PORTUGUESE ECONOMIC GROWTH RE-EXAMINED: AN ANTI-FADO MANIFESTO *

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This paper examines the recent growth performance of the Portuguese economy, both in a historical and in a comparative perspective. We first test whether productivity in Portugal has been converging to the EU average, using the stochastic approach to convergence. We then stress that convergence is not an automatic process. To this aim we show that there is no general tendency for poor countries to grow faster than rich countries, even within OECD. We also investigate the extent to which the information content of some policy induced variables helps to explain the variance of growth rates across OECD economies. We find positive correlation between economic growth and measures of institutional development, labour skills and labour market flexibility.

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There are many countries, not essentially different either in the degree of security which they afford to property, or in the moral and religious instruction received by the people, which yet, with nearly equal natural capabilities, make a very different progress in wealth.

THOMAS MALTHUS (1766-1834)[1]

I. Introduction

In the last forty years, the Portuguese economy exhibited an outstanding growth performance. With GDP growth ranking among the highest in the world, this country was able to reduce consistently the income gap in respect to the more advance nations. Some may argue that this achievement is not impressive. Since Portugal departed from a low standpoint, higher growth rates would be expected anyway. This reasoning has a long tradition in economic thinking. Following David Hume (1758), economists have been arguing that transfer of technology and decreasing returns provide poor economies with an impetus to "catch up". A fact that has received large consensus in the economic profession, however, is that there is no systematic tendency for poor countries to grow faster than rich countries. Moreover, if any important lesson came about with the recent developments in the theory of economic growth, this is that "policy matters". Economic growth (convergence) is nor automatic nor immune to government actions and in no way can be extrapolated from the past.

In line with the thematic of this conference, this paper first addresses the question as to whether Portugal has been converging to the EU average. We find that productivity in Portugal has indeed converged, but the pace of convergence has not been uniform along time. By showing that there is no general tendency for poor countries to grow faster than rich countries, even within OECD, we stress the Thomas Malthus claim that similar economies may exhibit distinct growth performances. We then investigate the extent to which the information content of some policy induced variables may help to predict productivity growth in the OECD sample. The aim of the exercise is not to develop any new theory of economic growth. Simply, by focusing on the role of policy, we stress the case against hazard and we point out some directions for reform. Following the topics covered by the conference, we focus on institutions, labour market flexibility, government finance and the quality of human resources. Physical capital accumulation and labour participation are excluded from the analysis so as to capture the overall effect of the policy, regardless as to whether it acts through factor accumulation or efficiency change. Restricting the analysis to OECD economies, we gain in two dimensions. First, we stress the case against the believe that convergence is kind of automatic in particular clubs. Second, we reduce substantially the complexity of the analysis, as one need not to discriminate the role of those attributes that are equally hated by industrialised economies.

The paper proceeds as following. In section 2 we present some comparative data. In section 3, we test whether Portuguese productivity has been converging to the EU average and the extent to which the pace of convergence has been affected by major regime shifts. In section 4, we check whether the simple convergence hypothesis holds in the OECD sample. In section 5, we run some regressions so as to investigate the extent to which some policy induced variables help to discriminate the different growth performances among OECD economies. Section 6 concludes.

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[1] Thomas Malthus (1817). The quotation is borrowed from Gylfason (1999).

II. Growth accountancy

After a secular trend of divergence, the Portuguese economy appears to have engaged in a convergence track towards the industrialised world[2]. With real per capita GDP (expressed in comparable units) growing at an average rate of 4% per annum in the period 1960-1992, Portugal is ranked 11th in a sample of 119 countries (Table 1). Using data from the European Commission, Portugal is ranked third in per capita GDP growth and first in growth of GDP per worker, among 22 OECD economies, for the period 1960-2000. In the 1980-2000 sub-period, Portugal is ranked third in terms of per capita GDP growth and second in growth of GDP per worker.

This fast growth experience allowed standards of living in Portugal to approach consistently those in more advanced nations. Column I of Table 2 shows that per capita GDP, in current PPS[3], rose from 41.5% of the EU average in 1960 to 73.8% in 2000. The evolution was not uniform along time. As shown in the table (see also Figure 1), the relative income gap has widened during the oil shock period (1973-85)[4]. The same happened in Greece and Spain, but not in Ireland[5].

GDP per capita (PCGDP) provides an appropriate measure to evaluate whether standards of living are approaching. But it should be taken into account that this variable has a rather complex nature, as it is influenced by cultural and social conditions, that determine demographic changes and labour participation, institutional factors and so on. To abstract from demographic changes, which are mainly exogenous to policy (at least in medium term), one may prefer to look at GDP per working age person (labelled GDPWAP in column II of Table 2)[6]. This variable measures what a society gets out of its pool of human resources, irrespectively as to whether people with working age are employed, unemployed or even out of the labour force. Hence, policies raising economic efficiency, education and capital accumulation will impact on this variable, regardless as to whether the channel is labour productivity or incentives to work.

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[2] De Long (1988), points to a fall from 61% of the US level in 1870 to 29% in 1913. Neves (1994: 105) plots the series of relative (to 16 industrialised countries) per capita GDP in Portugal, for the period 1830-1985 (see also Lopes, 1996, and Barros and Garoupa, 1996). Visual inspection of the (filtered) data suggests a secular trend of divergence along the nineteen century (with a brief interruption in 1860-1880) and up to the first decade of last century. A short convergence episode took place in the 1920s followed by two more decades of divergence. Although a slight recovery may be identified in the 1950s, only in the decade after did the Portuguese economy meet fast economic growth. In 1985, relative GDP was already at the same level as in 1830.

[3] PPS (Purchasing Power Standard) is a measure of purchasing power parity produced by the Euroestat, according to the methodology established by the UN International Comparison Project.

[4] Visual inspection of Figures 1 and 2 suggests that the series of relative PCGDP inherits some persistence from the population series. In the case of Portugal, movements of (relative) population reflect the massive emigration that took place during the *ultramar* war, the repatriation of Portuguese citizens from the ex-colonies in the aftermath of the revolution and also statistical smoothness, as population data are interpolated from census.

[5] Periodicity in Table 2 was chosen so as to allow the reader to check relative positions at the time of main regime changes. Since data are not filtered, strict comparisons across sub-periods are misleading.

[6] Ireland provides an interesting case to distinguish PCGDP and GDPWAP. Because of a baby boom in the 1980s, the ratio of "working age to total population" (relative to EU) rose in Ireland at an average rate at 0.9% per annum in the period 1986-2000. This purely demographic effect translates into a faster growth of relative PCGDP (3.7% a year) than relative GDPWAP (2.8%). In the case of Portugal, the difference between growth rates in columns I and II accounts for both a demographic effect (0.4% per annum) and also a 0.5% real appreciation effect (note that GDP per capita in column I is measured in current prices).

Column III, displays data on GDP per worker (GDPPW), relative to the EU average. As shown in the table, GDPPW in Portugal has been approaching consistently the EU average (see also Figure 1), contrasting with less obvious paths in Spain and Greece. This measure may be informative to evaluate technology and the quality of the inputs being used[7], but tell us nothing about unemployment and participation which, in large extent, are endogenous to policy. For example, while (relative) GDPPW evolved at similar rates in Portugal and Ireland along 1986-2000 (1.6% per annum), growth rates of (relative) GDPWAP in the same period differ substantially (2.8% in Ireland and 1.1% in Portugal). The difference is accounted for by "employment deepening", which in the case of Ireland has been an important outcome of a major policy shift, after decades of high unemployment[8].

Columns IV and V of Table 2 display information on relative endowments of physical and human capital. Comparison of columns III and IV for the case of Portugal suggest that the sharp rise in capital per worker observed since 1973 is a kind of return to a balanced growth path, following a period of insufficient capital accumulation. But measurement problems, specially in the beginning of the sample, call for caution in the interpretation of the data[9].

Educational attainment is measured by the average years of schooling, relative to four European countries. After a fast recovery from very low levels in the 1960s and the 1970s, education attainment in Portugal turns out to have a disappointing evolution in the 1980s (see also Figure 3). Complementary information in Figure 4 also raises some concerns about the quality of the Portuguese educational system.

A last comment on Table 2 is motivated by the Greek interesting picture. This country is apparently better endowed in terms of both physical and human capital than Portugal and Spain. This advantage has not translated, however, into higher productivity. The figures suggest that Greece is now facing a similar situation to that of Ireland in the mid-eighties and is in accordance to the view that factor accumulation is not sufficient for economic growth.

