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MAIN PATTERNS OF ECONOMIC GROWTH IN OECD COUNTRIES*

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This paper provides a comprehensive account of the most salient features of long run macroeconomic performance in the OECD from 1960 to 1990. Using the constant returns model as an organizing framework, we confirm the importance of capital accumulation for growth and find evidence of a limited catching-up process among OECD economies. However, this process is not stable across countries nor across time periods, and seems to have been severely affected by the unequal response of countries to the short run macroeconomic shocks of the late seventies and eighties. Many aspects of the OECD growth process cannot be explained within the limits of the exogenous growth model and suggest the necessity of an alternative theoretical framework.

1. Introduction and basic facts

Much effort has been devoted in recent times to study some of the most prominent features of medium term macroeconomic performance in the OECD, exploiting both the time and the cross-section dimension of data sets. The analysis of comparative unemployment experiences (Layard and Nickell (1992)) and, to a lesser extent, of business cycle phenomena (Danthine and Donaldson (1993) and Backus, Kehoe and Kydland (1993)), are examples of such approaches. In this paper we exploit the same kind of time and cross-section information to focus on long run issues, trying to uncover the most relevant facts of the growth process in the OECD. There are three main motivations for this exercise. First, welfare depends mainly on per capita income growth over the long run. Second, there is a renewed interest in growth models among economists, partially due to the important

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theoretical developments over the last decade. Third, and most important, we show that many important features of the growth process in the OECD are difficult to explain within the framework of exogenous growth models with constant returns to scale. This is against the consensus view in this field, and also despite the fact that the OECD is among the world economic regions the one which better fits the assumptions of the canonical growth model.

The OECD is the club of the richest countries in the world, sharing many economic and political institutions, for which an homogeneous data set can be assembled; moreover, the OECD presents an adequate balance of common institutional features and varying economic experiences which renders it most suitable to test macroeconomic theories. There is a well established result in the empirical literature of growth concerning the pattern of convergence among OECD economies (Barro and Sala-i-Martín (1991), Mankiw *et al.* (1992)). For most authors, the long run performance of the OECD economies is the best example of convergence as predicted by the exogenous growth model in either its simple or some augmented version. This is the reason why the Solow constant returns to scale framework (Solow (1956)) will be used a guideline throughout the paper. We shall present the features of growth in the OECD within the framework of standard convergence regressions to show that, despite what is generally agreed, this framework is unable to account for most of these features, suggesting the necessity of a broader view. This can be seen as a test of the exogenous growth model against a non fully specified hypothesis, rather than trying to test some particular model of endogenous growth. The endogenous growth literature has already produced a wide range of models, each of which highlights a particular «engine of growth». However, from an empirical point of view, most of these models are still on their infancy. On the one hand, some of their empirical propositions deal with variables for which not reliable data sets still exist; on the other hand, even if one could discriminate among the exogenous and the endogenous growth models, it is very difficult to discriminate among alternative incarnations of the endogenous growth approach on the basis of the empirical evidence (Pack (1994)).

The most salient patterns we find in the data can be summarized as follows. The OECD presents a unique record of sustained growth and narrowing income differentials, as compared with other regions in the world. To achieve this, OECD countries have devoted a significant and rather stable proportion of GDP to accumulate physical and human capital, although the contribution of well functioning economic and political institutions cannot be denied. Catching-up has proceeded faster in productivity than in per capita terms. There has been persistence in growth rates, although poorer countries have grown faster than the richer ones. All these features are well known, and fit rather well within the limits of the exogenous growth models. There are other evidences though, that pose a challenge to the standard view.

The different behaviour of productivity as compared with per capita income can be explained by the widening gap in employment rates among the OECD

economies. The unequal response of growth rates to the macroeconomic shocks of the seventies and eighties, cannot be understood without taking into account these huge disparities in the evolution of unemployment rates; this is troublesome from the perspective of full employment models. A more disaggregated look at this evolution, uncovers important differences among the countries in the OECD. The behaviour of accumulation rates and initial conditions do not properly capture the whole of the observed variation among growth rates, leaving some room for country specific effects. In particular, from 1975 to 1985 the convergence model underpredicts the rate of growth of the rich countries, whereas it overpredicts that of the poor countries. A closer scrutiny confirms the importance of country specific features. The ranking among OECD economies has remained stable all along the sample period. A group of five countries (Spain, Ireland, Portugal, Greece and Turkey) has stayed persistently at the bottom of the distribution and something similar can be observed at the other end. On the other hand, there have been a few sharp changes in the ranking. The upward movement of Japan and the downgrading of New Zealand might be responsible for a great deal of what has been considered aggregate convergence. Finally, the ranking has been far less stable in productivity terms, in which a substantial amount of overtaking has taken place.

Most of the convergence in the OECD took place during the first part of the sample period, until 1975, and resulted from the fast catching-up of the group of poorest countries. Similarly, the recession hit the most to this group of countries, whose gap with the OECD average started to widen again. So it seems as if convergence is mainly a feature of good times, whereas during the recession, the forces behind the catching-up process have ceased to operate. This indicates that medium term macroeconomic shocks might be more relevant than is usually assumed in the growth literature. While some authors have criticized the correlations among growth rates and short run macroeconomic indicators, on the basis of the lack of statistical robustness (Levine and Renelt (1992)), we find them to be very robust at the OECD level.

Growth is positively correlated with export growth and negatively so with inflation and money variability, while public consumption and deficits turn out to be non significant in most of the enlarged convergence regressions. The explanatory power of these variables is even greater than that of the Solow model variables for some periods. The slowdown in growth rates in 1975-1985, with respect to the previous years, is rather well accounted by the extraordinary rise in inflation among the poorer countries, and by the reduction in export growth in the richer ones. The most recent recovery (1985-1990) has also been associated with an unequal response of these macroeconomic factors across country groups. However, including these variables does not help to eliminate the systematic positive residual of convergence regressions for rich countries, nor the negative one for poor countries. After controlling for these variables, there is still room for country specific factors to explain the long run experience of the OECD countries.

The paper is organized as follows. In Section 2 we present the basic facts of the evolution of growth rates for the OECD during the period 1960-1990.

We compute dispersion and convergence measures and their time evolution, and analyze the relation of growth rates with their main determinants. In Section 3 we look at some of these facts in more detail, disaggregating across groups of countries and across shorter time periods. In Section 4 the correlation pattern among growth and medium term macroeconomic indicators is analyzed. In Section 5 we conclude with some remarks about what we have learnt from this exercise and how it can be used to suggest avenues for further empirical and theoretical research.

2. Growth and convergence

Although subject to many criticisms, the constant returns to scale framework does not appear *prima facie* at odds with some of the features of the long run evolution of the OECD economies. In Figures 1 and 2 we compare two of these features across world economic regions. As can be seen in Figure 1, the OECD and Asia are the only regions with substantial and steady GDP per capita growth during the sample period[1]. Furthermore, the share of GDP devoted to increase the capital stock is higher and far more stable in the OECD than in other regions (Figure 2).

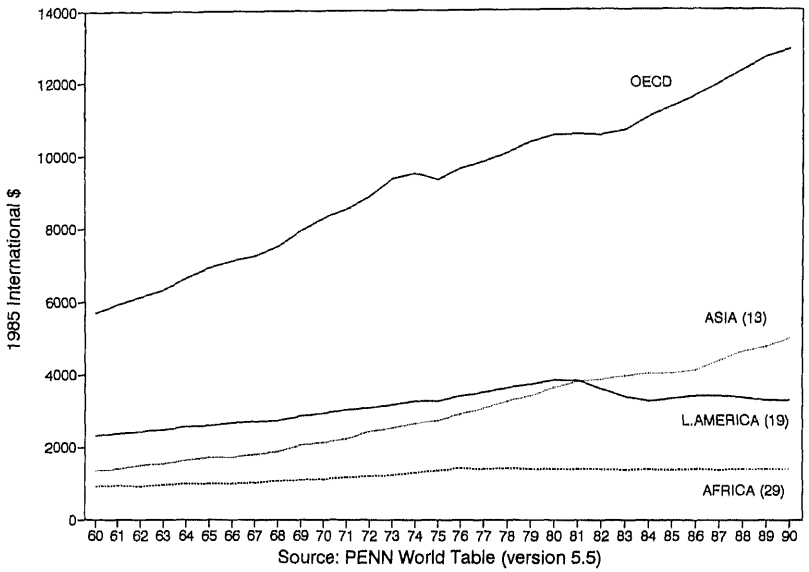


Figure 1
GDP Per capita across world regions

In Table 1 we present the basic information on growth rates in both per capita income and productivity[2]. The average rate of growth of income per capita (per worker) between 1960 and 1990 was 2.97 (2.84) for the OECD, and slightly higher

[1] Data in this figure are from the *Penn World Table 5.5*, an updated version of Summers and Heston's (1991) data set.

[2] Data in this table and hereafter come mainly from OECD statistics using OECD PPP's. See Dabán, Doménech and Molinas (1994) and Andrés, Doménech and Molinas (1995) for further details.

