

CHAPTER 5

CATCHING UP AND FALLING BEHIND: ECONOMIC CONVERGENCE IN EUROPE

5.1 Introduction

Over the past decade or so there has been a revival of interest in the topic of economic growth, which has been marked by new approaches (endogenous growth theory) and a great emphasis on empirical analysis. A major focus of this empirical research has been to quantify the impact of factors such as human capital, economic policies and institutions in explaining intercountry differences in economic growth. Another important focus has been on the issue of convergence, that is, whether there has been a tendency for real per capita income differences between rich and poor countries to narrow significantly over the long run.

From an economic policy point of view, the issue of convergence or divergence is very important. In the case of spontaneous convergence, this would point to the existence of market forces, which will eventually lead to similar living standards across countries. In the case of persistently large (or widening) gaps between poor and rich countries, there could be a need for economic policy measures (domestic and international) to stimulate a catch-up process. More generally, this analysis raises questions about the effectiveness and impact of domestic institutions and policies on long-term growth performance. Looking at past experience may be also be a valuable source of information as regards the expected future developments, which in this chapter refer to the prospects of achieving a more equitable income distribution among the countries of the European continent.

One of the ultimate goals of the process of economic and political transformation that started in the former centrally planned economies (CPEs) in the ECE region a decade ago is to improve the standards of living and the economic welfare of the population in these countries. The failure of the command economies to deliver on their promises to catch up quickly with the living standards and the quality of life prevailing in the developed market economies was one of the key factors that in the end brought about the fall of the communist system in eastern Europe and the former Soviet Union. The collapse of the political system in these countries mirrored the collapse of their economies, overburdened with shortages, macroeconomic disequilibria and structural rigidities (accumulated over the decades); employing obsolete technologies and supplying final

goods of mediocre quality, and largely isolated from the main international markets.

The start of transition to a market economy generated high hopes and expectations on the part of the peoples living in the eastern part of the continent. Many anticipated that the removal of the straightjacket of the command economy would unleash an entrepreneurial spirit and creative powers in these economies which would rapidly improve allocative and productive efficiency and pave the way to high rates of sustained economic growth. The point of reference, to which most of the transition economies have been – explicitly or implicitly – targeting their developmental goals during the past decade, is western Europe and in particular the European Union. One of the strategic policy goals of the transition economies is to achieve sustained and high rates of economic growth that would enable them to catch up with – to converge upon – the living standards of the developed market economies of western Europe.

The issue of convergence, both nominal and real, is also relevant in the context of west European integration. In fact, Article 2 of the Treaty on European Union stipulates that “The Community shall have the task ... to promote ... a high degree of convergence of economic performance, ... the raising of the standard of living and quality of life, and economic and social cohesion and solidarity among Member States.” In a similar vein, Article 130a stipulates that “the Community shall aim at reducing disparities between the levels of development of the various regions and the backwardness of the least favoured regions, including rural areas.” Significant transfers have been provided for in the framework of the Structural and Cohesion Funds to support the process of economic convergence in the peripheral regions, i.e. regions with real per capita incomes significantly below the European Union average. At the same time, the creation of these Funds can also be seen as reflecting the belief that economic integration and market forces will not necessarily promote regional convergence. The launch of EMU about a year ago was accompanied by fears about the lack of real convergence, not only in terms of cyclical synchronization but also of the unevenness of economic development in member countries. The start of EMU was expected to increase pressures for transfer payments to reduce regional and national differences in real incomes and to cushion the effects of asymmetric shocks.

The focus of this chapter is to assess whether or not economic convergence has been a characteristic of economic growth in Europe over the long term. In a broad sense, the notion of economic convergence usually refers to a process in which national economies display increasing similarities in the patterns of their performance. But in a narrower – and more commonly used – sense, it simply denotes the reduction of existing gaps in developmental and income levels between countries. There has been a long and continuing debate in the economic literature over various aspects – theoretical and empirical – of the notion of convergence, and the next section reviews some of these issues.