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[7] With some caution, of course, as it measures production "per employee", rather than "per hour worked". The European Commission computes labour productivity measuring employment in terms of full time equivalents but such index is not fully comparable across countries.

[8] In Ireland, the relative “employment to working age population ratio” increased at an average rate of 1.1% per annum. A similar path would have been difficult to achieve in Portugal, because unemployment has remained low and the participation rate is traditionally high. The existence of initially high unemployment levels has been often ignored in international comparisons involving the Irish economy.

[9] The European Commission follows the standard procedure of cumulating net investment flows at constant prices. The method involves, however, the specification of the capital stock in a base year. The European Commission postulates the capital-income ratio equal to 3 for all countries in 1960. This is, of course, arbitrary, and may led to large estimation errors, particularly in the early periods of the sample. The series becomes more reliable in recent years, because the correspondent estimates are less dependent on the initial assumption.

III. Testing Portugal-EU convergence

The observation that growth rates in Portugal have been higher than in the EU aggregate in a particular period of time does not provide evidence of convergence. If productivity shocks are independent, there will be no tendency for productivity levels to converge in the long run or even to follow parallel paths. In that case, the two economies will be drifting apart, even though in a particular period of time the respective time series looked like being approaching each other. For convergence to take place, productivity in Portugal shall evolve each moment in time so as to approach an equilibrium differential vis-à-vis the EU level.

In this section we test for Portugal-EU convergence investigating the persistence of shocks to relative productivity: if income disparities follow a stationary process, the null of non-convergence is rejected[10]. This is done using a simple Dickey Fuller test, including a drift and a time trend, so as to allow for different balanced growth paths and transition dynamics[11].

Columns I and V of Table 3 display the results of simple ADF tests for relative GDPWAP and relative GDPPW[12]. In both cases, the null of no-convergence is not rejected. In Columns II-IV and VI-VIII, structural breaks are also allowed for, so as to capture eventual changes in the convergence path. We use the "crash and trend model", with the following (a priori defined) structural breaks: the oil shock cum revolution (1974), EC accession (1986) and the Maastricht discipline (1993) – see further explanations in the table.

Results suggest that the oil shock (cum revolution) had an asymmetric impact, hitting the Portuguese economy harder than the EU region as a whole. When such break is allowed for, the null of no-convergence is rejected. The pace of convergence declined from 3.0% before the shock to 0.8% after the shock, when measured by GDPWAP and from 2.1% to 1.3% when measured by GDPPW.

Specifications with two breaks do not in general led to rejection of the unit root null, except in case of GDPPW, column VIII. This last result points to a positive effect of the Maastricht discipline, but its robustness has still to be proved, as more data becomes available.

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[10] See, for example, Carlino and Mills (1993). The implied assumption is that productivity shocks have a uniform long run impact across countries. Bernard and Durlauf (1995) also examined a less restrictive notion of convergence, requiring only the existence of common stochastic trends. St. Aubyn (1999), allowed for a smooth transition from non (stochastic) convergence to convergence, using a Kalman filter.

[11] Barros and Garoupa (1996) tested for Portugal-EU convergence in different sub-periods along 1951-93, using a Dickey-Fuller test without drift or time trend. Their estimates are likely to be biased, however, as the presence of transition dynamics prevents the asymptotic distribution of relative income to be approximated by the sampling distribution (see Bernard and Durlauf, 1996).

[12] Of course, since Portugal is not being subtracted from the EU aggregates, some endogeneity remains. We trust, however, the implied bias to be negligible. Results for PCGDP are not qualitatively different from those obtained with GDPWAP.

IV. Miracles and disasters

A well established result in the growth literature is that there is no general tendency for poor countries to grow faster than rich countries. In particular samples (specially those involving industrialised economies), however, the convergence hypothesis has received some support[13]. Figure 5 illustrates this. It graphs on the x-axis the 1960 level of GDPWAP and on the y-axis the growth of this variable along 1960-80. The figure suggests a strong tendency for economies to converge, with countries with initially low per capita income levels growing faster than the richer countries.

A common textbook interpretation for this kind of evidence is that industrialised nations, because they have similar technology levels, labour skills, investment rates, and population growth rates, are expected to enjoy convergence. Baumol (1986) goes a bit farther (pp 1077): "It seems not to have mattered much whether or not a particular country had free markets, a high propensity to invest, or used policy to stimulate growth. Whatever its behaviour, that nation was apparently fated to land close to its predestined position (...)" and (pp 1081): "(...) the convergence of productivity levels in industrialised countries condemned those with high 1870 productivity levels to relative slow growth since then". With no question, these conclusions carry a lot of determinism.

Referring to the *De Long critique,* we claim that one should not trust too much forces pushing for convergence. Even if the simple convergence hypothesis looks like holding in particular samples, results are in general fragile to small sample modifications. Figure 6 illustrates this. When the sample period changes to 1980-2000, no evidence of convergence is found among OECD nations. This is not caused by one particular outlier, but rather by a few of them, including "growth miracles" such as Ireland and Luxembourg and "growth disasters", such as Greece and New Zealand[14].

Table 4 displays the results of some formal tests. Different samples and productivity measures are considered, so as to stress the case against *unconditional* convergence [15]. As shown in the table, the regression slopes (betas) tend to be significant in 1960-1980 but not in 1980-2000 (exception for GDPPW) [16]. Similar conclusions hold using the Carree and Klomp (1997) T3 statistic (explanations in the table).

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[13] Baumol (1986) found significant evidence of convergence among the Maddison 16, in the period 1870-1979. For OECD economies in the post-WWII period, see, for example, Dowrick and Nguyen (1989), Mankiw et al. (1992), Barro and Sala-i-Martin (1992), Carre and Klomp (1997).

[14] De La Fuente (1998) uses the residuals to the fitted line to evaluate the relative performance of each economy, after controlling for the "convergence" effect. As shown later, however, this simple regression line suffers a significant bias.

[15] The terminology is due to Mankiw et al. (1992) and Barro and Sala (1992). If countries differ in their long-run per capita income levels, there will be no general tendency for poor countries to grow faster than rich countries (unconditional convergence). Conditional convergence will occur if each country tends to grow faster, the greater the gap between its initial per capita income level and its own long term potential.

[16] The conclusion is reinforced by the observation that this test tends to be biased towards rejection (Friedman, 1992, Quah, 1993).

Observation of Figure 5 suggests that, if convergence appeared to have dominated the data in the sixties and the seventies (eventually with the poorer countries taking advantage from the technological diffusion that was made possible by the establishment of the New Economic Order[17]), in the eighties idiosyncrasies are likely to have played a major role in explaining the cross-section variation of growth rates.

V. Some policy oriented calculations

To understand why some OECD economies have grown faster than others, it is necessary to learn on what is driving the motion. To deal with this question, we run some ad-hoc (Barro type) regressions, testing the significance of policy induced variables potentially related to growth. Instead of estimating an "average" production function, we concentrate on the overall effect of policy measures, regardless as to whether they act through factor accumulation or efficiency change[18]. It may be that the most important links between policy and growth are mediated through physical capital accumulation and labour participation. If one controlled for these variables, crucial effects of the policy would not be detected.

The choice of the explanatory variables is largely driven by the thematic of this conference. A specific question to be addressed is the degree to which good institutions matter. To capture the role of institutions, we use the Sachs and Warner (1997) general institutional quality index (INST), which is an average of 5 sub-indexes, measuring the rule of law, bureaucracy, corruption, expropriation risk and government repudiation of contracts. These indexes shall not be used separately because the country scores on the various sub-indexes tend to be highly correlated. Another topic of interest is the role of public finance. To capture the distortions and inefficiencies associated to big governments and high taxation, we include total expenditures in percent of GDP (GOVX) among the explanatory variables. For the composition of government spending, we use government fixed capital formation in percentage of GDP (GINV)[19]. Both variables are period averages[20]. As for the role of factor markets, we focus on labour market flexibility. The reason is that excessive protection is currently a major problem in Portugal (see Blanchard and Portugal, 2001). Employment protection is captured by the OECD index of "overall strictness against dismissals", late 1980s (EMPROT). The last topic of the conference is the role of human capital. In the empirical literature, the evidence for this variable has been mixed, eventually due to an excessive emphasis on schooling, rather than training (Temple, 1999). In this paper we proxy the quality of the human resources by a measure of "availability of skilled workers", based on a international survey (World Competitiveness Yearbook, 1991).

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[17] Mankiw et al. (1992) stressed instead the role of transition dynamics that followed the disruption caused by WWII. Empirical support to the role of trade as vehicle for convergence can be found, for example, in Ben-David (1993, 1996).