TABLE 1

COUNTRY	1960-1990 AVERAGES											1960-1975 and 1985-1990 AVERAGES			1975-1985 AVERAGES				
	Rates of growth (%)			GDP/N		GDP/L		Real	Nominal	Enrolment rates		Rates of growth (%)		Real	Rates of growth (%)		GDP/L		Real
	GDP/N	GDP/L	N	1960 (USA=100)	1990 (USA=100)	1960 (USA=100)	1990 (USA=100)	I/GDP	I/GDP	2nd.	3rd.	GDP/N	GDP/L	I/GDP	GDP/N	GDP/L	1975 (USA=100)	1985 (USA=100)	I/GDP
Australia	2.22	1.72	1.62	67.25	73.07	63.02	75.41	22.78	24.64	67.50	20.36	2.47	1.74	23.37	1.71	1.68	75.78	75.21	21.60
Austria	3.21	3.03	0.30	52.03	75.63	46.51	81.83	21.65	25.58	66.83	16.24	3.63	3.85	22.06	2.37	1.39	68.09	72.15	21.08
Belgium	3.08	3.00	0.29	53.27	74.59	53.48	93.48	16.47	20.23	83.67	20.16	3.70	3.34	17.22	1.85	2.32	69.87	70.36	14.93
Canadá	2.84	1.69	1.33	66.59	86.86	73.44	87.49	18.72	22.27	75.17	35.21	3.07	1.78	18.62	2.39	1.50	82.01	86.91	19.05
Switzerland	1.89	1.76	0.80	97.20	95.85	71.87	87.45	21.57	25.78	51.83	17.15	2.16	2.24	22.59	1.35	0.81	98.43	94.34	19.67
Germany	2.65	2.81	0.44	67.73	83.61	53.82	88.94	18.75	22.49	68.16	18.16	2.81	3.22	19.57	2.32	1.99	76.39	80.52	16.84
Denmark	2.56	2.00	0.39	63.17	75.73	53.53	69.75	18.79	21.37	92.83	21.60	2.59	2.17	20.02	2.49	1.66	71.52	76.62	16.43
Spain	3.75	4.29	0.81	31.76	53.66	30.69	77.58	17.50	23.44	63.50	15.33	5.25	4.81	18.34	0.75	3.25	52.37	47.36	16.18
Finland	3.45	3.31	0.40	48.57	75.53	37.98	72.41	27.18	26.18	89.00	19.39	3.90	3.95	28.29	2.56	2.02	65.32	70.48	24.65
France	2.94	3.27	0.73	58.81	79.13	50.84	96.37	18.55	22.65	72.17	21.19	3.48	3.74	19.15	1.86	2.33	75.53	76.17	17.60
United Kingdom	2.16	2.11	0.31	67.85	72.56	55.02	74.14	12.02	18.21	75.67	15.86	2.30	2.09	12.48	1.87	2.16	67.74	68.35	11.26
Greece	3.96	4.38	0.66	18.97	33.83	17.47	44.63	15.49	21.50	66.83	14.28	4.99	5.72	16.19	1.90	1.70	34.11	34.51	14.14
Ireland	3.49	3.99	0.71	31.22	49.14	31.39	73.12	16.93	21.94	73.50	16.17	4.01	4.22	16.19	2.46	3.54	39.09	41.74	19.02
Iceland	3.44	2.57	1.24	50.05	76.22	48.42	73.78	23.40	25.07	78.33	12.94	3.40	2.80	23.91	3.52	2.11	63.73	75.24	22.22
Italy	3.44	3.78	0.46	47.23	73.20	42.62	93.14	18.39	23.28	59.83	18.81	3.77	4.41	19.29	2.78	2.53	62.60	68.99	16.31
Japan	5.39	5.17	0.94	29.91	80.63	23.54	76.24	25.21	31.31	87.00	20.54	6.42	6.14	25.55	3.34	3.25	61.46	71.64	25.33
Luxembourg	2.62	2.03	0.64	75.18	91.16	66.95	87.22	21.10	25.16	84.32	20.62	2.83	1.98	22.53	2.18	2.14	78.54	81.67	18.20
Netherlands	2.40	2.31	0.88	63.50	72.77	57.49	81.88	18.35	22.82	80.17	22.86	2.99	2.96	19.53	1.23	1.00	74.99	71.00	15.92
Norway	3.23	2.85	0.56	50.10	73.27	43.69	73.22	29.66	28.31	80.50	18.59	2.98	3.01	29.59	3.73	2.54	62.07	75.06	30.02
New Zealand	1.31	1.17	1.18	75.13	61.86	67.15	67.92	14.24	22.63	79.50	22.65	1.44	1.46	14.58	1.03	0.61	73.49	68.17	13.68
Portugal	4.08	4.13	0.57	20.77	38.24	16.47	39.55	18.23	25.18	44.67	8.57	5.15	4.76	18.86	1.93	2.85	33.32	33.78	16.90
Sweden	2.40	2.07	0.45	67.26	77.16	52.66	70.08	17.46	21.04	73.67	22.26	2.90	2.60	18.32	1.39	1.01	80.42	77.45	15.68
Turkey	2.96	3.69	2.40	17.43	23.36	15.13	32.02	18.22	18.73	29.00	5.98	3.69	4.67	18.02	1.48	1.71	21.86	21.17	18.83
United States	1.94	1.09	1.09	100.00	100.00	100.00	100.00	17.25	18.71	93.48	48.84	2.01	1.34	17.51	1.79	0.60	100.00	100.00	16.73
OECD	2.97	2.84	0.80	55.04	70.71	48.88	75.73	19.50	23.27	72.38	19.74	3.41	3.29	20.07	2.10	1.95	66.20	68.29	18.43
EU	3.09	3.18	0.57	49.95	66.47	44.15	76.65	17.55	22.36	72.11	17.80	3.66	3.62	18.28	1.97	2.29	61.34	62.59	16.14
G7	3.05	2.85	0.76	62.59	82.28	57.04	88.04	18.42	22.70	75.92	25.52	3.41	3.25	18.88	2.34	2.05	75.10	78.94	17.59
OECD (6)	3.26	3.61	1.05	32.55	43.35	29.72	55.80	16.77	22.24	59.50	13.83	4.09	4.27	17.03	1.59	2.28	42.37	41.12	16.46

Sources: OECD (various publications), Human Capital from UNESCO (various yearbooks and own estimates) and own calculations
OECD (6) includes only the six poorest countries in 1990. GDP/N = GDP per capita. GDP/L = GDP per worker.

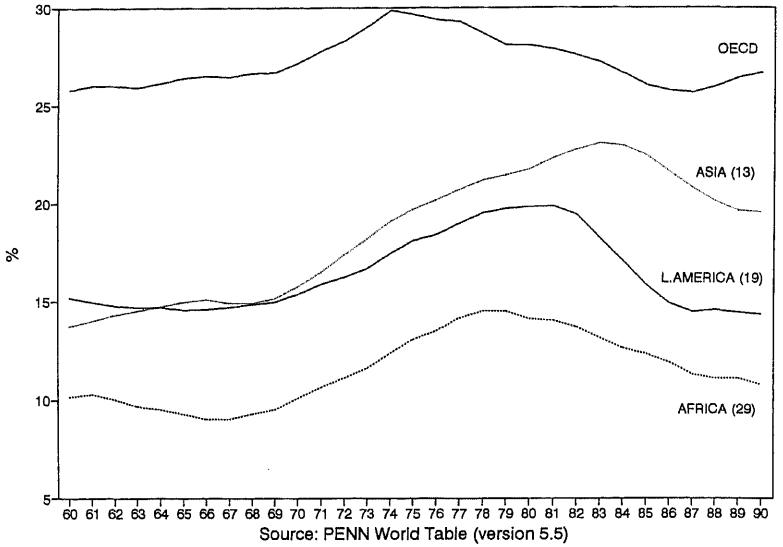


Figure 2
Ratio Investment/GDP (5 years moving averages)

for the European Union (EU), 3.09 (3.18) and the G7, 3.05 (2.85); while the six poorest countries in 1990 (OECD(6) hereafter: Turkey, Portugal, Greece, Ireland, Spain and New Zealand) grew at a faster rate, 3.26 (3.61). This growth process has been based in reasonable high investment/GDP rates (19.5), as well as in low population growth rates (0.8) and in a substantial investment in human capital (with 72.38 and 19.57 averages in secondary and university enrolment rates). Average growth has been far from homogeneous. Differences in accumulation rates explain part but not the whole of these differences. Some countries' relative success can be explained by relatively high savings rates; this is the case of Japan (5.39 growth rate and 25.21 savings rate), Finland (3.45 and 27.18), Norway (3.23 and 29.66) among the fast growers, and Great Britain (2.16 and 12.2) and New Zealand (1.31 and 14.24) among the slow growers. Variations in enrollment rates are even sharper and at first glance its correlation with growth rates is less clear; countries with very high enrollment rates (such as Denmark and USA) have grown less than others with much less human capital investment (Turkey, Portugal or Italy).

Perhaps the single most discussed issue in the growth literature during the recent years is whether the differences in per capita incomes and/or productivity across countries have narrowed or not along the growth process. A first look at the information in Table 1 suggests that the distance of most countries with respect to USA in income, and particularly in productivity levels, has fallen in relative terms, although with very different country experiences[3].

[3] Consider, for instance, the cases of Germany, Canada, Australia and the United Kingdom, with similar per capita incomes in 1960. Whereas Canada and Germany got very close to the USA level by 1990 (about the 85 per cent), the other two countries were still well below it (less than 75 per cent). This different pattern is also clear in other cases like Japan (30 per cent in 1960 and up to 80 per cent in 1990), Switzerland (stabilized around 96 per cent) and New Zealand (with a substantial worsening in its relative position).