Rather paradoxically, the subject of growth, which has been a centrepiece of economics since at least the eighteenth century, is one of the weakest in terms of providing economic policy guidelines: there is no policy “recipe of success” as regards long-term economic growth. In spite of a huge literature on the subject, economists have not come up with unequivocal answers to seemingly simple practical questions, such as: What determines the rate of economic growth? Why do some countries grow faster than others? And so on. The absence of a clear link between theoretical models and economic policy guidelines as regards the determinants of economic growth is probably one reason for contradictory interpretations of the empirical facts on long-term economic performance.⁴¹⁷

There are numerous methodological and practical problems surrounding the actual data that are used in the measurement and analysis of long-term growth and economic convergence. Large data sets of comparable income level data and covering a sufficiently large number of countries over long periods of time have started to be compiled only recently.⁴¹⁸ Despite continuing efforts, the quality of the data is in general far from satisfactory, a fact which weakens the conclusions that can be drawn from them.

Within the ECE region the data problems are especially acute in the transition economies. In the first place the political changes since 1989 have resulted in the emergence of a plethora of new states with only a very

short history as sovereign national entities. In most new (or re-established) states historical series of performance simply do not exist, and in the few where they have been compiled retrospectively they only cover a very short period or refer to experience under different national boundaries.

Secondly, even for states that have existed for much longer periods in their present boundaries, the quality of the data referring to the period of central planning imposes serious limitations on the analysis of long-run economic growth. During the 1970s and, especially, in the 1980s it was becoming increasingly obvious to most outside observers and analysts that the performance of the former CPEs was progressively weakening despite the desperate efforts of politicians and planners. Most independent analysts tend to believe that the last two decades of communism in eastern Europe and the former Soviet Union were generally a period of prolonged stagnation (or in the case of Poland, because of the debt crisis of the 1980s, of deep recession), when living standards fell even further behind those in western Europe. However, the true picture of these developments was distorted in most of the former centrally planned countries by the official statistics through which the authorities tried to conceal or minimize the fact of their relative decline.

Despite numerous efforts by outside observers and analysts to construct alternative measures of output growth in the former CPEs (discussed later in this chapter), there is still a lack of reliable long time series of output in central and eastern Europe and the CIS. Consequently, there has been relatively little research on their long-term growth trends. This is unfortunate since an accurate picture of the historic experience of a nation contains valuable information for projecting future growth prospects.

The analysis of long-term economic convergence in Europe in this chapter should be seen against these limitations. The numerous methodological and data problems restrict both the scope of the analysis and the conclusions that can be drawn from it. In any case, a detailed account of the main sources of growth in per capita GDP or of intercountry differences would be far beyond the scope of this chapter. Notwithstanding these limitations, however, the long-term series of economic convergence (and divergence) in Europe presented in sections 5.3 and 5.4 do reveal some interesting developments.

On the basis of the quantitative measures employed here, there is no evidence of monotonic convergence in Europe as a whole in the postwar period. In general, per capita incomes tended to converge both in the eastern and in the western parts of the continent during the 1950s and the 1960s, but subsequently more differentiated patterns of economic growth emerged, notably in eastern Europe. In western Europe, there was a strong convergence in real GDP per capita in the period 1950-1973, but this narrowing of inequality in GDP per head petered out into

⁴¹⁷ It has been argued that the “long-run rate of growth” derived from long time series is a theoretical abstraction not an “observable” variable; hence it may be questionable whether it is possible to establish any direct links at all between policy and long-term growth. J. Temple, “The new growth evidence”, *Journal of Economic Literature*, Vol. 37, March 1999, pp. 112-156.

⁴¹⁸ The most widely used data for this type of analysis are the so-called Penn World Tables (PWT) which contain comparable per capita GDP data for more than 130 countries from 1950. R. Summers and A. Heston, “A new set of international comparisons of real product and price level estimates for 130 countries, 1950-1985,” *The Review of Income and Wealth*, Series 34, No. 1, March 1988, pp. 1-25 and “The Penn World Tables (Mark 5): an extended set of international comparisons, 1950-1985”, *The Quarterly Journal of Economics*, Vol. 106, No. 2, May 1991, pp. 327-368. Another widely used set of data that cover a smaller number of (mostly industrialized) countries but for a longer period of time is in A. Maddison, *Monitoring the World Economy, 1820-1992*, Development Centre Studies (Paris, OECD, 1995).

broad stagnation thereafter. There was also little further progress in closing the real income gap relative to the United States after 1973; and in fact, the gap has widened slightly in the last decade. This average pattern, however, masks quite a large variation in the relative performance of individual countries. Overall, however, the outcome is a more dense clustering of countries around the median income.

