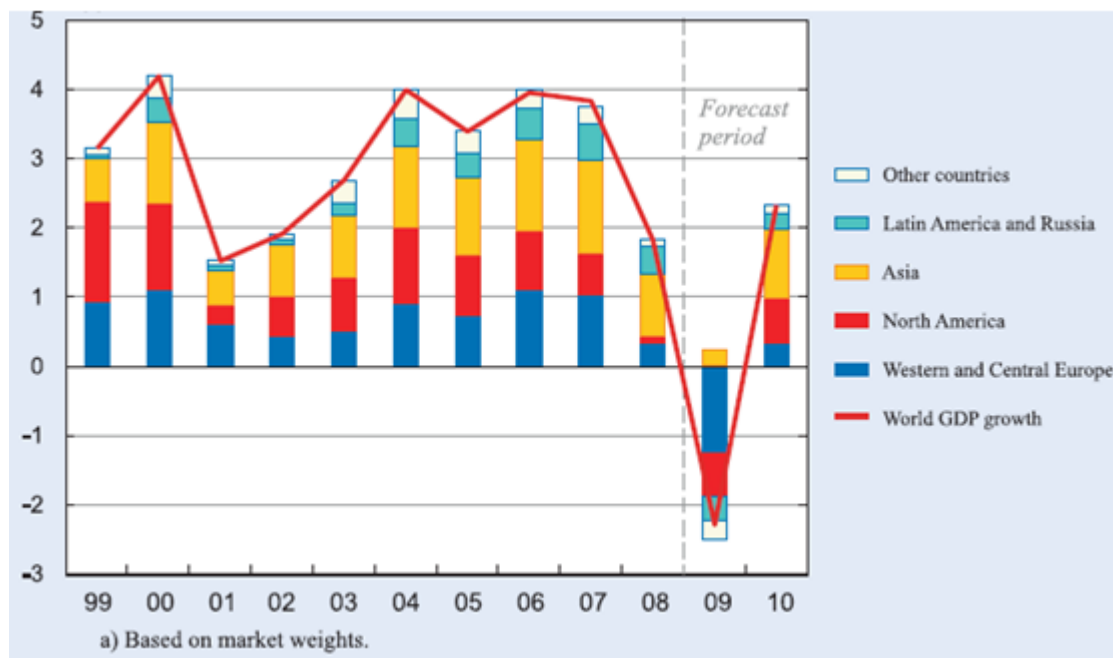
Figure 8 sketches the recent growth performance of Europe *vis-à-vis* the other regional areas. Before the present crisis, the potential growth rate was estimated 4% at the world level, 3,5% in the United States and only 2% in the European Union. The recession in the EU-15 economies has been as acute as in the US.¹ However, differently from this latter country, where goods’ and labour market flexibility has allowed large cuts in wage and prices, thus increasing the unemployment rate to 10%, European firms have delayed investment projects and hoarded jobs, so that labour productivity growth has kept declining. The recession has been particularly severe in some of the CEEC, also as an effect of highly fragile financial markets where the worsening of the banks’ balance sheets hindered borrowers’ ability to repay loans. As for last year, in contributing to the global growth the EU-27 (Western and Central Europe in Figure 8) represented the lowest share during the positive growth path and is estimated to represent the most of the 2009 negative GDP growth rate experienced by all areas but Asia. Potential growth in the EU-27 is now forecasted by the European Commission at around 1.5% per year from 2010 to 2013, half a point below the already low value estimated for Europe before the crisis.

¹⁶ The shares of the GDP of the European Union for these five economies in 2009 were: Germany: 20.1%; France: 16.0%; United Kingdom: 13.8%; Italy: 12.8%; Spain: 8.6%

If a more cooperative governance of the Europe-wide macroeconomic equilibrium will not be devised, the Europe 2020 strategy is doomed to remain just cheap talk.¹⁷ The strategy to speed the recovery should start from redistributing growth within Europe. First, high-tech infrastructures should be cooperatively promoted through the issuing of Eurobonds. Second, technical progress should be boosted through the restoration of a sound working of European financial markets centred on the relationship between networks of banks and innovative firms. Third, to remove the obstacle of too large trade imbalances between the economic giant of Europe and the Peripheral laggards export flows must revert: Germany should allow its domestic demand to increase. To be prepared to benefit from a larger foreign demand, the Mediterranean economies should commit themselves to strengthen productivity growth.