[18] For a structural approach focusing on the Portuguese economy, see Duarte and Simões (2001).

[19] Note that the information content of this variable is somehow limited, as the same level of infra-structures can be provided with alternative arrangements between the government and private agents.

[20] Two problems arise. First, these variables are silent in respect to the time path of government expenditures. Second, and more important, these variables are not entirely exogenous. To keep simplicity, however, we decided not make any corrective action.

Although macroeconomic imbalances are no longer a major issue in Portugal, one may want to stress the benefits of price stability. For this reason, average inflation (INFL) is also included among the explanatory variables. The direct link is through efficiency, as inflation acts as a tax on working capital. Since this variable is usually associated to macroeconomic imbalances, however, it may also capture the effects of related syndromes. A more difficult task in this sample is to control for trade openness. Since the only country that was not satisfying the Sachs and Warner (1995) criteria for "open economy" in 1980 is New Zealand, the variable OPEN (see description in Table 5) collapses into a country dummy.

In estimation, two problems arise. One is the existence of missing values. The other is that, because of multicolinearity, the significance of each variable may depend on the particular combination of variables included in the regression[21]. To deal with these problems, instead of presenting the result of a single equation, we experiment different combinations of explanatory variables and sample sizes. This allows the reader to evaluate the uncertainty concerning the estimates.

Various regression estimates are reported in Table 5. Results for the simple (unconditional) convergence equation are in columns I and VI. In both cases, the 1980 productivity level is non-significance, confirming the earlier result (Table 4) that convergence does not hold in this sample (remarkably, this is true even in column VI, after removing three of the outliers identified in Figure 6). In contrast, the initial productivity level becomes significant, even with Luxembourg in, once only two variables, SKILL and INST are controlled for.

Interpreting the results, one should take into account that some indicators used may be capturing the effect of more general syndromes, to which these variables are associated. In all equations, the signs of the estimated coefficients are as expected. The New Zealand dummy is significant whenever this country is in the sample (II-V), meaning that the poor performance of this country is not fully accountable by the other regressors. Although this may suggest that trade indeed makes a difference, a direct link cannot be established[22]. INFL gets a significant coefficient in some equations (V, XI), but is disturbed by the presence of either INST or GOVX. In general, the variables capturing the role of public finance have the expected sign but low significance. In contrast, SKILL, EMPROT and INST tend to be significant and to exhibit reasonably stable coefficients, even across samples. In equation IV, we see that these three variables, together with the initial income (capturing either decreasing returns or technological catch up) and the New Zealand dummy, account for 77% of the cross-country variation of productivity growth (for partial associations, see Figures A1-A4 in Appendix 1).

[21] See Levine and Renelt (1992). Focusing on OECD countries we benefit from reducing the range of potential explanatory variables. For larger samples, the methodology proposed by Sala-i-Martin (1996) provides a superior, although demanding, alternative.

[22] Using the stochastic approach, Greasley and Oxley (2000) failed to reject the non-convergence null for New Zealand vis-à-vis a number of countries. The authors emphasised the role of excessive protection in explaining why this country has been in a divergence track for almost a century.

As a final exercise, we use the estimates of equation IV to characterise the different growth performances (see Dowrick and Nguyen, 1989). Figure 8 reproduces Figure 6, with growth rates redefined in terms of deviations from that of Holland[23]. Two trend lines are also displayed. The slashed line correspond to the simple fit with two variables, like in Figure 6. The thick line depicts the unbiased "convergence" effect, as implied by equation IV. It gives the differential growth that would be expected in a country having attributes similar to that of the benchmark economy, conditional on its initial income. Interpretation, however, should be kept in reasonable limits, as the exercise carries a lot of counter-factual.

Vertical distances in respect to the thick line in Figure 8 measure the relative effect of the remaining explanatory variables and the country residual. The quantitative contributions of these variables are displayed in Table 6. Interpreting, the Irish "miracle" appears to be largely accounted for by availability of skilled workers and labour market flexibility. In Portugal and Spain no variable apart from the "catch-up" effect pushes for convergence towards the benchmark economy. In Portugal, the quality of institutions, the quality of human resources and employment protection account together for 1.48% loss of (relative) economic growth (1.38% in Spain).

Comparing the actual growth rates with the predicted rates in Table 6, we verify that this small set of variables does a quite good job in discriminating growth performances. The major exception is US, which actual growth rate goes well beyond the one implied by the quality of the attributes considered. The correspondent residual is the "measure of our ignorance".

VI. Concluding remarks

A well established result in the growth literature is that there is no systematic tendency for poor countries to grow faster than rich countries. In the last century, the large majority of developing economies remained poor and incapable of reducing the income gap in respect to more advanced nations. A dozen of countries, however, including Portugal, have done consistently well.

In this paper we stress that growth performances depend on policy actions. If the Portuguese economy has achieved impressive growth rates, this shall not be de-linked from the strategic option to participate in major international movements in the 1960s. EFTA membership in 1959 and GATT participation in 1962 mark the policy move towards openness, breaking with a period of economic slowdown, characterised by inward oriented economic policies and limited competition. Progressive integration in the global economy proceeded with the 1971 EFTA-EC agreement, EC accession in 1986, participation in EMS in 1992, the adoption of the Single Market in 1993, and the decision to join the first wave of EMU.

[23] Holland is roughly the median country both in terms of initial income and economic growth. Choosing a different benchmark would affect the intercept of the adjusted line, but not the slope.

The benefits from globalisation came in various fronts (see, for example, Macedo, 1990, Lopes, 1996). On one hand, increasing competition in international markets is likely to have impacted through efficiency and greater exposure to external productivity shocks. On the other hand, and most important, these external commitments required the implementation of complementary policy actions that helped to sustain economic growth. These include the elimination of *Condicionamento Industrial* (an inheritance from the 1930s restricting competition), financial liberalisation, sound public finance, privatisation, dismantling of monopolies, adoption of a consistent macroeconomic policy framework and, broadly speaking, the implementations of the *Acquis Communautaire* in a number of areas. Cunha and Martins (2001), called the disciplinary device implied by external commitments a "virtuous pressure".

Much has still to be done, though. As argued above, more attention should be given to structural matters. Inflexibility, market distortions, unfair competition, taxation, bureaucracy, corruption, privilege and status quo are in the core of the policy agenda all over the world and we believe the same should hold in Portugal. For these tasks to be addressed, however, a redefinition of priorities on the fiscal side has to be considered. Otherwise it will be impossible to proceed with consolidation of the public finance and at the same time to keep in track with the policy agenda.

A major challenge for the policymakers in the current circumstances is the declining incidence of the "virtuous pressure". Perhaps this explains some loss of impetus in important areas of reform (as an example, the different paths followed by Portugal and Spain in respect to EMPROT, figure 9; for more, see OECD, 2001, pp 114-115). To overcome the natural resistance of the established groups, a greater pedagogy is likely to be required in the near future.

To banish fateful prospects is part of the task. Fate bring indifference and indifference provides an appropriate social environment for interest groups to defend the status quo. The Anti-Fado Manifesto is not only a testimony against the believe that some mysterious forces inside the EU will push income levels in Portugal towards the EU average, irrespectively of the domestic policy actions. It is also a cry against catastrophic thinking, that tends to emerge in the Portuguese society in periods of economic slowdown. For both, I end up expressing my militancy with a quite dramatic quotation:

Morra o fado![24] Morra! - Pim[25].

[24] Vasco Santana, *in* Telmo (1933).

[25] Almada Negreiros (1915).

References

Baumol, W. (1986), "Productivity Growth, Convergence and Welfare: What the Long Run Data Show", *Americam Economic Review 76* (5), 1072-1085

Barro, R. J. (1991), "Economic growth in a cross-section of countries", *Quarterly Journal of Economics* 106:2, 407-43.

Barro, Robert and J.W. Lee (1993), "International comparisons of educational attainment", *Journal of Monetary Economics* 32, 363-394.

Barro, R. and X. Sala-i-Martin (1992), "Convergence", *Journal of Political Economy*, 100 (2), 223-251.

Barros, P. and Garoupa, N. (1996), "Portugal-European Union Convergence: Some evidence", *European Journal of Political Economy* 12 (3), 545-53.

Ben-David, D. (1993), "Equalising Exchange: trade liberalisation and income convergence", *Quarterly Journal of Economics*, 63 83), 653-680.

Ben-David, D. (1996), "Trade and convergence among countries", *Journal of International Economics*, 279-298.

Bernard, A. and S. Durlauf (1995), "Convergence in International Output", *Journal of Applied Econometrics* 10, 97-108.