Within the eastern part of the continent, convergence in the levels of per capita income was a feature only of the 1950s and 1960s; the loss of momentum in the 1970s was followed by a rapid divergence in the 1980s. During the period of economic and political transformation since 1989, the diverging trends among the transition economies taken have become even more pronounced. At the same time there emerged subgroups of transition economies in which per capita incomes were more homogeneous. Some of them (notably central Europe) were also beginning to catch up on west European levels, but most of the transition economies continued to diverge from one another and to fall further behind the income levels of western Europe.

The rest of the chapter is divided into three sections. Section 5.2 briefly reviews some of the conceptual issues and the main empirical findings of growth and convergence in published studies. Section 5.3 analyses convergence in the western market economies and section 5.4 does the same for the eastern part of the continent.

5.2 Growth and convergence: conceptual and empirical approaches

For most of the period since the end of the Second World War the analysis of economic growth has been dominated by debates which have swirled around the neo-classical growth model developed by Solow.⁴¹⁹ This model has provided the basis for the dominant orthodoxy for most of the period, with a strong influence on economic policy in the last 20 years or so.

In this model the level of output is determined by the labour force and fixed capital interacting within the framework of a given technology available to all and determined outside the economic system. As fixed capital is subject to diminishing returns (or declining marginal productivity) each economy will converge on a unique, long-run stable growth path – the “steady state” – determined by the growth of the labour force and technical progress. In the short run, growth rates above the long-run stable rate may be achieved by using capital and labour more efficiently at the given level of technology. This movement along the production

frontier will be stimulated by the prospect of increasing returns to capital so long as capital per worker is below its optimum. The process of accelerated growth towards the long-run balanced growth path can be characterized as one of “transitional dynamics”. After this period of “catching up” with the optimal level of output, growth in incomes per head will slow down to the rate of technical progress.

Since poorer countries are generally considered to have capital-labour ratios below their long-run optimum, and thus to be backward in adopting the available technology, their rate of return on fixed investment should be higher than in richer countries. Consequently, there should be a systematic tendency for poorer countries to grow faster than rich countries until they have “caught up” with the levels of income per head in the latter. This is the so-called *convergence hypothesis*.

In this neo-classical framework persistent intercountry differences in incomes per head reflect either differences in the quantity of factors of production available or in the efficiency with which they are combined. Consequently, analysis then focuses on the supply and quality of the factors of production – the supply of labour and its level of education, the incentives to invest and to adopt superior techniques of production – to account for such differences. The policy recommendation of the mainstream neo-classical school is that the best way to ensure both convergence of incomes per head and steady economic growth over the long run is to allow market forces to operate as freely as possible. This, essentially, is the basis of the policy recommendations to developing and to transition economies to enable them to catch up with the prevailing income levels in western Europe and North America. The presumption that poorer economies, on average, will grow faster than richer ones (over the long term) has been termed (absolute) *beta convergence*.⁴²⁰ Such differential growth is necessary to reduce the intercountry variation of per capita income levels. A tendency for the dispersion of per capita incomes (as measured by their standard deviation) across a group of countries to fall over time has been labelled *sigma convergence*. Clearly, progress in *sigma convergence* is not only a function of the differential rates of growth between poorer and richer countries but also of the size of the initial income gap.

Beta convergence is a necessary but not a sufficient condition for *sigma convergence*.⁴²¹ Beta convergence

⁴¹⁹ R. Solow, “A contribution to the theory of economic growth”, *The Quarterly Journal of Economics*, Vol. 70, No. 1, 1956, pp. 65-94. For a more recent account see also R. Solow, “Neoclassical growth theory”, in J. Taylor and M. Woodford (eds.), *Handbook of Macroeconomics*, Vol. 1A (Amsterdam, Elsevier, 1999), pp. 638-667.

⁴²⁰ The existence of (absolute) beta convergence is estimated on the basis of a univariate cross-country regression of per capita income growth between year t and 0, $[y(t)-y(0)]$, on the initial level of per capita income $y(0)$, i.e. $[y(t)-y(0)] = a + \beta y(0) + e$, where e denotes an error term. The coefficient on initial income is labeled as β , and a negative sign indicates convergence. R. Barro and X. Sala-i-Martin, “Convergence”, *Journal of Political Economy*, Vol. 100(2), April 1992, pp. 223-249.