A related issue is whether differences in (human and physical) accumulation rates account for differences in growth rates, or rather there is a genuine catching-up effect whereby poorer countries grow faster than richer ones due to higher investment opportunities. Barro and Sala-i-Martín (1991, 1992) have proposed two ways of presenting the information about the long run path of relative incomes: σ and β convergence. According to these autors, σ convergence is the variation over time of a measure of dispersion of the variable of interest across countries, and does not incorporate any prior about what the relevant model of the economy is. As such, it is only a crude measure of convergence, since the estimated variance of income across countries is contaminated by the variance of the shocks hitting the economy at any particular point in time[4]. Hence, even if the economies were truly getting closer in the long run, this statistic has a lower bound given by the variance of these shocks.

The evolution of the standard deviation of (the log of) per capita income and productivity across OECD countries is displayed in Figure 3. Both series start from a similar level in 1960, and since then there has been a steady reduction in dispersion until 1974, although much faster in output per worker than in output per capita. Afterwards, convergence in output per worker has proceeded at a slower rate, whereas that in per capita income has ceased to do so. For the period as a whole, the standard deviation of output per worker has fallen by 43 per cent, whereas the dispersion of per capita income has done so only by 33 per cent. As Figure 3 shows this fall in the dispersion of incomes is not a worldwide pattern (see also Parente and Prescott (1993)); in fact, it is very much an OECD feature. Starting from

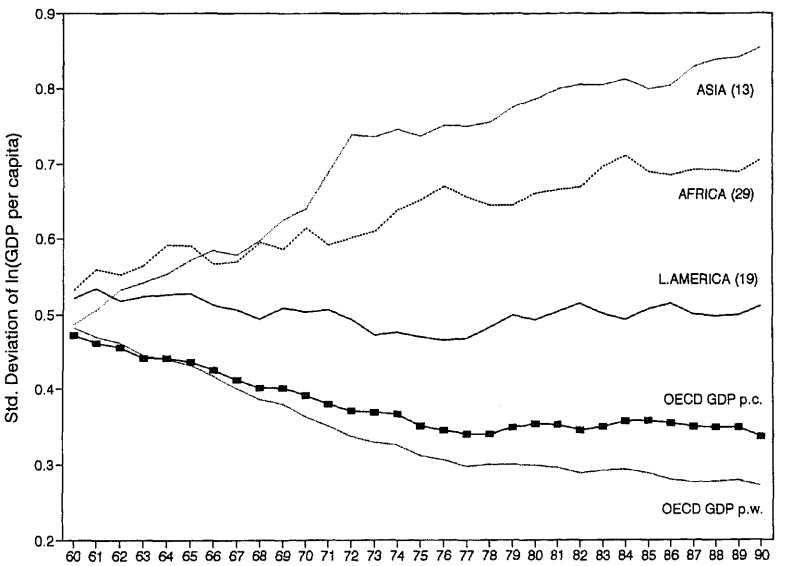


Figure 3
Sigma convergence across world regions

[4] In addition, the standard deviation is a single parameter that does not capture some interesting aspects of the distribution dynamics (Quah (1993a)).

comparable levels in 1960, dispersion in 1990 was much higher in Asia and Africa and has remained roughly constant in Latin America. The fall in dispersion points towards a clear pattern of convergence within the OECD, that has been brought about by the increased integration of goods and financial markets, as well as by the expansion of world trade. All these forces have led to an intensive technological catching-up as reflected in the steady and sizable fall dispersion in productivity. However, a much slower convergence in the demographic structure and in participation rates has resulted in a more limited convergence in income per capita. Besides, the unequal impact of macroeconomic shocks in the seventies and eighties might explain the interruption in the convergence process in per capita incomes in the OECD from 1974 onwards.

The different pattern in per capita income and productivity reflects a fundamental difference among more and less advanced countries. The decline in the dispersion of productivity has gone hand in hand with a sharp increase in the dispersion of employment rates. This can be seen in Figure 4, in which the time evolution of the standard deviation of employment rates across countries is depicted. The employment rate is defined as employment over total population; hence its variance reflects the behaviour of both participation and unemployment rates. This statistic displays a smooth rising trend until 1978 and a sharp increase thereafter. Some lagged countries have managed to close the gap with the most advanced ones in productivity terms at the cost of very low employment rates. These economies (most notably Spain) have achieved substantial output gains with very low employment creation.

Figure 4
Convergence in the employment rate

The notion of σ convergence does not isolate the different factors that contribute to growth, and hence that may lead different economies to fall apart or to get close in the long run. An alternative measure of convergence among countries focuses on whether poorer countries tend to grow faster than richer ones. This is what is known in the literature as β convergence. It can be obtained from a regression model like (1), in which y is output per capita (or per worker), x^* is its steady-state growth rate (which in this model corresponds to the rate of labour augmenting technological progress), $\hat{y}$ is output per capita (or per worker) in efficiency units and y^* its steady-state value; finally, T is the period of time considered, β is the convergence rate and u is the error term[5]:

$$(1/T)\ log(y_{it}/y_{i,t-T}) = x_i^* + (1/T)\ (1-e^{-\beta T})\ log(\hat{y}_i^*/\hat{y}_{i,t-T}) + u_{it} \qquad [1]$$

This measure has four major limitations for our purposes. First, it is not model free, in fact it is only valid in a model with a well defined steady-state and a saddle path dynamic structure, as the constant returns to scale exogenous growth model. Second, β is a measure of the speed at which each country's income moves towards its steady-state once it has been pushed away from it due to a particular shock. This is a single country implication of the model whose interpretation in a multi-country setting is not straightforward. Third, long run averages hide much useful information contained in annual growth rates, by imposing a particular structure to the long run component of per capita income[6]. Finally, as Quah (1993b) has made clear, a parameter like β estimated from multi-country cross section models after time averaging the data, is bound to deliver very little information; in particular, a positive $\hat{\beta}$ may be consistent with a non degenerate distribution of incomes in the long run.

Nevertheless, the model in [1] can still deliver some meaningful information about the determinants of the growth rate, in particular in the OECD sample, where the restrictive assumptions of the canonical growth are more likely to be met. A first look at the autocorrelation pattern of growth rates, uncover another specific feature of the OECD that is not inconsistent with the implication of the exogenous growth model. As Easterly *et al.* (1993) have pointed out, there is very little persistence in growth rates at a worldwide level, with the exception of the OECD, in which growth rates follow a first order auto-

[5] Barro and Sala-i-Martín (1991) prove the following relation among the standard deviation of the log of GDP per capita across countries (σ) and the speed of convergence (β):

$$\sigma_t^2 = \sigma_u^2 / (1 - e^{-2\beta}) + [\sigma_0^2 - \sigma_u^2 / (1 - e^{-2\beta})]\ e^{-2\beta t}$$

where σ_0^2 is the variance at the beginning of the sample period, and σ_u^2 is the variance of the residual in equation (1) below.

[6] This is particularly serious when thirty years averages are taken. It should be noticed that this procedure is equivalent to assume a deterministic linear trend structure for the long run component of income (see Quah (1993b)).

correlation process with declining persistence. Low persistence is difficult to explain in endogenous growth models, in which structural country characteristics determine the growth rates. Similarly, persistence should be high in exogenous growth models until countries approach their steady-state and start to bounce around it, following temporary idiosyncratic shocks. As Table 2 makes clear, persistence is quite substantial for the OECD as a whole and it declines steadily from 1960 to 1990; the virtual absence of inertia during 1980-85, and to a lesser extent 1985-1990, can be explained by the increase in macroeconomic turbulence during these years. Persistence is higher and declines by less, in productivity than in income per capita. This means that the catching-up in productivity still goes on, although somehow hidden in per capita terms due to different unemployment and participation experiences across countries.

TABLE 2
Persistence in Growth Rates

	Per Capita Income	Productivity
OECD		
1965-70	0.696**	0.737**
1970-75	0.217	0.635**
1975-80	0.308	0.487*
1980-85	−0.092	−0.069
1985-90	−0.121	0.295
EU		
1965-70	0.802**	0.831**
1970-75	0.776**	0.752**
1975-80	−0.019	0.573**
1980-85	−0.228	−0.068
1985-90	−0.061	0.415
OECD (18)		
1965-70	0.692**	0.753**
1970-75	0.046	0.536**
1975-80	0.683**	0.611*
1980-85	0.069	−0.085
1985-90	0.113	0.017
G-7		
1965-70	0.981**	0.951**
1970-75	0.362	0.884**
1975-80	0.216	0.881**
1980-85	0.011	0.247
1985-90	0.587	0.302

Note: In this table appear the correlations between current and lagged 5 years growth rates averages.
** Significant at 1% level.
* Significant at 5% level.

The declining pattern of autocorrelation in growth rates might be compatible with an endogenous growth model, if we assume that it has been caused by an asymmetric increase in the short term macroeconomic turbulence in the latest years of the sample. Alternatively, persistence should decline in an exogenous growth model as countries approach their steady state. Testing whether growth rates present a positive or a negative correlation pattern with initial income levels has become the most popular way of discriminating among these two approaches. This is what the β convergence concept is useful for. The absolute convergence version of the model assumes that $y^*_{i,t}$ is either constant or, at least, uncorrelated with $y_{i,t-1}$ and hence that it can be included in the error term and still obtain a consistent estimate of β in [1]. Nevertheless, the advantage of the β convergence model is that it allows us to relate growth rates with its main determinants in a well specified model. Figure 5 gives a first hint of an unambiguous negative correlation among growth and initial levels of per capita income in 1960[7], after controlling by the variables behind the (unobservable) steady-state (savings rate (I/GDP), human capital accumulation (SEC) and population growth). The relation is unambiguously negative and significant; according to this relation it is clear that low income countries in 1960 have enjoyed, on average, higher growth rates[8]. However, nothing in this picture implies that absolute differences have in fact shrunk during these years.