Bernard, A. and S. Durlauf (1996), "Interpreting tests of the convergence hypothesis", *Journal of Econometrics* 71, 161-173.

Blanchard, O. and P. Portugal (2001), "What hides behind an unemployment rate: comparing Portuguese and U.S. labour markets", *American Economic Review* 91 (1), 187-207.

Carlino, G. and Mills, L. (1993), "Are US regional incomes converging?: a time series analysis", *Journal of Monetary Economics* 32, 335-346,

Carree, M., and L. Klomp. (1997), "Testing the convergence hypothesis: a comment", *Review of Economics and Statistics* 79, 683-686.

Cunha, L. and F. Martins (2001), "The Portuguese economic Integration in the EU: some lessons to be drawn", mimeo, Banco de Portugal.

De Long, J. (1988), "Productivity Growth, Convergence and Welfare: Comment", *Americam Economic Review* 78 (5), 1138-1154.

Dowrick, S. and D-T. Nguyen (1989), "OECD comparative economic growth 1950-85: catch-up and convergence", *The American Economic Review* 79(5), 1010-1030.

Duarte, A. and M. Simões (2001), Principais factores de crescimento da economia portuguesa no espaço europeu", proceedings of the fourth conference of CISEP – Centro de Investigação sobre Economia Portuguesa, ISEG, Lisboa.

Freitas, "Sobre o valor real do Escudo: uma abordagem empírica", *Economia*, Vol XVI, Nº3, UCP - Universidade Católica Portuguesa, 1992, Outubro.

Fuente, (1998), "Convergence equations and income dynamics: the sources of OECD convergence, 1970-95", Centre for Economic Policy and Research Discussion Paper No 1794.

Friedman, M. (1992), "Do old falacies ever die?", *Journal of Economic Literature* XXX, 2129-2132

Greasley, D. and L. Oxley (2000), "Outside the Club: New Zealand's economic growth, 1870-1993", *International Review of Applied Economics* 14 (2), 173-192.

Gylfason, T. (1999), *Principles of Economic Growth*, Oxford University Press, Oxford UK.

Hume, D. (1758), *Essays and Treatie's on several subjects*, London: A. Millar.

Levine, R. and D. Renelt (1992), "A sensitivity analysis of cross-country growth regressions", *American Economic Review 82(4*), 942-63.

Lopes, J. (1996), *A Economia Portuguesa desde 1960*, Gradiva, 1996.

Macedo, J. B. (1990), "External liberalisation with ambiguous public response", in Bliss. C. and J.B. Macedo (eds), *Unity with Diversity in the European Economy: The Community's Southern Frontier*, Cambridge University Press.

MacKinnon, J. (1991), "Critical values for cointegration tests", in Engle, R. and C. Granger (eds), *Long Run Economic Relationships*, Oxford Academic Press.

Maddison, A.(1995), *Monitoring the world development 1820-1992*, Paris OECD.

Mankiw, G., D. Romer and D. Weil (1992), "A contribution to the empirics of economic growth", *Quarterly Journal of Economics*, 107 (2), 407-38.

Malthus, Thomas (1817), *Essay on Population*, 5th edn., London.

Negreiros, J. A. (1915), "Manifesto Anti-Dantas", Textos de Intervenção, *Orpheu*, nº3, Lisboa.

Neves, J. C. (1994), *The Portuguese Economy: a Picture in Figures*, Universidade católica Portuguesa, Lisbon.

Quah, D. (1993), "Empirical cross-section dynamics in economic growth", *European Economic Review* 37, 426-434.

OECD, 1999, Employment Outlook. Paris, June.

OECD, 2001, Economic Surveys: Portugal. Paris.

Rappoport and Reichlin (1989), "Segmented trends and non-stationary time series", *The Economic Journal*, 99, 168-177.

Rodrick, D. (1997), "TFPG controversies, institutions and economic performance in East Asia", Working Paper NBER 5914.

Sachs, J. and A. Warner (1995), "Economic Reform and the Process of Global Integration", *Brooking Papers of Economic Activity* 1-118.

Sachs, J. D. and Warner, A. M. (1997) Fundamental sources of long-run growth. *American Economic Review*, papers and proceedings, May.

Sala-i-Martin, X. (1996), "I just run four million regressions", NBER Working paper 6252.

St. Aubyn (1999), "Convergence across industrialised countries (1890-1989): new results using time series methods", *Empirical Economics* 24, 23-44.

Telmo, C. (1933), *A Canção de Lisboa*. Tobis Portuguesa.

Temple, J. (1999), "The new growth evidence", *Journal of Economic Literature* XXXVII, 112-156.

The International Institute for Management Development (1991), *The World Competitiveness Yearbook* , Lawsanne, Switzerland.

Table 1: Per capita GDP, annual average growth rates, 1960-92

Rank	Country	Growth rate
1	Korea	6.6
2	Singapore	6.2
3	Taiwan	6.1
4	Hong Kong	6.1
5	Botswana	5.6
6	Malta	5.4
7	Japan	5.2
8	Thailand	4.6
9	Cyprus	4.5
10	Malaysia	4.3
11	Portugal	4.0
12	Indonesia	3.9
13	Lesotho	3.7
14	Greece	3.7
15	Spain	3.6
16	Ireland	3.5
17	Seychelles	3.5
18	Tunisia	3.3
19	Cape verde	3.2
20	Italy	3.2

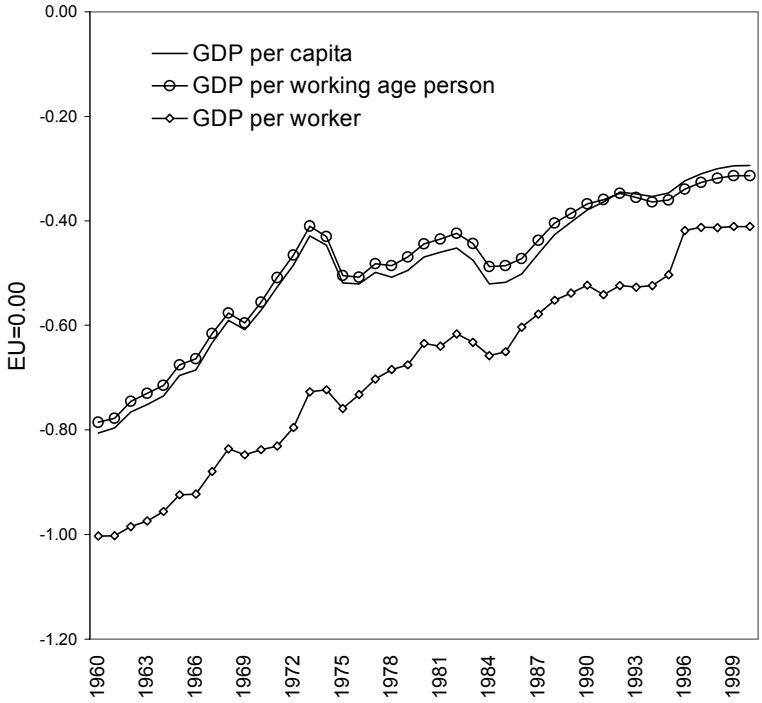
Source: Sala-i-Martin (1996).

Table 2 – Growth accounting

	I		II		III		IV			V	
	Per capita GDP		**GDP per working age person**		**GDP per Employed**		**Capital-labour ratio**			**Education attainment**	
	PPS current EU15=100		1995 PPS EU15=100		1995 PPS EU15=100		1995 PPS EU15=100			EU4=100	
Portugal											
1960	41.5		45.59		36.7		36.9		1960	29.8	
1973	59.9	*3.1*	66.34	*3.2*	48.3	*2.3*	34.8	*-0.5*	1975	40.6	*2.1*
1985	54.8	*-0.7*	61.53	*-0.6*	52.2	*0.6*	47.0	*2.5*	1985	53.0	*2.7*
2000	73.8	*2.0*	73.0	*1.1*	66.3	*1.6*	62.0	*1.9*	1990	53.8	*0.3*
Spain											
1960	60.7		59.64		63.6		64.0		1960	59.8	
1973	78.8	*2.2*	78.91	*2.4*	82.9	*2.2*	64.4	*0.1*	1975	73.7	*1.4*
1985	72.9	*-0.6*	74.35	*-0.5*	96.6	*1.3*	85.2	*2.4*	1985	85.4	*1.5*
2000	81.1	*0.7*	81.76	*0.6*	92.0	*-0.3*	88.0	*0.2*	1990	89.2	*0.9*
Greece											
1960	44.5		49.43		55.6		56.0		1960	77.4	
1973	72.7	*4.2*	81.03	*4.2*	98.5	*4.9*	95.8	*4.6*	1975	86.6	*0.8*
1985	65.8	*-0.8*	75.48	*-0.6*	85.0	*-1.2*	106.7	*0.9*	1985	98.6	*1.3*
2000	67.9	*0.2*	67.51	*-0.7*	80.4	*-0.4*	116.7	*0.6*	1990	104.1	*1.1*
Ireland											
1960	64.7		75.11		78.8		79.3		1960	102.5	
1973	62.1	*-0.3*	71.83	*-0.4*	78.0	*-0.1*	86.3	*0.7*	1975	103.9	*0.1*
1985	68.8	*0.9*	81.37	*1.0*	95.3	*1.7*	108.3	*1.9*	1985	105.4	*0.1*
2000	118.4	*3.7*	123.9	*2.8*	121.3	*1.6*	90.6	*-1.2*	1990	104.5	*-0.2*