⁴²¹ For a discussion of these convergence concepts see X. Sala-i-Martin, “Regional cohesion: evidence and theories of regional growth and convergence”, *European Economic Review*, Vol. 40, 1996, pp. 1325-1352.

implies the existence of a longer-term catch-up mechanism, i.e. forces which work towards the narrowing of income differences across countries. These forces, however, can be offset by temporary shocks which adversely (or, positively) affect short-run growth performance. This is why the existence of beta convergence may not be fully reflected in changes of the dispersion of income levels.⁴²²

The available empirical evidence does not support the universal convergence hypothesis: there is no systematic tendency for poor countries to grow faster than the richer ones. In fact, the dominant feature has been for diverging productivity levels and real per capita incomes between the group of advanced industrialized economies on the one hand and the developing countries on the other.⁴²³ There are, of course, some significant exceptions, such as the east Asian growth rates. The general conclusion, however, is that countries do not tend to converge to the same balanced growth path, but rather settle on different ones, a fact which is mirrored in more or less persistently large differences in per capita income.

The lack of convergence is still seen by many mainstream economists and policy advisers as the result of a lack of commitment on the part of national governments to move sufficiently quickly in liberalizing their economies. There have always been critics, however, who challenge the basic assumptions of the neo-classical model – especially the assumption that all countries have the same access to exogenous technology – and who dispute the claim that untrammelled market forces are capable of triggering sustained growth and convergence in underperforming transition and developing economies. There is no space for a review of all these approaches here but, briefly, one can recall the Schumpeterian approach⁴²⁴ which incorporates a very different view of competitive markets and identifies innovative entrepreneurship, and the associated institutional structures that nurture it, as the key to sustained growth. The post-Keynesian analysis⁴²⁵ also stresses the importance of institutional frameworks in mobilizing resources but it places critical importance on the role of demand – especially expectations of demand – and the importance of cumulative causation in either

confining countries in low level development traps or in breaking through, via higher profits and a strengthening of the propensity to invest, to a path of sustained growth. But in this analysis, there are increasing returns to scale and from an increasingly fine division of labour⁴²⁶ and so different rates of investment can place economies on persistently different growth paths.⁴²⁷

More recently the dominant neo-classical growth model has been challenged by the “new growth” or “endogenous growth” theories. Although they remain closer to the neo-classical framework than the Schumpeterian or post-Keynesian analyses, they nevertheless severely qualify the case for untrammelled market forces in promoting optimal resource allocation and sustained growth. In these new approaches much emphasis is placed on the endogenous sources of growth and technical progress and especially on the importance of investment in human capital and on the spillover effects of fixed capital. Some of these analyses also agree with the post-Keynesian view that increased investment may raise the long run rate of growth because investment may be subject to increasing returns. In general, the key to catch up lies in closing the technology gap between the poor and richer countries. Although this can be accelerated by imports of capital goods and by FDI the effectiveness of such channels depends crucially on “absorptive capacity” and “social capabilities”, which are understood broadly to include a wide range of political and economic institutions as well as political and macroeconomic stability.⁴²⁸

Because of their recognition of the important influence of institutions and policies on fixed investment, R&D and creating access to foreign technology, the new growth theories allow, at least in principle, a greater role for government policy in creating the conditions for sustained growth and catch up. (The view that economic behaviour is embedded in a framework of economic, social and political institutions that extends well beyond the domain of economic activity and which, in general, can only be changed fairly slowly, is one that has greatly

⁴²² R. Barro, *Determinants of Economic Growth (The Lionel Robbins Lectures)* (Cambridge, MA, The MIT Press, 1997), Second Printing, p. 11. See also P. Henin and Y. Le Pen, “Les épisodes de la convergence européenne”, *Revue économique*, Vol. 46, No. 3, 1995, pp. 667-677.

⁴²³ L. Pritchett, “Divergence, big time”, *Journal of Economic Perspectives*, Vol. 11, No. 3, Summer 1997, pp. 3-17; C. Jones, “On the evolution of the world income distribution”, *Journal of Economic Perspectives*, Vol. 11, No. 3, Summer 1997, pp. 19-36; UNCTAD, *Trade and Development Report, 1997* (United Nations publication, Sales No. E.97.II.D.8), pp. 69-86. See also R. Barro, op. cit., chap. 1.

⁴²⁴ J. Schumpeter, *The Theory of Economic Development* (Cambridge, MA, Harvard University Press, 1934).

⁴²⁵ N. Kaldor, “A model of economic growth”, *The Economic Journal*, Vol. 57, 1957, pp. 591-624 and *Causes of the Slow Rate of Economic Growth of the United Kingdom* (London, University Press, 1966).

⁴²⁶ A. Young, “Increasing returns and economic progress”, *The Economic Journal*, Vol. 38, December 1928, pp. 527-542. Young’s dynamic analysis was an important influence on Kaldor’s work.