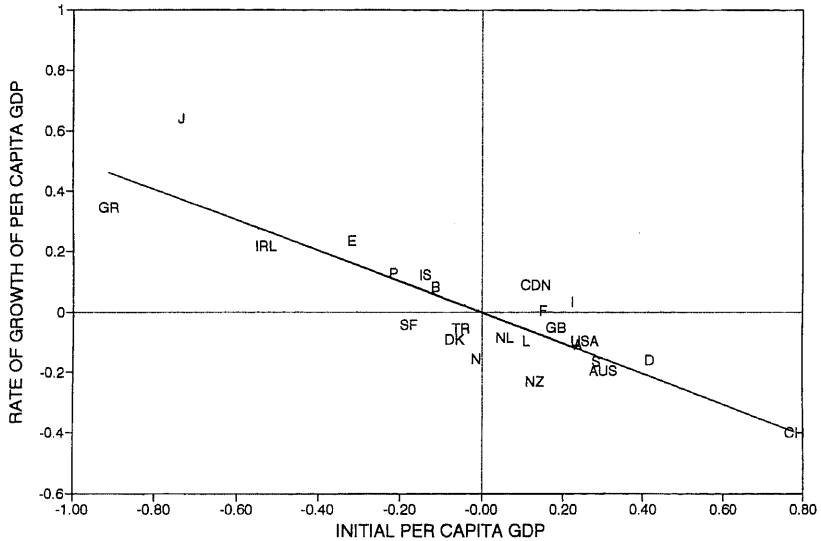
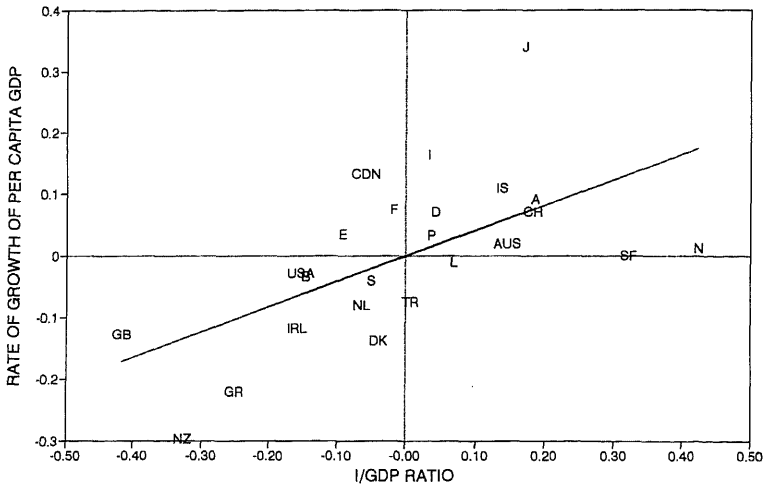


Figure 5
β convergence in OECD countries 1960-90

[7] A very similar picture is obtained using output per worker instead.

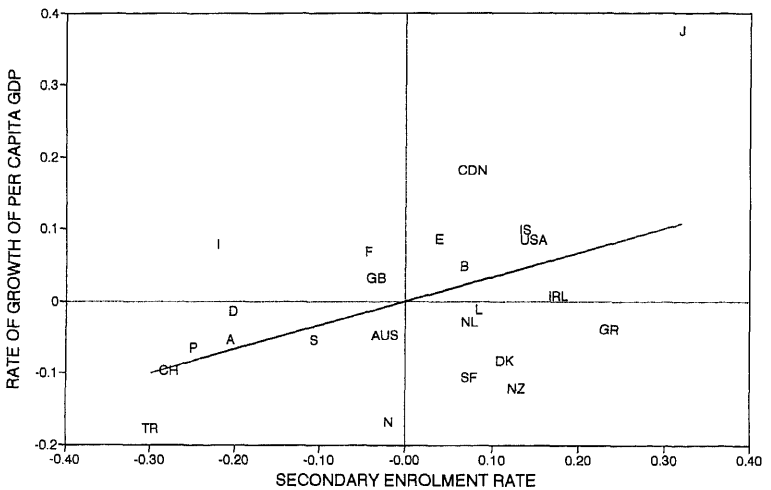
[8] Similar results are found in Mankiw *et al.* (1992), Dolado *et al.* (1993), Andrés *et al.* (1995) among others.

The partial correlation among growth, savings and human capital accumulation is represented in Figures 6 and 7. The correlation among growth and investment is positive and significant, and it remains so after controlling for initial income, population growth and schooling. This result is stable along the sample period, although it is heavily influenced by the experience of Japan, New Zealand and Great Britain, In particular, the case of Japan with extraordinary high rates of savings and growth during the sample period, has a strong influence in this result. The same significant positive correlation is found between growth and



Orthogonal Components to Initial Income and other Steady State Variables.
GDP p.c. growth = 0.41 ln(I/GDP)

Figure 6
Correlation I/GDP vs. Growth



Orthogonal Components to Initial Income and other Steady State Variables.
GDP p.c. growth = 0.33 ln SEC
(2.35)

Figure 7
Correlation Human Capital vs. Growth

schooling after controlling for the initial income, savings and population growth. Unlike the case of physical capital, this correlation does not hold all along the sample period, vanishing from 1980 onwards[9]. These partial correlations[10] do not necessarily imply any sort of causation running from the accumulation rates to growth. In fact, some recent studies suggest that this correlation might be weak if individual country effects are taken in account (Cohen (1993)) and that the direction of causality might be running from growth to capital accumulation (Blömstrom, Lipsey and Zejan (1993)). What they indicate though is that the information contained in the steady-state proxies might be relevant and should be incorporated in the β convergence analysis as is done in Figure 5.

3. On stability of growth and convergence within the OECD

In the previous section we got a picture of the main features of the long run evolution of the OECD as a whole, which was quite consistent with what standard growth models lead us to expect. However, underlying these basic relationships, there are many empirical results that deserve a more careful interpretation and a broader theoretical framework. In this section we discuss some of them which arise naturally when we look at the data from a more dissagregated perspective. This dissagregation proceeds both across countries and along time. The motivation to do so lies in two hints of structural instability in our sample, both across country groups and across shorter time periods, Let us first analyze in more detail the process of growth and convergence along time.

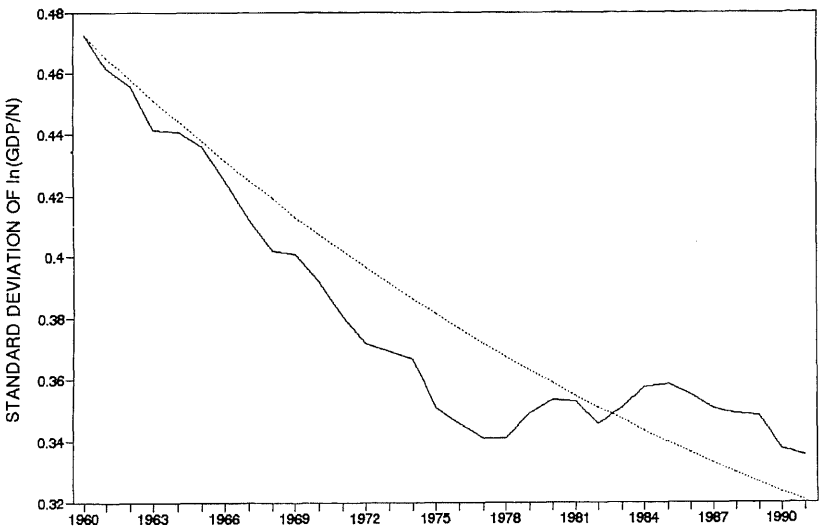


Figure 8
Sigma convergence in OECD

[9] Once the secondary schooling rates become very high in all countries, their variance might not be big enough as to explain differences in income levels. This suggests that maybe some other human capital proxy could be more informative for the OECD in recent times (e.g.: university enrolment rates).

[10] The correlation among growth and population growth is negative as expected, but is not reported here to save space.

In Figure 8 we have drawn again the GDP per capita σ convergence line, this time against the implicit σ convergence[11] that we would expect if the β coefficient we obtained were stable all along the sample period. The nature of the structural break which has taken place in the process of convergence is suggested by the fact that the observed sigma declined faster than the theoretical one until the mid seventies, and much more slowly thereafter. It might be argued that these lines display such unequal behaviour due to the increased variance of the medium term macroeconomic shocks, that is not removed in the σ convergence calculation. This could make compatible the stability of the simple exogenous growth interpretation with the observed lack of convergence (which considers short and long run movements in output as being orthogonal each other).

The obvious alternative explanation for the discrepancy among observed and implicit σ convergence is a change in the convergence rate. The information contained in Table 1 indicates that this might well be the case. During the 1975-85 decade, the OECD average per capita growth rate fell down to a 2.1 per cent annual rate (from 3.41 during the 1960-75 and 1985-90 period); the drop was even more dramatic among the poorest countries (from 4.09 to 1.59 per cent). Alongside with this slowdown, convergence ceased to proceed any further. Only Austria, Canada, Germany, Denmark, Finland, Iceland, Italy, Japan and Norway kept their catching-up process with respect to USA per capita GDP levels. Some countries simply managed to keep their relative position constant, while others were less fortunate and suffered a deterioration in relative real income (Spain, Netherlands, New Zealand, Sweden, Switzerland). This first hint of a slowdown in the rate of convergence associated to the overall fall in growth rates is corroborated by the low correlation among growth and initial conditions that we find during the 1975-85 decade. Initial income coefficient estimates in Table 3 display a clear pattern; they are high until 1975 to become smaller or even non significant until 1985 and recover a little since then. This is true regardless of whether we control for the accumulation rates or we do not. The worldwide recession has had different impact across OECD economies. The interpretation of this fall in the convergence rate across OECD economies should be made with caution. A fall in the convergence rate might be due to a homogeneous fall in the speed at which each country returns to its potential output, or rather to a sharp deterioration in macroeconomic performance in some particular countries, in relation with what their accumulation rates could indicate. The question is then whether we do face a time structural break or rather a cross-country one.