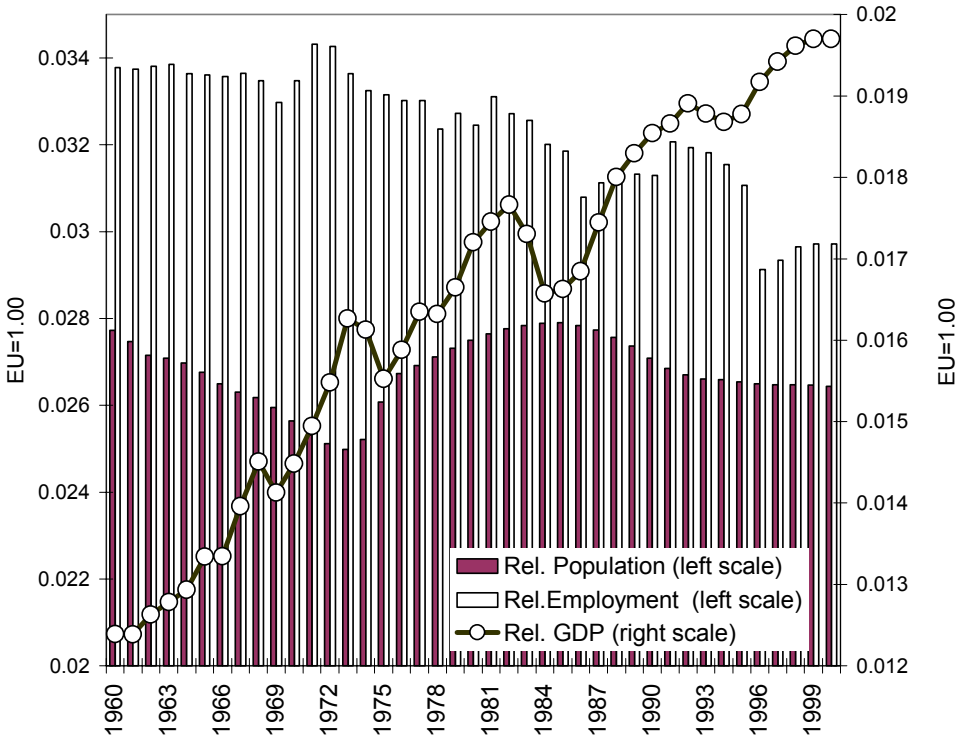
Note: (unfiltered) average annual growth rates for each sub-period are in italic. Data on education attainment follows a distinct periodicity, due to lack of data.
Source: Columns I-IV: own calculations, using data from the European Commission. Column V: education attainment is measured by the average schooling years in the population over age 15 (Barro and Lee, 1993, TYR15). EU4 is a non-weighted average of UK, Germany, France and Italy.

Figure 1. Per capita GDP, GDP per working age person and GDP per worker (Portugal, constant PPS)



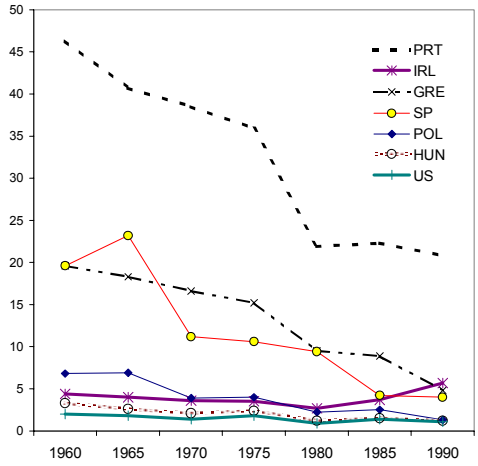
Source: Own calculations using data from the European Commission.

Figure 2: Population, employment and GDP (Portugal)



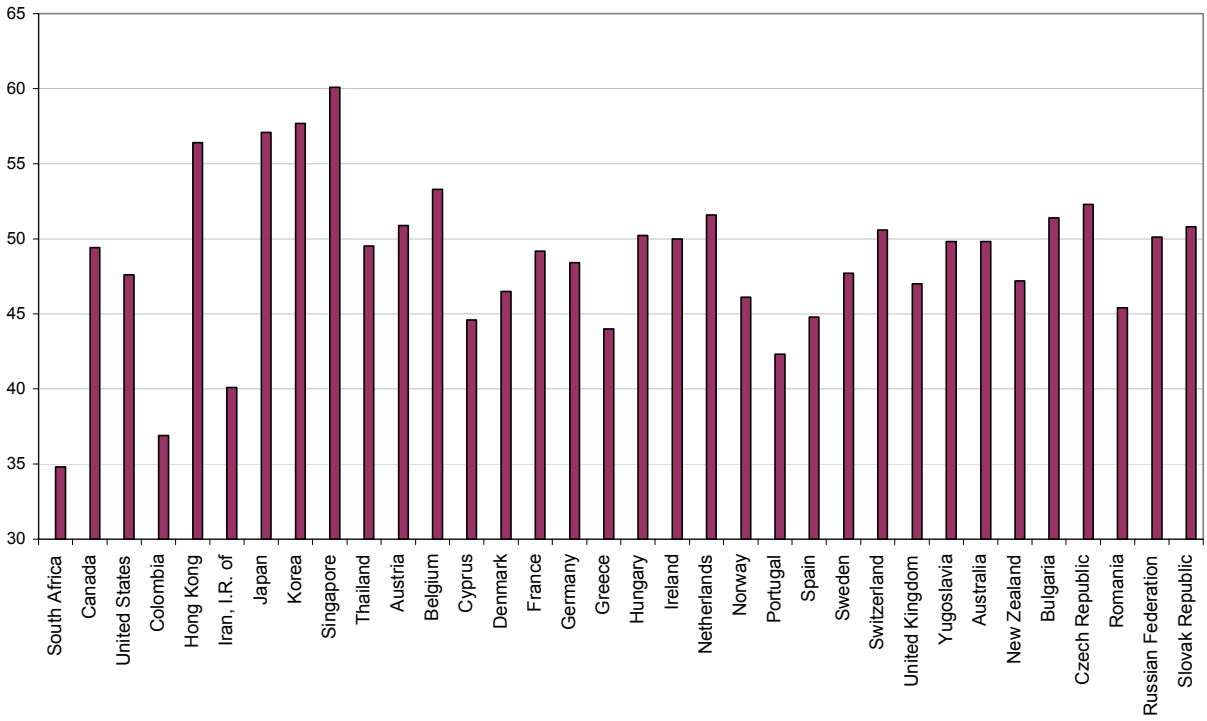
Source: Same as Figure 1.

Figure 3 - Percentage of "no schooling" in the population over age 15



Source: Barro and Lee (1993) data set.

Figure 4 - International Test Scores: `Math, 1993-98, age of pupils: 13`



Source: Same as Figure 3.