⁴²⁷ Recent developments in international trade theory which take into account economies of scale and imperfect competition are also relevant to the issue of convergence or divergence in real income levels across countries. The implications of these economic geography models are more ambiguous about the gains from trade and integration for peripheral regions than the more optimistic conclusions of the transitional Heckscher-Ohlin framework. P. Krugman and A. Venables, “Integration and the competitiveness of peripheral industry”, in C. Bliss and J. Braga de Macedo (eds.), *Unity with Diversity in the European Economy: The Community’s Southern Frontier* (Cambridge, Cambridge University Press, 1990), pp. 56-75, and “Globalization and the Inequality of Nations”, *The Quarterly Journal of Economics*, Vol. 110, No. 4 November 1995, pp. 857-880.

⁴²⁸ M. Abramovitz, “Catching up, forging ahead and falling behind”, *The Journal of Economic History*, Vol. XLVI, No. 2, June 1986, pp. 385-406. D. Romer, “Idea gaps and object gaps in economic development”, *Journal of Monetary Economics*, Vol. 32, 1993, pp. 543-573.

influenced the analysis of the transition process in this *Survey* over the past decade.)

The view that economic growth is a complex function of a wide range of interrelated factors, over and above traditional factor inputs, has led some analysts to develop the idea of *conditional convergence*.⁴²⁹ This remains within a neo-classical framework but describes the tendency of countries to converge on their own long-run equilibrium paths⁴³⁰ as a function of a number of preconditions or “conditioning variables”. Differential growth rates then reflect the distance of countries from their own steady states.⁴³¹ This of course is a concept of convergence which has a completely different meaning from that of (absolute) β -convergence. In the case of groups of countries with broadly similar long-run equilibrium positions, there might be a tendency for (absolute) convergence within such groups (*convergence clubs*) but not between them.⁴³²

The existence of conditional convergence has been uncovered in large samples of 100 countries or more, as well as in smaller samples limited to the OECD countries. Absolute β -convergence has only been found for the group of OECD economies and among the states of the United States. A striking feature of this work is that the speed of convergence, i.e. the rate at which countries close the gap between their initial incomes and their respective (or common) steady states, has consistently been found to be about 2 per cent per annum.⁴³³ A similar rate has also been found both across the states of the United States and across the regions of western Europe.⁴³⁴ Thus convergence emerges as a rather

slow process: it takes about 35 years to close half of the gap between initial income and the steady state income level.⁴³⁵ The same estimates also provide evidence for diminishing returns to physical and human capital, but these tend to set in rather slowly.

Testing for the existence of conditional convergence requires choosing “conditioning variables” as proxies for the determinants of the long-term balanced growth path of the individual economies. A wide range of economic, institutional and political variables have been included in empirical growth studies and many have been found to have a statistically significant effect on growth. The choices of variables, however, is often *ad hoc* and estimates of their impact on growth have been found to be fairly weak and to suffer from other econometric problems such as endogeneity, measurement error and model uncertainty.⁴³⁶ Without discussing the role of other factors, only the share of investment in GDP and the ratio of trade to GDP (“openness”) have been found, in general, to display a relatively robust positive correlation with long-term economic growth.⁴³⁷ Thus, empirical estimates of the sources of long-term growth should be treated with scepticism, especially as they still assume that technology is similar across countries. But perhaps the main lesson from such work is that the process of catch up is certainly not an automatic process to be triggered by market liberalization and that the relative advantages of backwardness, once emphasised by Gerschenkron⁴³⁸ as a stimulus to productivity growth via a process of imitation and adaptation, may be very elusive.

5.3 Convergence in western Europe and North America

This section first sketches the postwar pattern of economic growth in the western market economies, and views the evolution of relative income levels in the context of a changing macroeconomic environment. This is followed by three different perspectives on convergence. First, there is a description of the evolution of real per capita GDP relative to the United States. To use the United States as a benchmark appears natural

⁴²⁹ Conditional convergence is estimated on the basis of a multivariate regression analysis, with initial income and a set of “conditioning variables” (V) that are supposed to determine the long-run income level as explanatory variables, i.e. $[y(t)-y(0)] = a+by(0)+cV+e$. Conditional convergence exists if the coefficient on initial income is negative. In other words, in case of conditional convergence there is a negative *partial* correlation between initial income per capita and subsequent growth.