[11] Following Barro and Sala-i-Martín (1991) we compute the implicit σ convergence for each year as:

$$\sigma_t^2 = e^{-2\hat{\beta}}\,\sigma_{t-1}^2 + \sigma_u^2$$

where, according to footnote 5 we approximate σ_u^2 as

$$\sigma_u^2 = \left[\sigma_{90}^2 - \sigma_{60}^2\, e^{-60\hat{\beta}}\right]\left[1-e^{-2\hat{\beta}}\right]\left[1-e^{-60\hat{\beta}}\right]^{-1}$$

TABLE 3
Initial Income Coefficient Estimates
(Absolute β convergence equation)

	Per Capita Income	Productivity
OECD		
1960-90	−0.572	−0.723
1960-65	−0.544	−0.671
1965-70	−0.553	−0.703
1970-75	−0.751	−0.841
1975-80	−0.048*	−0.297*
1980-85	0.077*	−0.294*
1985-90	−0.425	−0.408
EU		
1960-90	−0.666	−0.753
1960-65	−0.792	−0.733
1965-70	−0.810	−0.705
1970-75	−0.843	−0.730
1975-80	−0.288*	−0.540
1980-85	0.396*	−0.011*
1985-90	−0.317*	−0.182*
OECD (18)		
1960-90	−0.724	−0.799
1960-65	−0.791	−0.806
1965-70	−0.658	−0.751
1970-75	−0.796	−0.719
1975-80	−0.633	−0.521
1980-85	−0.400*	−0.500
1985-90	−0.344*	−0.328*
G-7		
1960-90	−0.771	−0.872
1960-65	−0.891	−0.864
1965-70	−0.899	−0.938
1970-75	−0.443*	−0.842
1975-80	−0.583*	−0.710
1980-85	−0.407*	−0.911
1985-90	−0.771	−0.559*

Note: * Not significant at 5% level.

The β convergence model does not fully capture the determinants of cross country variations in growth rates. The natural way to analyze the presence of systematic components in the residuals is to explore their structure across country groups chosen according to income levels. At first sight, these residuals series do not look totally asystematic. Table 4 shows the average residual across different country groups, as well as its correlation with initial per capita and per worker income. The conditional convergence regression overpredicts the performance of the poorest countries in 1990 (OECD (6)) and, even more significantly, systematically underpredicts the rate of growth of the seven largest countries (G7), both in per capita and per worker GDP.

Furthermore, the correlation of the residual with initial income is negative within these two groups, and for the OECD as a whole, which confirms the presence of some pattern in the residuals. It should be noticed that the conditional convergence regression brings together the two sources of growth in the Solow model: the determinants of the long run position of the economy (capital accumulation and technical progress), and the scope for catching-up (measured by the initial conditions). The behaviour of the residuals indicate that rich countries have grown over and above, whereas poor country did less, than what these two components taken together would explain.

TABLE 4
Average Residuals
(Conditional convergence equation)

Per capita GDP		
	Residual Mean	Correlation with Initial Income
EU	−0.000647	0.063
	(−0.12)	
OECD (18)	0.004881	−0.139
	(0.92)	
OECD (6)	−0.014642	−0.175
	(−1.31)	
G-7	0.023074	−0.369
	(2.60)	
Productivity		
	Residual Mean	Correlation with Initial Income
EU	0.007320	0.161
	(1.37)	
OECD (18)	0.002928	−0.112
	(0.60)	
OECD (6)	−0.008783	−0.043
	(−0.86)	
G-7	0.022116	−0.427
	(2.80)	

Note: *t*-statistic in parenthesis.

Figure 9 shows the comparative performance of OECD (6) and G-7 in terms of the cyclical component of per capita GDP obtained using the Hodrick-Prescott filter[12]. The former group improved its relative position during the first part of the sample period, but it has been loosing ground steadily since 1975. Large swings in growth rates among poorer countries

[12] Following Hodrick and Prescott (1980), as we are using annual data, we employ a value of 400 for the smoothing parameter.

are responsible for these differential performance. A weaker productive structure leads to a greater variance in cyclical fluctuations and to long lasting negative effects of economic recessions. As we saw in Table 2, the autocorrelation patterns are very different across economic regions. Although the inertia in growth rates decreased all over the OECD during the deepest stagnation period (1980-85), it has been always higher among rich than among poor country groups. This fact could be compatible with a steady impulse for growth in the most advanced countries, which would suggest an interpretation of the growth process closer to the endogenous growth approach, as opposed to the exogenous growth one we gave in the previous section (on the basis of the OECD experience as a whole). Alternatively, macroeconomic shocks might have had more impact upon the most fragile productive structures within the OECD, bringing the period of fast catching-up to an end. We shall return to this in the next section.

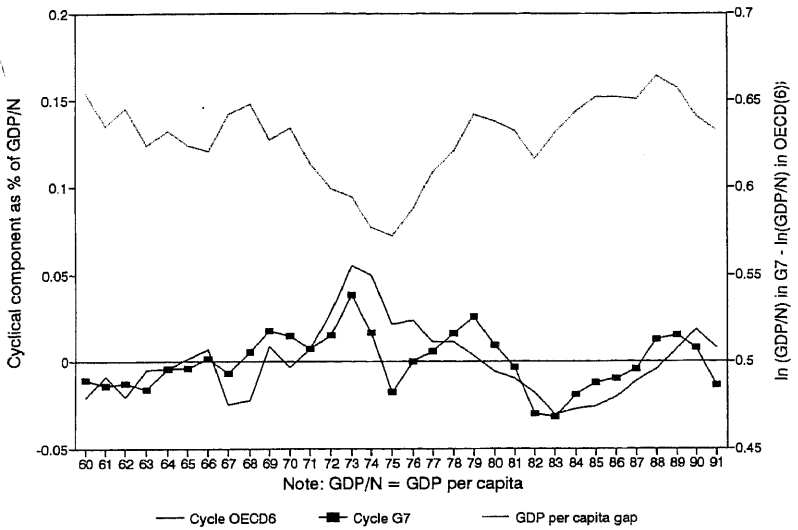


Figure 9
Cycle and differences in GDP per capita

Differences in the long run economic performance across individual countries, can be better appreciated looking at the change in rankings in both per capita income (Figure 10) and productivity (Figure 11) from 1960 to 1990[13]. There are several interesting facts in the evolution of these rankings. First, the overall change in the ranking from 1960 to 1990 is much more pronounced in productivity than in income per capita; the rank correlation coefficient between 1990 and 1960 is 0.62 in income whereas it falls to 0.51 in productivity. Two periods account for most changes in the ranking which was fairly stable until 1975 and then again from 1980 to 1985. However, this low correlation coefficient should not be interpreted as indicating high mobility in the ranking, at least as far as income per capita is concerned. In Figure 10 we appreciate three well defined groups of countries. On the one hand, income differences among middle

[13] This representation of the rankings is taken from Dolado *et al.* (1994).

income countries have become almost insignificant with ten countries in a range of $500 per capita; small differences among countries bias the rank coefficient downwards. At the two ends of the distribution, the ranking is quite stable, with three countries always at the top (USA, Switzerland and Luxembourg) and five of them always at the bottom (Spain, Ireland, Portugal, Greece and Turkey). In fact, absolute difference among these countries and the OECD average have increased sharply. Finally, there is a small group of significant swings with