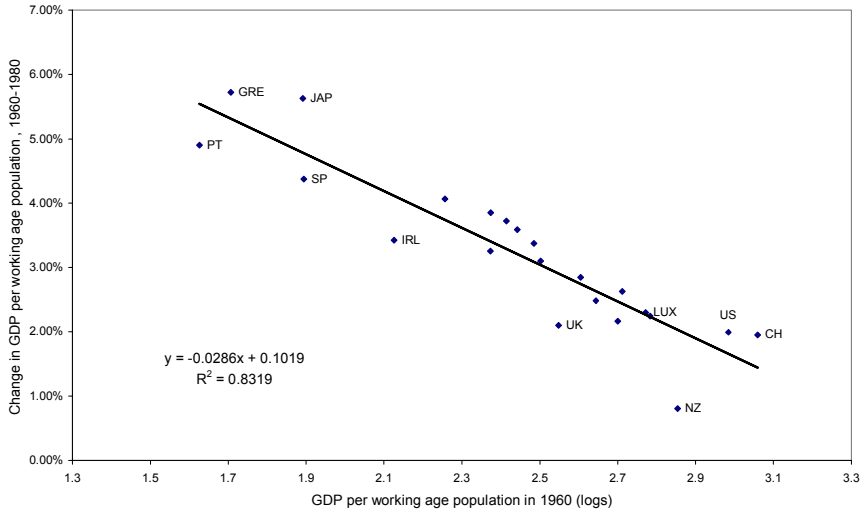
Table 3 – Stochastic convergence: Portugal-EU

	I	II	III	IV	V	VI	VII	VIII
	Dependent: Relative GDP per working age population (logs)				Dependent: Relative GDP per worker (logs)			
Discontinuities	none	1974	1974 1986	1974 1993	none	1974	1974 1986	1974 1993
ρ	0.74	0.49	0.37	0.49	0.66	0.25	0.21	0.08
ADF	*-2.7*	*-4.8* **	*-4.6*	*-4.2*	*-2.7*	*-4.4* *	*-4.1*	*-4.8* *
Impetus of catch-up:								
First segment		0.030 *10.0*				0.021 *9.5*		0.021 *11.6*
(+) Break 1		-0.022 *-7.3*				-0.008 *-3.5*		-0.008 *-4.1*
(=) Second segment		0.008				0.013		0.013
(+) Break 2								0.007 *2.1*
(=) Third segment								0.020
Adjusted R-squared		0.544	0.556	0.515	0.174	0.335	0.306	0.361
S.E. of regression		0.0173	0.0171	0.0179	0.1295	0.0194	0.0198	0.0190
Lags used	5	1	1	1	0	1	1	1
LM(SC,2)	1.13	1.20	4.45	1.15	2.94	2.21	4.32	2.93
Included observations:	35	39	39	39	40	39	39	39

Notes: t-ratios in italic. (**) and (*) denote significance of the unit root test at 1% and 5%, respectively. LM(SC, 2) denotes the Breusch-Godfrey tests for the null of no serial correlation of order 2. Critical values for the unit root test without discontinuities are from MacKinnon (1991). The critical values for the unit root null with structural breaks are from Rappoport and Reichlin (1989): 4.73 and 4.08 (models with two segments) and 5.45 and 4.76 (models with three segments). In the table, the line labelled "first segment" displays the estimate of $\widetilde{\beta}_0$. Lines labelled "break 1" and "break 2" display the implied changes in the slope $\widetilde{\beta}_1$, $\widetilde{\beta}_2$ (see explanations below).

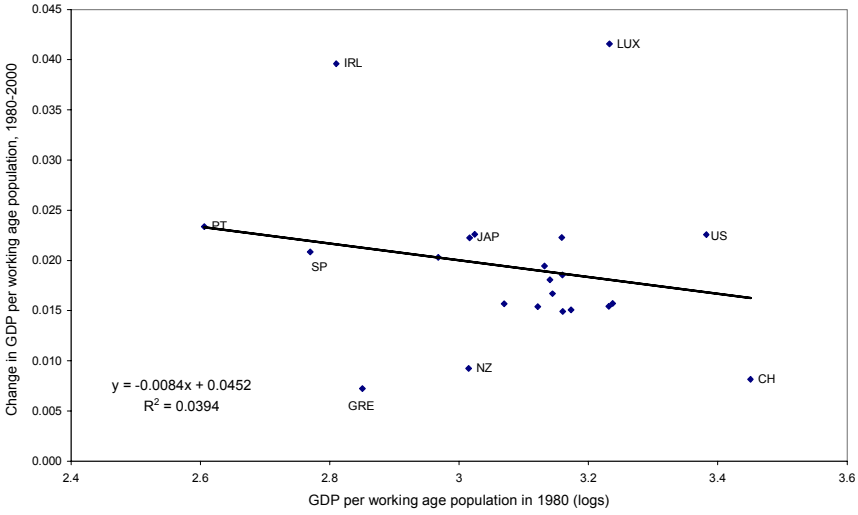
Method: Let z_t denote the dependent variable, $D_i = \begin{cases} 0 & when \quad t < i \\ 1 & when \quad t \geq i \end{cases}$ and i the time of the structural break. For columns III, IV, VII and VIII we run $\Delta z_t = \alpha_0 + \alpha_1 D_1 + \alpha_2 D_2 + \beta_0 t + \beta_1 D_1 t + \beta_2 D_2 t + (\rho - 1) z_{t-1} + \delta \Delta z_{t-1} + u_t$. Estimates in columns II and VI are computed in a similar way, imposing $\alpha_2 = \beta_2 = 0$. Column I and V display the results of simple unit root tests. Whenever the unit root null is rejected, the "impetus of catch-up" is also displayed. This is estimated by non-linear least squares, imposing $\alpha_i = \widetilde{\alpha}_i (1-\rho) + \widetilde{\beta}_i (\rho - \delta)$ and $\beta_i = \widetilde{\beta}_i (1-\rho)$, so as to obtain directly in the output the coefficients and t-statistics of the equivalent representation: $z_t = \widetilde{\alpha}_0 + \widetilde{\alpha}_1 D_1 + \widetilde{\alpha}_2 D_2 + \widetilde{\beta}_0 t + \widetilde{\beta}_1 D_1 t + \widetilde{\beta}_2 D_2 t + \widetilde{u}_t$, in which $\widetilde{u}_t = \left[1 - (\rho + \delta) L + \delta L^2\right]^{-1} u_t$ is a zero-mean covariance-stationary process. The transformation requires the roots of the characteristic equation $\lambda^2 - (\rho + \delta)\lambda + \delta = 0$ to lie inside the unit circle of the complex plan, which in equations above is always satisfied (see Freitas, 1992, for further details).

Figure 5- Growth rates versus initial levels, GDP per working age population, 1960-1980



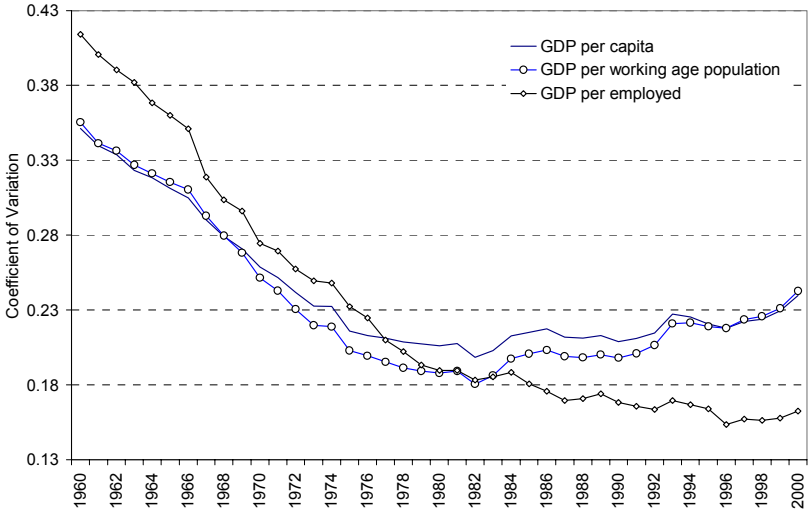
Sample: 22 OECD countries: Portugal (PT), Luxembourg (LUX), Belgium (BEL), Denmark (DNK), Germany (GER), Greece (GRE), Spain (SP), France (FR), Ireland (IRL), Italy (IT), Holland (NDL), Austria (AUT), Finland (FIN), Sweden (SWE), United Kingdom (UK), United States (US), Japan (JP), Canada (CAN), Switzerland (CH), Norway (NOR), Australia (AUS), New Zealand (NZ).
Source: Same as Figure 1.

Figure 6- Growth rates versus initial levels, GDP per working age population, 1980-2000



Source, Sample: Same as Figure 5.

Figure 7 – Sigma convergence



Source: Same as Figure 1.
Sample: Same as Figure 5.