⁴³⁰ For a consistent approach to estimating the existence of conditional convergence within the neoclassical framework see G. Mankiw, D. Romer and D. Weil, “A contribution to the empirics of economic growth”, *The Quarterly Journal of Economics*, Vol. 107, No. 2, May 1992, pp. 407-437.

⁴³¹ G. Mankiw, “The growth of nations”, *Brookings Papers on Economic Activity*, 1:1995 (Washington, D.C.), p. 284.

⁴³² W. Baumol, “Productivity growth, convergence, and welfare: what the long-run data show”, *The American Economic Review*, Vol. 76(5), December 1986, pp. 1072-1085. Comparing income levels in 1870 and 1979, Baumol identified a group of 16 advanced economies in such a convergence club. It is noteworthy that he found also some tentative evidence for club convergence among a group of the former centrally planned economies. A more restrictive form of the “club convergence” hypothesis is the requirement that countries are broadly similar both as regards their fundamental structural characteristics and their initial conditions. O. Galor, “Convergence? Inference from theoretical models”, *The Economic Journal*, Vol. 106, July 1996, pp. 1056-1069.

⁴³³ R. Barro, op. cit.; G. Mankiw, D. Romer and D. Weil., op. cit.

⁴³⁴ R. Barro and X. Sala-i-Martin, “Convergence across states and regions”, *Brookings Papers on Economic Activity*, 1:1991 (Washington, D.C.), pp. 107-182.

⁴³⁵ This can be calculated by solving the so-called half-time equation $[1-\exp(-\beta T)] = 0.5$, where β denotes the rate of convergence. T is the number of years required to close half of the gap at a given rate of convergence.

⁴³⁶ R. Levine and D. Renelt, “A sensitivity analysis of cross-country growth regressions”, *The American Economic Review*, Vol. 82(4), September 1992, pp. 941-963; P. Klenow and A. Rodriguez-Clare, “Economic growth: a review essay”, *Journal of Monetary Economics*, Vol. 40, 1997, pp. 597-617; J. Temple, op. cit.; S. Durlauf and D. Quah, “The new empirics of economic growth”, in J. Taylor and M. Woodford (eds.), op. cit., Vol. 1A, pp. 235-310.

⁴³⁷ The direction of causality between “openness” and growth has been questioned in a number of studies. It is likely that the relationship is more complex than often supposed and that processes of cumulative causation are at work.

⁴³⁸ A. Gerschenkron, *Economic Backwardness in Perspective* (Cambridge, MA, Belknap Press, 1962).

TABLE 5.3.1
Changes in real GDP per capita, 1950-1998
(Average annual growth rates)

	1950- 1960 ^a	1960- 1973	1973- 1990	1990- 1998	1950- 1998 ^b
France	3.6	4.4	1.9	1.1	2.8
Germany ^c	7.1	3.4	2.1	1.3	3.3
Italy	5.4	4.5	2.5	1.1	3.4
United Kingdom	2.3	2.6	1.8	1.6	2.1
Austria	5.8	4.3	2.4	1.4	3.5
Belgium	2.4	4.4	2.1	1.7	2.7
Denmark	2.4	3.6	1.7	2.4	2.5
Finland	3.9	4.5	2.5	1.1	3.1
Greece	5.1	7.1	1.5	1.5	3.7
Iceland .....	..	4.0	2.7	1.3	2.8
Ireland	2.2	3.7	3.3	6.6	3.7
Luxembourg .....	..	3.1	2.7	3.6	3.0
Netherlands	3.3	3.6	1.6	2.0	2.6
Norway	2.8	3.5	3.0	3.1	3.1
Portugal	3.8	6.7	2.6	2.4	3.9
Spain	3.7	6.2	1.9	2.0	3.4
Sweden	2.6	3.4	1.6	0.5	2.1
Switzerland	3.2	3.1	0.9	-0.4	1.7
Turkey	3.3	3.0	2.2	2.4	2.7
Canada	1.8	3.5	1.8	0.7	2.1
United States	1.6	3.1	1.7	1.7	2.1
Japan	7.6	8.4	3.0	1.1	5.0
Total above ^d	3.2	4.0	1.9	1.5	2.7
Western Europe ^d	4.0	3.8	1.9	1.1	2.7
European Union ^e	4.1	4.0	2.0	1.1	2.8
Memorandum item:					
Standard deviation ^f	1.7	1.5	0.5	1.4	0.8

Source: See annex 1 to this chapter.