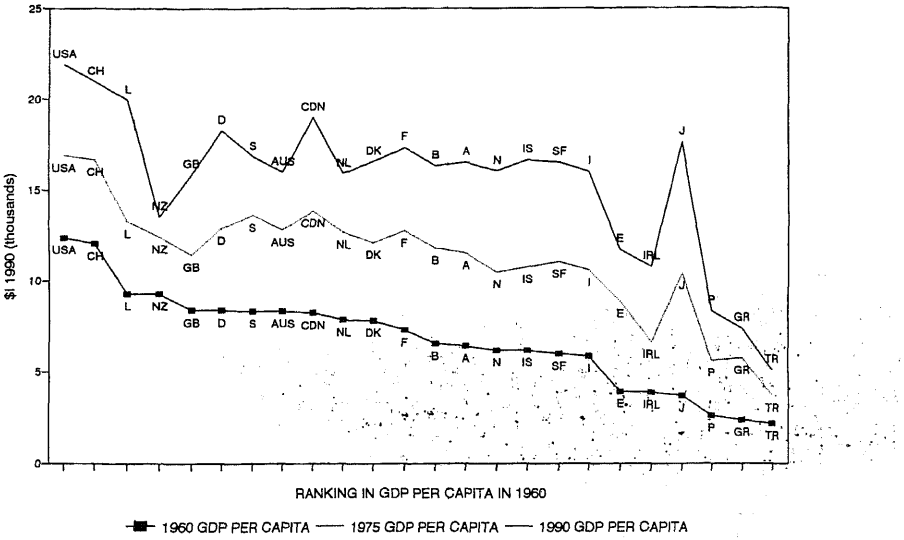


Figure 10
Ranking by GDP per capita

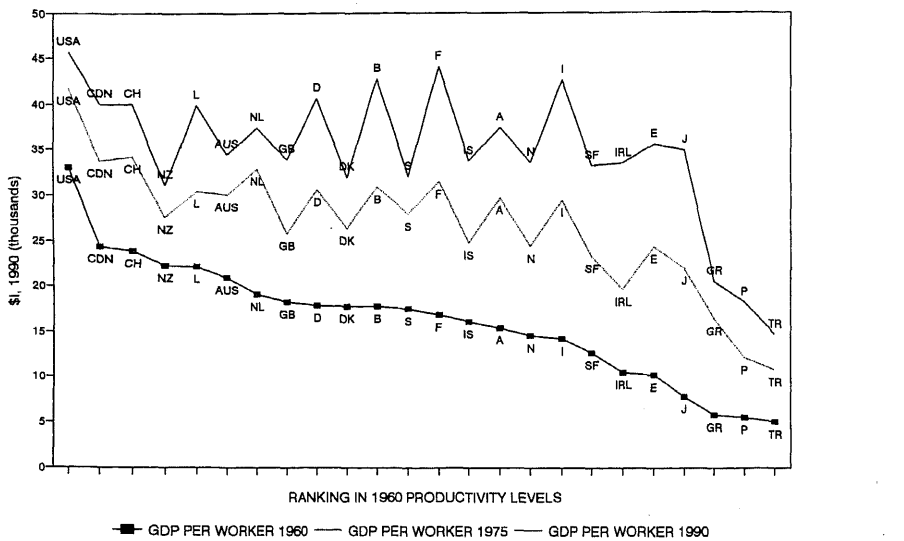


Figure 11
Ranking in productivity

economic «miracles», such as Japan, and «disasters»[14] as New Zealand and, to a lesser extent, Great Britain. Changes in the productivity ranking are quite different, and reflect true mobility in relation to the relative position in 1960. USA, at the top, and Greece, Portugal and Turkey, at the bottom, still keep their positions unaltered. However, the list of miracles and disasters is now larger. Spain, Japan, Ireland, Italy, France, Belgium and Germany have significantly improved their relative productivity, whereas New Zealand, Denmark, Great Britain, Sweden, Iceland and the Netherlands, have worsened substantially in relative terms.

4. The influence of macroeconomic factors upon growth

So far we have been dealing with the basic variables suggested by the growth literature to account for the long run performance of OECD economies. However, in this literature it is now widely assumed that a stable macroeconomic environment is a necessary condition for sustained economic growth (Fischer, 1993). The whole issue of the correlation among growth and shorter term macroeconomic fluctuations is still inconclusive[15], and leaves open the question of whether we can improve our understanding of the long run evolution of OECD economies by looking at medium term macroeconomic indicators. Nevertheless, there are several reasons to look at the influence of shorter run macroeconomic shocks, both nominal and real, upon growth rates.

First, we have seen in the preceding section that the convergence process in the OECD has been far from stable, showing a noticeable slowdown from the mid seventies partially due to the bad performance of poorer countries; therefore, it could be the case that those countries have suffered with a special intensity from a deteriorated macroeconomic scenario. Thus, econometrically, the argument to account for these variables is similar to that underlying the reasons to enlarge the unconditional convergence regression to include accumulation rates. There could be some variables with long or medium term effects upon growth, and their exclusion from the convergence regression might bias the coefficients of the other variables included.

Second, the theoretical growth literature has shown different channels through which macroeconomic performance might influence economic growth. Although, the review of these contributions is beyond the scope of this paper, it is worthwhile to mention some of them. Most of the recent literature denies the positive effect of inflation upon growth via the Mundell-Tobin effect, and emphasizes the distortionary effects on the price mechanism (De Gregorio, (1993) and Easterly (1993)). Once we account for

[14] In Parente and Prescott's (1993) terminology.

[15] A theoretical discussion of this issue is contained in Stadler (1990), Aghion and Saint-Paul (1993) and Stiglitz (1993).

these distortionary effects of inflation, money growth is expected to be positively correlated with growth according to the standard Phillips curve mechanism. The consensus is even greater in the expected positive effects of outward oriented policies upon growth[16]. Both, the exogenous growth model (Feder, 1982) and the new endogenous growth theory (Grossman and Helpman, 1991) have pointed out that countries with larger export shares, will benefit from higher growth rates, since they specialize in those activities with higher productivity. The role of government in growth has also been analyzed in several papers, showing that different components of public spending might enhance or harm growth depending on whether they cooperate with other factors in the production function or not (Barro, 1989), or whether they introduce price distortions (Singh (1992) and Easterly (1994), for example).

Finally, the large empirical growth literature has extensively explored the influence of such macroeconomic indicators upon growth. At first glance, the evidence looks rather mixed: although some of the cross-section studies (e.g. Grier and Tullock (1989), Kormendi and Meguire (1985), Fischer (1991, 1993)) report significant results for this kind of variables, Levine and Renelt (1992) have found in a sample of about 100 countries that only investment rates hold a robust relationship with growth, while the correlation running from several indicators of economic performance is very sensitive to the variables included in the estimated equations. However, in a similar exercise for the OECD, Andrés, Doménech and Molinas (1994) have found that the number of economic indicators that show a robust relationship with growth is larger than in Levine and Renelt's sample. Besides investment rates, exports and money growth, inflation and the variance of money growth have a significant influence upon growth irrespective of the regressor included in the growth equation.

In Table 5 we present a summary of the main features of the medium term indicators of OECD economies. A first look at the table hints the way in which some of these variables are correlated with growth. The outstanding performance of Japan seems associated with a rapidly expanding export sector (10.65 per cent annual rate of exports growth), while lower than average growth in New Zealand, Switzerland and the United Kingdom may be partially explained by a continuous deterioration in competitiveness and a significantly lower than average rate of growth of exports (around 4.5 per cent). On the other hand, the overall deterioration in the macroeconomic stance during the 1975-85 decade is well captured by the last eight columns, which show a widespread fall in exports growth and an increase in inflation and public deficits during the recession. The most salient feature is the extraordinary increase in inflation rates among the less advanced countries (OECD (6)). The increase in inflation rates is far more moderate among the richest countries with the exception of Iceland and, to a lesser extent, France, Italy and the United Kingdom.

[16] See Greenaway and Sapsford (1994) for a review of this literature.

TABLE 5

COUNTRY	1960-1990 AVERAGES									1960-1975 and 1985-1990 AVERAGES				1975-1985 AVERAGES			
	Rates of growth (%)					G/Y	Public Budget Deficit	Unemployment Rate	Participation Rate	Rates of growth (%)		Public Budget Deficit	Unemployment Rate	Rates of growth (%)		Public Budget Deficit	Unemployment Rate
	GDP/N	GDP/L	Exports	Money	Inflation					Exports	Inflation			Exports	Inflation		
Australia	2.22	1.72	5.95	8.94	7.26	19.77	−1.46	4.50	44.41	6.95	6.80	−1.09	3.49	4.66	8.86	−2.39	6.83
Austria	3.21	3.03	7.13	7.29	4.68	24.15	−2.89	2.28	41.65	7.98	4.75	−2.21	2.07	6.22	5.03	−4.20	2.70
Belgium	3.08	3.00	6.34	5.94	4.99	21.04	−5.72	5.96	40.12	7.95	4.92	−4.06	4.28	3.90	5.64	−9.05	9.60
Canada	2.84	1.69	6.74	8.74	5.51	22.58	−2.61	6.91	43.85	6.72	4.91	−1.73	5.89	7.45	7.18	−4.46	8.99
Switzerland	1.89	1.76	4.83	5.70	4.58	13.48	−0.13	0.29	50.67	5.20	5.44	0.02	0.18	4.62	3.41	−0.53	0.53
Germany	2.65	2.81	5.96	7.97	3.98	22.28	−0.99	3.42	45.77	6.76	4.35	−0.46	2.62	5.02	3.67	−2.13	5.24
Denmark	2.56	2.00	5.05	11.39	7.29	30.91	0.03	4.64	50.02	5.64	7.17	1.45	2.95	4.44	8.25	−2.93	8.28
Spain	3.75	4.29	8.21	15.41	10.36	18.80	−2.67	8.32	37.98	9.27	8.54	−1.97	6.63	6.99	14.85	−4.24	12.29
Finland	3.45	3.31	5.25	12.28	8.22	23.86	−0.68	3.43	50.01	5.01	8.15	−0.26	2.59	6.23	9.18	−1.67	5.30
France	2.94	3.27	6.76	9.56	6.91	22.36	−1.35	4.93	42.78	8.24	5.76	−1.01	4.06	4.64	9.79	−1.86	7.05
United Kingdom	2.16	2.11	4.25	10.32	8.20	30.82	−2.23	4.90	47.11	4.76	7.22	−1.18	3.60	3.70	10.89	−4.62	7.85
Greece	3.96	4.38	9.65	17.27	11.75	22.17	−5.35	4.82	38.41	11.90	9.10	−4.90	4.98	6.34	17.95	−5.95	4.37
Ireland	3.49	3.99	8.65	10.06	8.78	23.74	−8.29	8.88	37.56	8.96	7.12	−6.51	8.05	8.91	12.81	−12.78	10.87
Iceland	3.44	2.57	4.84	32.64	27.13	21.29	−2.44	0.59	44.41	4.57	19.45	−2.46	0.69	5.84	44.43	−2.63	0.44
Italy	3.44	3.78	7.27	15.73	10.02	21.59	−8.03	7.19	40.40	8.90	7.50	−6.40	6.81	4.90	15.81	−11.70	8.13
Japan	5.39	5.17	10.65	12.04	4.98	15.92	−3.11	1.77	49.09	12.21	5.91	−1.72	1.51	8.75	3.71	−6.12	2.29
Luxembourg	2.62	2.03	4.94	13.44	5.19	17.79	1.52	0.58	43.07	5.59	4.78	1.92	0.35	4.21	6.50	0.87	1.10
Netherlands	2.40	2.31	6.04	8.17	5.03	20.42	−2.81	4.83	42.14	7.56	5.43	−1.82	3.35	3.76	4.77	−4.90	8.20
Norway	3.23	2.85	5.34	12.81	6.52	25.15	−1.33	1.92	45.95	5.99	5.82	−1.08	1.80	4.65	8.51	−1.80	2.23
New Zealand	1.31	1.17	4.42	9.98	8.94	21.70	−3.91	1.95	45.39	4.67	7.08	−2.44	1.57	4.40	13.38	−7.13	2.90
Portugal	4.08	4.13	7.79	14.55	12.43	22.40	−6.29	4.77	48.58	7.87	8.32	−4.66	3.46	8.42	21.47	−10.36	7.69
Sweden	2.40	2.07	5.15	9.04	7.22	30.41	−1.86	1.96	49.90	5.93	6.47	−0.22	1.75	4.20	9.37	−5.83	2.47
Turkey	2.96	3.69	10.33	32.18	28.89	22.15	−3.66	10.64	40.69	8.79	21.87	−3.18	10.53	14.28	45.11	−4.70	10.93
United States	1.94	1.09	6.31	6.12	5.05	19.21	−2.29	5.98	44.44	8.42	4.42	−1.72	5.27	2.94	6.75	−3.54	7.43
OECD	2.97	2.84	6.58	12.40	8.91	22.25	−2.86	4.39	44.35	7.33	7.55	−1.99	3.69	5.81	12.39	−4.78	5.99
EU	3.09	3.18	6.74	11.65	7.91	22.86	−3.51	5.27	42.83	7.78	6.68	−2.47	4.26	5.44	11.03	−5.80	7.56
G7	3.05	2.85	6.85	10.07	6.38	22.11	−2.94	5.01	44.78	8.00	5.72	−2.03	4.25	5.34	8.26	−4.92	6.71
OECD (6)	3.26	3.61	8.17	16.58	13.52	21.83	−5.03	6.56	41.44	8.58	10.34	−3.95	5.87	8.22	20.93	−7.53	8.17