Table 4. Tests for unconditional convergence

		N	β	λ	t		σ_0	σ_T	T_3	
GDP per working age population										
1960-1980	G22	22	-0.029	0.044	*6.6*	**	0.39	0.20	*7.8*	**
	EU15	15	-0.026	0.036	*6.0*	**	0.35	0.19	*5.5*	**
1980-2000	G22	22	-0.008	0.009	*0.8*		0.20	0.23	*-1.2*	
	EU15	15	-0.006	0.006	*0.4*		0.19	0.25	*-1.7*	
Per capita GDP										
1960-1980	G22	22	-0.026	0.036	*5.5*	**	0.39	0.22	*5.8*	**
	EU15	15	-0.023	0.031	*5.0*	**	0.36	0.21	*4.4*	**
1980-2000	G22	22	-0.014	0.016	*1.4*		0.22	0.23	*-0.3*	
	EU15	15	-0.013	0.015	*0.9*		0.21	0.24	*-0.6*	
GDP per employed										
1960-1980	G22	22	-0.030	0.047	*6.5*	**	0.45	0.21	*9.1*	**
	EU15	15	-0.028	0.041	*3.8*	**	0.38	0.21	*4.7*	**
1980-2000	G22	22	-0.020	0.026	*2.6*	*	0.21	0.17	*1.7*	*
	EU15	15	-0.016	0.020	*1.6*		0.21	0.19	*0.6*	

Samples: G22 refers to the sample described in Figure 5. EU15 refers to all European Union countries. Notes: (**) and (*) denotes significance at 1% and 5%, respectively. N refers to the number of countries; β is the measure of beta-convergence, obtained running $(x_{iT} - x_{i0})/T = \alpha - \beta x_{i0} + \varepsilon_i$, where: $x_{i\tau}$ is the value of the dependent variable at hand (in logs) in country i at time τ; 0 and T refer to the first and last period of the sub-sample considered. The implied speed of convergence, λ, is obtained from $\beta = -\left(1 - e^{-\lambda T}\right)/T$. The t –statistic tests the significance of λ. σ_τ is the cross-section standard deviation of $x_{i\tau}$. The last column displays the values of the Carree and Klomp (1997) statistic, $T_3 = (N)^{0.5} \dfrac{\sigma_0^2 / \sigma_T^2 - 1}{2\left(1 - (1+T\beta)^2\right)^{0.5}}$, which has a standard normal distribution under the null of no sigma-convergence.

Table 5 – Regression variables explaining growth between 1980 and 2000

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
C	0.05	0.03	0.08	0.07	0.11	0.05	0.09	0.09	0.09	0.10	0.12
	1.6	*1.0*	*2.7*	*3.9*	*4.0*	*2.1*	*3.8*	*4.0*	*4.1*	*4.2*	*3.8*
GDPWAP80	-0.008	-0.030	-0.042	-0.042	-0.037	-0.011	-0.039	-0.038	-0.041	-0.041	-0.035
	-0.9	*-2.6*	*-5.6*	*-5.8*	*-5.0*	*-1.3*	*-4.2*	*-4.3*	*-4.8*	*-4.8*	*-4.1*
SKILL		0.00033	0.00033	0.00034	0.00032		0.00034	0.00035	0.00032	0.00033	0.00031
		1.6	*2.7*	*3.0*	*2.4*		*2.7*	*2.9*	*2.6*	*2.7*	*2.3*
EMPROT			-0.0029	-0.0029	-0.0026		-0.0029	-0.0025	-0.0036	-0.0030	-0.0026
			-2.7	*-2.8*	*-2.4*		*-1.8*	*-2.1*	*-2.8*	*-2.6*	*-2.1*
INST		0.0044	0.0035	0.0039			0.0039	0.0040	0.0038	0.0039	
		2.0	*1.7*	*3.3*			*3.0*	*3.2*	*3.0*	*3.0*	
GOVX							-0.00012	-0.00017			
							-0.7	*-1.2*			
GINV							0.0008		0.0015		
							0.4		*1.1*		
INFL			-0.0002		-0.0011						-0.0011
			-0.3		*-2.5*						*-2.3*
NZD		0.02	0.02	0.02	0.02						
		1.6	*2.8*	*3.2*	*2.1*						
R-squared	0.039	0.421	0.772	0.771	0.723	0.099	0.752	0.748	0.741	0.716	0.656
Adjusted R-squared	-0.009	0.285	0.675	0.695	0.630	0.043	0.617	0.643	0.633	0.629	0.550
S.E. of regression	0.00832	0.00701	0.00387	0.00375	0.00413	0.00637	0.00403	0.00389	0.00394	0.00396	0.00437
Included observations	22	22	21	21	21	18	18	18	18	18	18

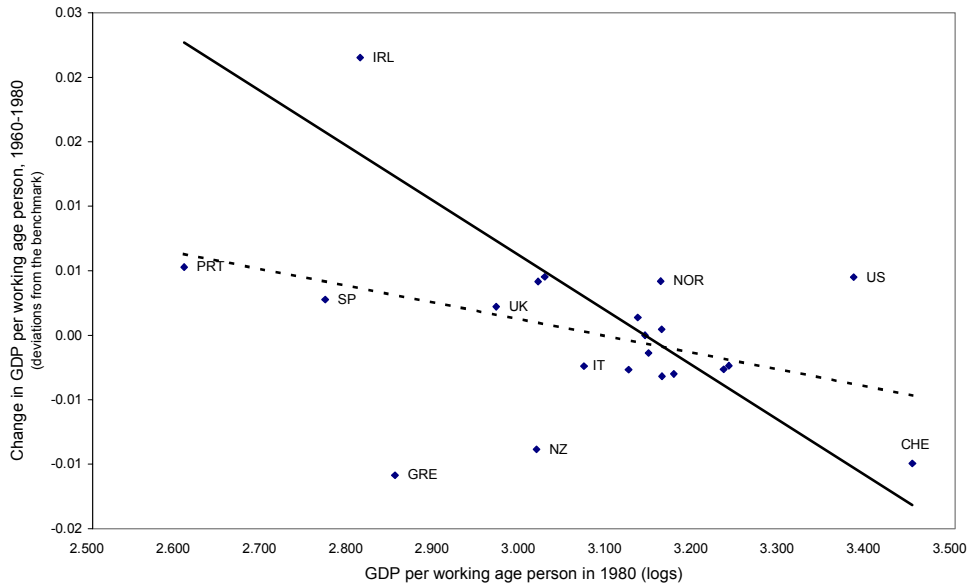
Notes: t-statistics in italic.
Dependent: Average annual change in log of GDP per working age person between 1980 and 2000
Explanatory variables (further details in Appendix 1):
GDPWAP80: Log of GDP per working age person in 1980.
SKILL – Availability of technically skilled labour
EMPROT – Overall strictness against dismissals, late 1980s.
INST - Institutional quality index, 1980.
GOVX - Ratio of total government expenditures to GDP, average 1980-2000.
GINV - Government investment divided by GDP, average 1980-2000.
INFL - Average CPI inflation rate along 1980-2000.
NZD: Fraction of years during the period 1980-1990 in which the country is rated as an open economy according to the criteria in Sachs and Warner (1995).
Samples:
22: Portugal, Luxembourg, Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Holland, Austria, Finland, Sweden, United Kingdom, United States, Japan, Canada, Switzerland, Norway, Australia, New Zealand.
21: All but Luxembourg.
18: Excludes Luxembourg, Switzerland, Australia, New Zealand.

Table 6 – Sources of differential growth

	Portugal	Spain	Greece	Ireland	New Zealand	United States
Equation IV						
Actual growth rate	2.34	2.08	0.72	3.96	0.92	2.26
Predicted	2.39	1.79	1.06	3.51	0.92	1.50
Of which:						
Catch up effect	2.27	1.57	1.23	1.40	0.53	-1.03
SKILL	-0.17	-0.29	-0.24	0.67	-0.21	0.09
EMPROT	-0.49	-0.23	0.17	0.43	0.40	0.84
INST	-0.82	-0.86	-1.70	-0.59	-0.06	0.00
NZD	0.00	0.00	0.00	0.00	-1.33	0.00
Benchmark growth rate	1.60	1.60	1.60	1.60	1.60	1.60
Residual	-0.05	0.30	-0.33	0.45	-	0.76