^a 1950-1998, 1950-1960 and 1950-1973: Luxembourg is excluded.

^b 1960-1998 for Iceland and Luxembourg.

^c 1950-1990 and 1950-1998: west Germany; 1990-1998: unified Germany.

^d 1950-1998 and 1950-1960: Iceland and Luxembourg are excluded.

^e 1950-1998 and 1950-1960: Luxembourg is excluded.

^f Standard deviation of average annual growth rates across 22 countries.

given that not only has it been the leading economy over the postwar period in terms of per capita GDP, but has also been persistently operating at the frontier of technology and has therefore been the major source of new technology and the associated catch-up potential for western Europe. This is followed by a statistical analysis of (absolute) beta convergence and the evolution of sigma convergence.

(i) The broad pattern of postwar growth

Real per capita GDP in western Europe rose at an average annual rate of about 2¾ per cent between 1950 and 1998 (table 5.3.1). Such a growth rate may appear relatively modest, but its cumulative effect has been to increase real per capita GDP by a factor of 3.6. Although per capita GDP is known to be an imperfect measure of welfare, this provides some idea of the order of magnitude of the considerable improvement in living

standards over the postwar period. The average growth performance over such a long period, however, masks some large differences across countries and over time.

(a) The “Golden Age”

In looking at the postwar period it is increasingly common to treat 1973 as a watershed that marks the end of the Golden Age, which western European economies had experienced since 1950. The period 1950-1973 is regarded as exceptional in the modern European economic history because it combined unprecedentedly high rates of growth with relatively mild cyclical fluctuations and generally moderate rates of inflation. In fact, it was the period with the fastest rate of output expansion since the beginning of “modern growth” in 1870.⁴³⁹

There had already been unexpectedly strong growth in western Europe in the five years following the end of the war, such that the large real income gaps which existed among most countries in 1945 had been reduced to their pre-war levels by 1950. On this criterion, 1950 can be said to mark the end of reconstruction and the start of a new era in western European economic history. But the real income gap vis-à-vis the United States, the technological leader, was very large in 1950, amounting, on average, to some 55 per cent (table 5.3.2). This gap indicates the large potential for technological catch-up growth which existed at that time. Real GDP per capita in western Europe rose by some 4 per cent per annum between 1950 and 1973. In contrast, it rose by only 2.4 per cent a year in the United States, while in Japan the average annual increase was some 8 per cent. The favourable growth performance in western Europe can be attributed to the combined impact of a variety of influences.

A central factor was the combination of strong growth in fixed investment in machinery and equipment and, associated with this, a massive transfer of technology from the United States. There was, moreover, a large stock of human capital which possessed the necessary skills to adapt to the new technologies, and the legal and institutional framework required for the operation of a market economy was largely in place. In other words, “Europe’s overall ‘social capability’ for growth had been hibernating, but it had not been destroyed”.⁴⁴⁰ The Golden Age can thus be characterized as a period during which the “transitional dynamics” of moving towards a long-term balanced growth path were reinforced by a considerable narrowing of the technology gap. Given the low levels of capital per worker (relative to the United States) firms had ample scope for increasing investment without running into diminishing

⁴³⁹ N. Crafts and G. Tonniolo, “Postwar growth: an overview”, in N. Crafts and G. Tonniolo (eds.), *Economic Growth in Europe since 1945* (Cambridge, Cambridge University Press, 1996), pp. 1-37; A. Maddison, *op. cit.*, pp. 71-86.

⁴⁴⁰ N. Crafts and G. Tonniolo, *op. cit.*, p. 21.

TABLE 5.3.2
Real GDP per capita, 1950-1998
(United States=100)

	1950	1960	1973	1990	1998
France	52	63	74	77	74
Germany ^a	43	73	76	81	77
Italy	36	52	63	72	68
United Kingdom	69	73	69	70	70
Austria	38	57	66	74	73
Belgium	54	59	70	74	74
Denmark	66	72	77	76	80
Finland	42	53	63	72	69
Greece	18	25	42	40	40
Iceland .....	..	58	65	77	74
Ireland	34	36	39	50	74
Luxembourg .....	..	90	90	105	122
Netherlands	57	67	72	71	73
Norway	53	60	63	77	87
Portugal	19	24	37	43	45
Spain	28	34	50	52	53
Sweden	67	74	77	75	69
Switzerland	92	108	108	93	79
Turkey	17	20	19	21	22
Canada	75	77	80	82	76
United States	100	100	100	100	100
Japan	19	33	64	79	75
<i>Western Europe</i>	45	57	62	65	61
European Union	46	60	67	71	67

Source: See annex 1 to this chapter.