Sources: OECD (various publications) and IMF (International Financial Statistics)
OECD (6) includes only the six poorest countries in 1990. GDP/N = GDP per capita. GDP/L = GDP per worker.

The regression analysis that follows augments the β convergence analysis of previous sections where we did not control for macroeconomic performance indicators. We have estimated the convergence equation including macroeconomic variables, using five years rather than thirty years averages. Five years averages are a popular approach to eliminate cyclical fluctuations of macroeconomic variables, leaving some room for time varying shocks to affect economic growth. Additionally, this procedure has two advantages. First, in the short run the variables we considered as investment rates, inflation, exports growth or budget surplus could be affected by growth rates. However, while five years averages eliminate most of the cyclical fluctuations, they also cancel out some of the endogeneity problems of these variables. Second, this approach makes easier the use of instrumental variables in the estimation of growth equations because we can use lagged observations as appropriate instruments of potentially endogenous variables.

Table 6 shows the estimated coefficients by instrumental variables of a linear version of a convergence equation including not only the variables proposed by the augmented Solow model (Mankiw, Romer and Weil, 1992), but also some additional economic indicators, as exports and money growth, inflation, variance of money growth, and the ratio of budget surplus to GDP. This equation is the outcome of a conventional process of specification search, where other indicators such as variance of inflation, imports growth or several variables of foreign openness where used. With the exception of the budget surplus to GDP variable which is also significant in this specification of the convergence equation, all other macroeconomic indicators are robust to changes in the conditioning set included in the regression, that is, they remain significant in most of the possible combinations between the variables considered (see Andrés, Doménech and Molinas, 1994). We have also imposed the restriction of constant returns to scale, as it is common in the literature, being well accepted by the data [17]; all the signs are also the expected ones. As for the public sector variables we tried, only the five years lagged budget surplus to GDP ratio is significant and with a negative sign contrary to the results of Fischer (1993) or Easterly and Rebelo (1993), although both papers use a larger sample which includes developing countries where fiscal imbalances are rather important. This result seems to be much in line with the keynesian interpretation that expansionary fiscal policies were used to counteract the negative effects of recessions.

We have used the estimated coefficients reported in Table 6 to express the change of the rate of growth of per capita GDP in terms of the rates of growth of the different regressors, so that we are able to evaluate the contribution of each variable to the explanation of the variation of per capita growth rates between different subperiods. With this exercise we try to explain not only the slowdown in the rate of growth of GDP per capita, but also if the modest performance of poor countries can be explained by these

[17] The restriction tested is that the sum of coefficients of the investment rate, the secondary enrolment rate and the population growth is equal to zero. The statistic for this restriction is 2.825, which distributes as a χ^2_1 (critical value equal to 3.84).

TABLE 6
Dependent variable log (Y^i_{t+5} / Y^i_t). Sample *i*: 1,..., 24; *T*: 1960, 65,..., 85
Estimation method: Instrumental Variables

	Coefficient	*t*-Statistic
Ln Initial GDP per capita	−0,050	−2.71
Ln (I/GDP)	0.069	3.14
Ln Secondary enrolment rate	0.043	2.28
Ln (Population growth +0.05)	0.110*	−
Exports growth	0.660	3.43
Money Growth	0.845	4.01
Inflation	−0.689	−3.61
Variance of money growth	−0.031	−3.35
(Budget Surplus/GDP)$_{-T5}$	−0.380	−2.03
Implied β = 1.03%		
R^{-2} = 0.632		
σ = 0.046		
DW = 2.11		
N. Obs. = 120 (N = 24, T = 5)		

Notes: * restricted parameter.
Estimated equation includes time dummies.
Instrumented variables: inflation, investment rate and population growth.
Instruments: constant, time dummies, lagged values of growth rates, investment rate, population growth, budget surplus to GDP, inflation, exports and money growth and variance of money growth, current values of initial GDP per capita, human capital, exports and money growth and variance of money growth.

medium term indicators that could extend the human capital augmented exogenous growth model [18].

We can analyze three distinct sources of growth in per capita income. First, there is a catching-up term which explains growth by the distance of an economy to its long run equilibrium. Second, the economy can grow because saving rates or population growth rates may change. And third, there is a variety of shocks that can move the economy in either direction. In Table 7 we summarize our findings, showing in the left hand side the explanation given by our estimated model to the growth slowdown of the 1975-85 period compared to the decade before, and confronting in the right hand side the evolution of growth rates between the 1985-90 and 1975-85 periods.

The first column tells us the observed reduction in average growth rates between the two reference periods. The OECD as a whole grew on average

[18] The same exercise could be done in terms of productivity slowdown because the equation estimated in Table 6 produce a very similar results, although with a better fit, when we use GDP per worker and employment growth instead of GDP per capita and population growth.