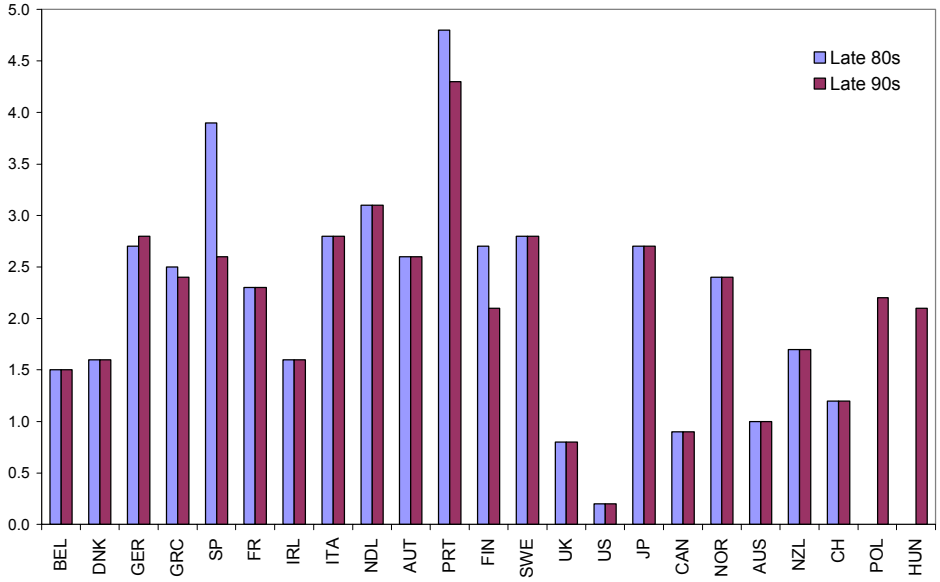
Source: Own calculations, using equation IV from Table 5. The table displays (a) the actual growth rate along 1980-2000, g_i, (b) the predicted rate, $\hat{g}_i = \hat{\alpha} - \hat{\beta}x_{i0} + \hat{\gamma}z_i$, where x_{i0} is the (log) GDP per working age person in 1980 and z_i is the vector explanatory variables, and (c) the residuals $\hat{\varepsilon}_i = g_i - \hat{g}$. The predicted growth rate is break down by the effects of the explanatory variables, redefined in terms of deviations from the benchmark economy, Holland. That is, $\hat{g}_i = \hat{g}_{NED} - \hat{\beta}(x_{i,0} - x_{NED,0}) + \hat{\gamma}(z_i - z_{NED})$.

Figure 8 – Actual growth rates versus "catch-up" effect



Notes: Referring to the notes in Table 6, the figure displays deviations from the benchmark growth rate, $(g_i - g_{NED})$ against initial income, x_{i0}. The dashed line depicts the fitted values of the simple unconditional model (as in figure 6). The thick line depicts the catch-up effect, as implied by equation IV, $\hat{\beta}(x_{i,0} - x_{NED,0})$.

Figure 9 - Employment strictness of protection against dismissals



Source: OECD (1999).

Appendix 1

Table A1: Data used

country	PCGDP growth 1980-2000	GDPPW growth 1980-2000	GDPWAP growth 1980-2000	SKILL 1980s	EMPROT 1980s	INST 1980s	YOPEN	GOVX 1980-2000	GINV 1980-2000	INFL 1980-2000
LUX	4.1	2.5	4.2	64.35	na	10.0	1959	45.2	4.8	3.7
BEL	1.9	1.8	1.9	64.35	1.5	9.7	1960	55.5	2.7	3.2
DNK	1.7	1.6	1.6	71.37	1.6	9.7	1960	57.7	2.0	4.2
GER	1.7	1.6	1.5	71.43	2.7	9.6	1959	48.1	2.4	2.4
GRC	1.0	0.7	0.7	53.76	2.5	5.5	1959	42.1	3.1	14.2
SP	2.5	1.7	2.1	52.22	3.9	7.6	1960	40.8	3.5	6.7
FR	1.6	1.7	1.5	52.42	2.3	9.3	1959	52.6	3.3	4.1
IRL	4.6	3.4	4.0	80.86	1.6	8.3	1966	46.4	3.0	5.2
ITA	1.8	1.5	1.6	57.25	2.8	8.2	1959	51.4	3.0	7.2
NDL	1.9	1.1	1.8	60.98	3.1	9.8	1959	53.8	3.4	2.5
AUT	1.9	2.0	1.7	74.36	2.6	9.4	1960	53.5	3.4	2.9
PRT	2.7	2.8	2.3	56.02	4.8	7.7	1960	43.1	3.8	11.4
FIN	2.2	2.8	2.3	63.02	2.7	9.7	1960	51.1	3.4	4.3
SWE	1.5	1.8	1.5	62.96	2.8	9.6	1960	64.4	3.3	5.6
UK	2.1	2.1	2.0	48.70	0.8	9.3	1960	44.6	2.0	4.7
US	2.3	1.6	2.3	63.78	0.2	9.8	1950	34.8	2.6	3.4
JP	2.3	2.1	2.2	65.99	2.7	9.4	1962	33.2	5.6	1.3
CAN	1.6	1.1	1.5	58.81	0.9	9.7	1952	46.5	2.6	3.7
NOR	2.4	2.0	2.2	67.86	2.4	9.6	1960	48.0	3.4	5.0
AUS	2.1	1.6	1.9	61.22	1	9.4	1964	na	na	4.7
NZL	1.2	1.3	0.9	54.63	1.7	9.6	1986	na	na	6.2
CH	0.9	0.4	0.8	63.64	1.2	10.0	1950	na	na	2.7

PCGDP: GDP divided by total population. 1995 PPS, logs (European Commission).
GDPPW: GDP divided by the number of employees. 1995 PPS, logs (European Commission).
GDPWAP: GDP divided by the working age population. 1995 PPS, logs (European Commission).
SKILL – Availability of technically skilled labour (World Competitiveness Yearbook, 1991).
EMPROT – Index of employment protection (overall strictness against dismissals, late 1980s, OECD, 1999).
INST - Institutional quality index (Sachs and Warner's, 1997). Average 5 sub-indexes, each based on survey data compiled during the 1980s from Political Risk Services, measuring (1) the rule of law (2) the bureaucratic quality (3) the corruption in government (4) the risk of expropriation (5) the government repudiation of contracts.
GOVX - Ratio of total government expenditures to GDP, average 1980-2000. Levels were adjusted for the 1995 accountancy change (own calculations using data from the European Commission).
GINV - Government investment divided by GDP, average 1980-2000. Levels were adjusted for the 1995 accountancy change (own calculations using data from the European Commission).
INFL - Average CPI inflation rate along 1980-2000 (European Commission).
YOPEN: Sachs and Warner (1995) timing of trade liberalisation. This measure is based on the satisfaction of 5 requirements at the same time: (1) average tariff rates below 40 percent; (2) average quota and licensing coverage of imports of less than 40 percent; (3) a black market exchange rate premium that averaged less than 20 percent during the decade of the 1970s and 1980s; and (4) no extreme controls (taxes, quotas, state monopolies) on exports.

Figure A1 - Partial association between GDPWAP growth and 1980 GDPWAP

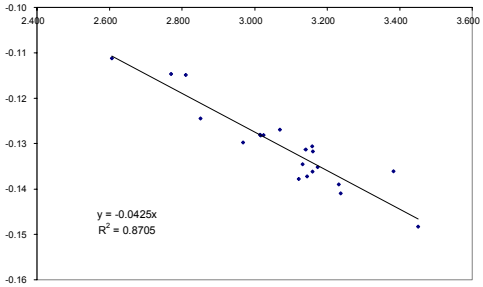


Figure A2 - Partial association between GDPWAP growth and SKILL

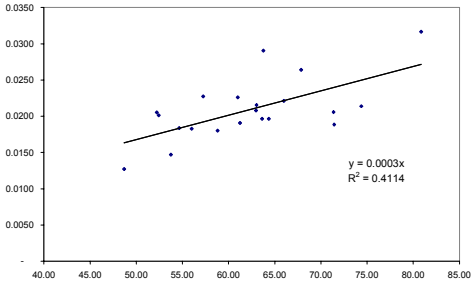


Figure A3 - Partial association between GDPWAP growth and EMPROT

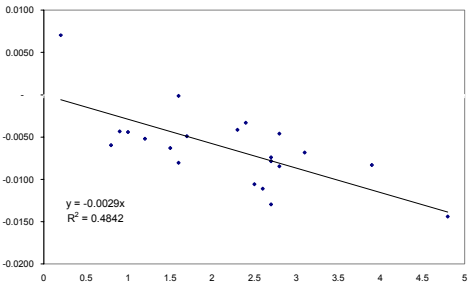
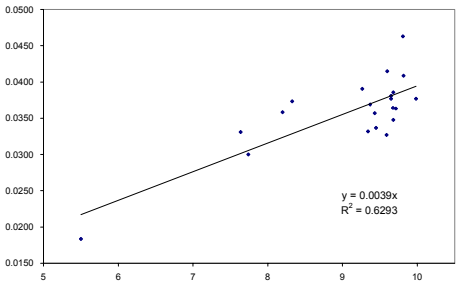


Figure A4 - Partial association between GDPWAP growth and INST



Source (all figures): Own calculations, using the results of regression IV, Table 5(see Barro, 1991).