Figure 8.

Regional contribution to world GDP growth



Source: IMF and CESifo.

¹⁷ Under the label of Europe 2020 the European Commission proposes a more focussed strategy than the too ambitious Lisbon Agenda set in 2000, where the goal of making Europe “the most competitive knowledge-based economy in the world” by 2010 was put forward. Three priorities have been selected by Europe 2020: 1. Smart growth: developing an economy based on knowledge and innovation; Sustainable growth: promoting a more resource efficient, greener and more competitive economy; Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion.

6. Conclusions

The per capita income growth of the most advanced Western European countries *vis-à-vis* the US has been hampered by a capital accumulation characterised by a lower degree of innovation and capital use per worker, by a slowdown in labour productivity growth (labour market reforms introduced more flexibility, but rising employment mainly consisted of low-skill workers with temporary contracts instead of in high-education researchers and managers), and by a persisting gap in hours worked. Briefly, too many EU-15 economies have not yet reaped the benefits of the process and product innovations linked to ICT.

Since the 1920s, the United States has been the country of the technological frontier, while Europe had reached the productivity frontier by the mid-1990s, and afterwards has lagged behind. It is likely that economic growth will be progressively more influenced by multinational companies driving a sharp selection of researchers and managers in vastly populated world areas where knowledge-based agglomeration factors will be concentrated.

It should not be overlooked that population growth is going to retrieve the leading role performed in the growth theories of the nineteenth century, not because of the gloomy forecasts put forward by Malthus, but as an effect of human capital as the embodiment of technical progress. In this respect, the most prominent country is not the United States but China.¹⁸ The demographic factor is bound to foster a giant increase in the labour force potential of this latter country with the largest population worldwide.¹⁹ The comparison with the European Union is rather worrying. If population growth will keep oscillating around zero, as an effect of the expected raise in the dependency ratio in the five largest EU economies the participation rate will dramatically fall between 2000 and 2040.²⁰ This is not to say that Europe is bound to decline, but the character that the Old Continent will play in the future on the stage of the world has to be reshaped from the scratch.

¹⁸ After more than two decades of growth rates averaging 8% or more per year, in 2010 the Chinese GDP represents the 11% of world GDP, to be compared with the 22% of the US and 21% of the EU-15 values. A major factor boosting the China catching-up is represented by the shift from agriculture to industry and services, as massive as about 195 million workers between 1978 and 2005. In 2040, the Chinese GDP is expected to become the largest economy in the world, with a share of 40% of total GDP, against 14% and 5% for the United States and EU-15, respectively.

¹⁹ Over the next generation, in China the school enrolment ratio is likely to grow at a rate of about 100% in secondary education, and of about 50% in the tertiary education. A so heavy investment in human capital, through a selection conducted over a huge labour force, will warrant to China an enormous flow of researchers and high-skill workers for the knowledge-based economy of the future.

²⁰ The forecast is of percentage variations in the dependency ratio as wide as from 0.47 to 0.79 in Germany, from 0.49 to 0.81 in Italy, from 0.46 to 0.72 in Spain, from 0.54 to 0.75 in France, and from 0.54 to 0.64 in the United Kingdom (Fogel, 2010).