TABLE 7
GDP per capita growth slowdown

COUNTRY	1965-75 TO 1975-85							1975-85 TO 1985-90						
		Growth Rates Differences	Catching-up	Differences in			Other Factors	Residual	Growth Rates Difference	Catching-up	Differences in			Other Factors	Residual
				Saving Rates	Inflation	Exports					Saving Rates	Inflation	Exports		
Australia	1	−1.28	−0.04	−0.14	−0.26	−0.34	0.19	−0.69	−0.61	−0.02	0.00	0.39	0.44	−0.40	−1.01
Austria	2	−1.76	−0.18	−0.10	0.03	−0.53	−0.80	−0.19	0.26	−0.05	−0.04	0.32	0.05	−0.40	0.37
Belgium	3	−1.90	−0.14	−0.24	−0.00	−0.64	−0.60	−0.28	0.99	−0.01	−0.06	0.34	0.39	0.04	0.30
Canadá	4	−1.02	−0.13	0.09	−0.24	−0.10	0.62	−1.26	−0.70	−0.07	0.15	0.54	−0.14	−0.57	−0.61
Switzerland	5	−0.39	0.06	−0.13	0.29	−0.21	−0.56	0.16	0.64	0.01	0.26	0.01	0.07	−0.77	1.06
Germany	6	−0.27	−0.05	−0.25	0.17	−0.39	−0.30	0.55	0.12	−0.05	−0.06	0.20	0.19	−0.30	0.14
Denmark	7	0.27	0.00	−0.40	0.01	−0.17	0.20	0.63	−1.03	−0.09	−0.02	0.65	0.17	−0.42	−1.31
Spain	8	−3.79	−0.15	−0.26	−0.80	−0.58	−0.29	−1.71	3.40	0.04	0.03	1.02	−0.31	0.81	1.81
Finland	9	−1.49	−0.16	−0.20	−0.09	−0.07	−1.23	0.25	0.52	−0.09	−0.01	0.54	−0.25	−0.41	0.73
France	10	−1.64	−0.10	−0.19	−0.51	−0.86	−0.12	0.14	0.57	−0.02	−0.04	0.86	0.10	−1.06	0.73
United Kingdom	11	−0.05	0.02	−0.18	−0.60	−0.37	0.54	0.53	1.00	−0.04	0.14	1.00	0.23	0.09	−0.42
Greece	12	−3.51	−0.25	−0.34	−1.43	−0.82	0.41	−1.08	−0.62	−0.01	−0.22	0.15	0.13	−0.88	0.21
Ireland	13	−1.28	−0.15	0.07	−0.60	−0.05	0.59	−1.14	2.50	−0.06	−0.36	1.41	0.03	−0.66	2.15
Iceland	14	0.45	−0.21	−0.19	−3.49	−0.02	2.68	1.69	−1.51	−0.10	−0.22	3.12	−0.24	−1.84	−2.23
Italy	15	−1.03	−0.15	−0.25	−1.18	−0.68	0.04	1.20	0.11	−0.06	−0.08	1.25	0.21	−1.21	0.01
Japan	16	−3.05	−0.28	−0.07	0.47	−0.82	−2.04	−0.31	0.73	−0.14	0.06	0.39	−0.58	−0.15	1.15
Luxembourg	17	−0.17	−0.01	−0.24	0.10	−0.45	−1.46	1.88	1.70	−0.07	0.02	0.40	0.55	0.93	−0.13
Netherlands	18	−1.90	−0.06	−0.36	0.25	−0.73	−0.72	−0.28	0.93	0.03	0.02	0.58	0.33	−0.06	0.04
Norway	19	0.27	−0.18	−0.07	−0.26	−0.17	−0.14	1.08	−2.49	−0.16	−0.27	0.67	0.02	−0.76	−1.99
New Zealand	20	−0.45	0.08	−0.06	−0.85	0.08	0.30	0.01	−1.30	−0.01	0.19	0.43	−0.31	0.13	−1.73
Portugal	21	−3.05	−0.23	−0.23	−1.93	0.49	0.17	−1.31	2.23	0.00	−0.11	0.77	0.40	0.61	0.56
Sweden	22	−1.34	−0.02	−0.23	−0.47	−0.45	0.02	−0.19	0.20	−0.01	0.09	0.42	0.04	−0.60	0.27
Turkey	23	−2.86	−0.15	−0.03	−4.82	0.52	2.35	−0.72	2.18	−0.03	−0.20	−0.33	−0.27	1.95	1.06
United States	24	0.16	0.04	−0.08	−0.25	−0.44	−0.14	1.03	−0.10	−0.02	0.06	0.48	1.05	−0.53	−1.15
OECD		−1.29	−0.10	−0.17	−0.69	−0.33	−0.01	0.00	0.41	−0.04	−0.03	0.65	0.10	−0.27	0.00
CEE		−1.53	−0.11	−0.24	−0.54	−0.44	−0.13	−0.07	0.99	−0.03	−0.06	0.72	0.20	−0.18	0.34
G7		−0.98	−0.09	−0.13	−0.31	−0.52	−0.20	0.27	0.25	−0.06	0.03	0.67	0.15	−0.53	−0.02
OECD (6)		−2.49	−0.14	−0.14	−1.74	−0.06	0.59	−0.99	1.40	−0.01	−0.11	0.57	−0.06	0.33	0.68

1.29 points less in the second decade, though this slowdown is not homogenous across country groups (2.49 points in the OECD (6) and only 0.98 in the G-7). Countries like Spain (3.79), Greece (3.51), Portugal (3.05) or Turkey (2.86) suffered the most the world crisis, taking into account that they where among the fast growers in the first decade. In the following columns the contribution of some of our variables to the slowdown explanation is quantified. We keep our attention basically on four variables. In the second column we observe that for the OECD as a whole, 0.10 points of the slowdown are due to the catching-up process (transitional dynamics to the steady state), i.e. countries tend to grow slower the closer they are to their long run equilibrium. This source of slowdown seems not to be very important, and if any, it tells us that poor countries were slightly more affected than the richer ones, because they were far away from their long run equilibrium in the mid sixties. The third column displays results quite similar to the previous ones, investment efforts declined in the OECD, bringing the rates of growth down. The impact was higher in the EU than in both the G-7 and the OECD (6), but again explaining only a small fraction of the overall slowdown.

The next variables in our analysis belong to the macroeconomic performance indicators category. We only show the explanatary power of inflation rates (column 4) and export growth (column 5), which are the ones that have received more attention in the literature. The first important fact to be noticed is that these two macroeconomic indicators display a significant explanatory power relative to both the catching up term and the investment rate (0.69 points of the slowdown are explained by the increase in inflation rates and 0.33 points by the reduction in exports growth). More important though is to compare these figures across country groups. We can appreciate that inflation has been especially harmful[19] in poor countries (1.74 points of OECD (6)'s slowdown compared with only 0.31 points of G-7's slowdown). The opposite is true for exports growth performance, where richer countries suffered the most (0.52 points of G-7's slowdown compared with 0.06 points of OECD (6)'s slowdown). According to the estimated parameters of our convergence regression the model continues overpredicting the performance between the two reference decades for the OECD (6), and infrapredicts it for the G-7 (the residuals being −0.99 and 0.27 respectively). Therefore, the inclusion of additional regressors to account for the macroeconomic instability between 1975 and 1985 does not solve the problem of a systematic pattern in the residual[20].

[19] We must be careful when interpreting the effect of inflation on growth. Although we have instrumented this variable, we can not claim that we have isolated a causal effect running from inflation to growth. This negative correlation is stronger in a period of supply shocks (1975-85) that causes both slow growth an high inflation (see Andrés, Doménech and Molinas (1994)).

[20] Nevertheless, the inclusion of macroeconomic indicators succeeds in reducing the size of the residuals across groups of countries. In particular, this is so in the G-7 where the mean of the residuals becomes non significant, in contrast with the results presented in Table 4. Similarly, the correlation of the residuals with initial income falls substantially.

In the right hand side of the table we show the results of the same exercise for the differences in growth rates between the 1985-90 and the 1975-85 periods. In this case growth rates increased between the two reference periods. The OECD as a whole grew on average 0.41 points more in the second period, being the OECD (6) and the EU significantly higher than average growers. It is interesting to compare the explanatory power of the variables with the previous ones. As far as the catching up and the investment rates concern there are not big differences, although investment rates fell in the OECD (6) and the EU, but not in the G-7. Nevertheless, these variables explain again only a moderate part of the differences in growth rates. The observed pattern of macroeconomic factors shows important differences with the previous one. The reduction in inflation contributed quite positively to the increase in growth rates both in the OECD (6) and the EU, but in this case the same happened with the richer countries. As far as exports growth is concerned, the EU and the G-7 countries where able to benefit from increases in their trade performance, while poor countries still suffered from a reduction in their exports activities. Finally, the residuals show a similar pattern as the previous one; the model infrapredicts the increase in growth rates between the two periods for the OECD (6) and overpredicts it for the G-7. Therefore, these results confirm the evidence presented in Section 3: even if we extend the growth equation to include some macroeconomic factors which can affect growth, there is an important part of the growth process in the OECD to be explained, having different influences upon rich and poor countries.

5. Concluding remarks

The purpose of this paper was to uncover the features of the long run performance of OECD economies. Since 1960 there has been a sizable reduction in the dispersion of productivity levels within the OECD, alongside with a similar, although less pronounced, pattern in per capita income. This process of narrowing differentials can be explained by two facts which distinguish the OECD from other world economic regions (Africa, Latin America, Asia (except Japan)): a negative correlation among growth rates and initial conditions (yesterday's poorer countries are more likely to grow faster today) and high persistence in growth rates (countries with higher growth today are more likely to grow faster tomorrow). These features are consistent with some of the most popular implications of the exogenous growth model with constant returns to scale. However this framework leaves many facts of the recent OECD growth process unexplained. These are summarized in the introduction so they will not be repeated here.

We find that the convergence process has not been stable along time nor across countries. Country specificities and initial conditions might determine the long run path of the economy to a greater extent than the aggregate constant returns to scale production function might suggest. These features alongside with a robust correlation among policy variables and growth rates

would, if corroborated by more elaborated studies, suggest the existence of some mechanism of endogenous growth. Although it is beyond the scope of this paper to asses which particular version of the endogenous growth literature would be the most suitable one to explain the OECD experience, several issues seem to be of particular interest on these grounds. Thus, it is difficult to infer very much about the long run evolution of the wealth distribution across countries on the basis of the model of a single country (Quah (1993c)), without explicit account of factor mobility and spillovers (Lucas (1993)). Similarly, to the extent that the experience in the OECD is neither of steady convergence nor of divergence, it does not fit well in the narrow framework of models with a single steady-state characterization. Finally, the recent OECD growth experience fits rather poorly in a model of competitive market clearing, in particular in the labour market (Aghion and Howitt (1993), Bean and Pissarides (1993)).

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Resumen

En este artículo se aborda una descripción detallada de los principales rasgos del proceso de crecimiento en la OCDE entre 1960 y 1990. Tomando el modelo de rendimientos constantes como marco de referencia, se confirma la importancia de la acumulación de capital para promover el crecimiento a largo plazo, así como la existencia de un proceso de convergencia limitada entre los países de la OCDE. Este proceso no es, sin embargo, estable en el tiempo ni entre países y ha sido fuertemente influido por la respuesta desigual a las perturbaciones macroeconómicas de finales de los años setenta y de los ochenta. Por otra parte, muchos aspectos del comportamiento a largo plazo de las economías de la OCDE no encuentran una explicación adecuada en el marco del modelo de crecimiento exógeno y precisan de un marco analítico alternativo.

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