References

- Aghion, P. and P. Howitt (1992) "A Model of Growth through Creative Destruction", *Econometrica*, 60: 323-351.
- Acemoglu D., S. Johnson, J.A. Robinson, and P. Yared (2008) "Income and Democracy", *American Economic Review*, 98: 808-842.
- Acemoglu D., P. Aghion, F. Zilibotti (2006) "Distance to Frontier, Selection, and Economic Growth", *Journal of European Economic Association*, 4: 37-74.
- Baumol W. (1986) "Productivity Growth, Convergence, and Welfare: What the Long-Run Data Show," *American Economic Review*, 76: 1072-85.
- Barro R.J. (1991) "Economic Growth in a Cross Section of Countries," *Quarterly Journal of Economics*, 106: 470-43.
- Becker G.S. (2002) "The Age of Human Capital", in E.P. Lazear, *Education in the Twenty-First Century*, Hoover Institution Press, Stanford (CA).
- Blanchard O. (2004) "The economic future of Europe", *Journal of Economic Perspectives*, 18: 3-26.
- Blanchard O. (2006), "European Unemployment. The evolution of facts and ideas", *Economic Policy*, 21: 5-59.
- Blanchard O. and F. Giavazzi (2003) "Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Markets," *Quarterly Journal of Economics*, 118: 879-907.
- Blanchard O. and J. Wolfers (2000) "The role of shocks and institutions in the rise of European unemployment: the aggregate evidence", *Economic Journal*, 110: 182-207.
- Boldrin M. and F. Canova (2001) "Inequality and convergence in Europe's regions: reconsidering European regional policies", *Economic Policy*, 16: 207-253.
- Cappellen A., F. Castellacci, J. Fagerberg, B. Verspagen (2003) "The impact of EU regional support on growth and convergence in the European Union", *Journal of Common Market Studies*, 41: 621-644.
- Coe D. T. and E. Helpman (1991) "Quality Ladder and Product Cycles", *Quarterly Journal of Economics*, 106: 557-586.
- Coe D. T. and E. Helpman (1995) "International R&D spillovers", *European Economic Review*, 39: 859-887.
- Croci Angelini E. and F. Farina (2011) "Real Divergence across Europe and the Limits of EMU Macroeconomic Governance", in Della Posta P. and L.S. Talani (eds.), *Europe and the Financial Crisis*, Palgrave, London, 2011
- De Grauwe P. (2008), "The Euro at ten. Achievements and strategies", *Empirica*, 22: 5-27.
- Farina F. and R. Tamborini (2003) "Macroeconomic stabilisation and EU Enlargement", in F. Praussello (ed.), *EU Enlargement: The Endgame Economic Issues*, F. Angeli editore, 2003
- Farina F. and R. Tamborini (2004) "'Set a sufficiently ambitious budget target and let the automatic stabilizers work'. Can it really work in the European Monetary Union?", *Open Economies Review*, 15: 143-168.
- Fogel R.W. (2010) "Further Comments on the Impact of the Asian miracle on the Theory of Economic Growth", NBER Working Paper n. 15721.
- Hausmann R., L. Pritchett, and D. Rodrik (2005) "Growth Accelerations", *Journal of Economic Growth*, 10: 303-329.
- Helpman H. (2010) "Labour Market Frictions as a Source of Comparative Advantage with Implications for Unemployment and Inequality", *Review of Economic Studies*, 77: 1100-1137.
- Krugman, P.R. (1991) "Increasing returns and economic geography," *Journal of Political Economy*, 99: 483-499.
- Mankiw N.G., D. Romer, and D.N. Weil (1992) "A Contribution to the Empirics of Economic Growth", *Quarterly Journal of Economics*, 107: 407-437.

- Nickell S. (1997) “Unemployment and Labour Market Rigidities: Europe versus North America”, *Journal of Economic Perspectives*, 11: 55-74.
- Prescott, E. C. (2004), ‘Why do Americans work so much more than Europeans?’, *Quarterly Review*, Federal Reserve Bank of Minneapolis, 2–13.
- Quah D.(1996a) “Twin Peaks: Growth and Convergence in Models of Distribution Dynamics”, *Economic Journal*, 106: 1045-55.
- Quah D. (1996b) “Regional Convergence Clusters across Europe”, *European Economic Review*, 17: 55-78.
- Rodrik D. (2008) “The Real Exchange Rate and Economic Growth”, in W. Douglas, N. Elmendorf, G. Mankiw, and L.H. Summers (eds.), *Brookings Papers on Economic Activity*, Fall.
- Romer P. (1986), Increasing returns and long run growth”, *Journal of Political Economy*, 94: 1002-1037.
- Romer P. M. (1990) “Endogenous Technological Change,” *Journal of Political Economy*, 98: S71-S102.
- van Ark, B., O’Mahony, M. and Timmer, M.P. (2008), “The productivity gap between Europe and the U.S.: Trends and causes”, *Journal of Economic Perspectives*, vol. 22(1), pp. 25–44
- Sapir A., P. Aghion, G. Bertola, M. Hellwig, J. Pisani-Ferry, and D. Rosati (2004) *An Agenda for a Growing Europe*, Oxford University Press, Oxford.
- Vandenbussche J., P. Aghion e C. Meghir (2006) “Growth, distance to frontier and composition of human capital”, *Journal of Economic Growth*, 11: 97-127.



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