Note: Figures are rounded.

^a 1950-1990: west Germany.

returns. Another important source of growth was structural change, i.e. the reallocation of production factors towards higher value added sectors, which is reflected, *inter alia*, in a pronounced fall of the share of agriculture in the total economy.

In the traditional growth accounting exercises all these changes show up in a marked acceleration in the growth of labour and total factor productivity in western Europe (and Japan), relative to both their own historical record and to the United States.⁴⁴¹

But this account is only part of the story. There are a host of other factors, which were of primordial importance for sustaining rapid growth over this period. In particular, there was a set of domestic and international institutional arrangements, created in the early postwar years, which can be presumed to have reinforced the factors supporting catch-up growth, thereby creating a virtuous circle of growth.⁴⁴²

In a nutshell, a conducive environment for fixed investment was created by ensuring high rates of return by means of wage restraint and favourable export growth.

Wage moderation bolstered profits which, in turn, provided the necessary funds for financing fixed investment in a context where access to international funds was still narrowly circumscribed. The wage austerity nevertheless benefited workers because of the subsequent favourable impact of higher investment on the growth of output, productivity and real incomes. The time consistency problem involved in this behaviour of firms and trade unions was solved by creating a “commitment” framework, i.e. an explicit or implicit social pact which also involved the monitoring of economic developments and consultations about their implications, and attempts to restrict the growth in wages to that in productivity.⁴⁴³

On the international plane, a range of institutional mechanisms were created to foster increasing openness and the integration of the west European economies, thus providing for the necessary enlargement of markets to enable a better exploitation of comparative advantages and economies of scale with associated positive effects on the profitability of business investment. These arrangements included the Marshall Plan,⁴⁴⁴ the European Payments Union (which was a framework for gradually liberalizing intra-European trade and paving the way towards current account convertibility), the European Coal and Steel Community, the OEEC, the GATT and the Bretton Woods system of fixed exchange rates. The latter provided a nominal anchor for stabilizing price expectations with concomitant positive effects on the effectiveness of macroeconomic stabilization policies.⁴⁴⁵ A hallmark of the striving for closer European integration was the creation of the European Economic Community in the Treaty of Rome in 1957. In general, these international institutions constituted another kind of “commitment” framework, which fixed the rules of the game and locked in the progress made in trade liberalization. Together with sustained growth, the domestic and international institutional setting created favourable expectations about longer-term increases in real incomes, which, in turn, stimulated private investment.⁴⁴⁶

⁴⁴³ Ibid.

⁴⁴⁴ Maddison notes that the United States provided a considerable flow of financial support for western Europe at a time when it was most needed. A. Maddison, op. cit., p. 75. On the role of the Marshall Plan in postwar reconstruction see also UN/ECE, *Economic Survey of Europe in 1989-1990*, chap. 1.

⁴⁴⁵ This was also a period of international capital controls which allowed some countries to keep interest rates artificially low to bolster fixed investment. N. Crafts and G. Tonniolo, op. cit., p. 24.

⁴⁴⁶ A. Boltho, “Growth”, in A. Boltho (ed.), *The European Economy, Growth and Crisis* (Oxford, Oxford University Press, 1982), pp. 9-37. Boltho points to the importance of export-led growth in a context of flexible supply conditions in this period, but he also emphasizes the role of economic policies in forming expectations and bolstering the confidence of households and businesses in the Golden Age. He argues that economic policies were permissive for growth in this period but also surmises that the prolonged period of steady growth may have instilled a confidence among business “that, in the event of a downturn, governments would and could step in to maintain the level of activity and

⁴⁴¹ A. Maddison, op. cit., pp. 41-42, table 2.6.

⁴⁴² B. Eichengreen, “Institutions and economic growth: Europe after World War II”, in N. Crafts and G. Tonniolo (eds.), op. cit., pp. 38-72.

(b) *The post-1973 period*

The growth of output and of output per person slowed markedly after 1973 in the wake of the first oil shock and the subsequent deep recession of 1974-1975. This marked deterioration in performance has been attributed to a variety of factors, the relative importance of which is difficult to quantify.⁴⁴⁷ One factor was probably that with progress in technological catch up and increasing capital intensity, diminishing returns became more important although European GDP per head was still one third lower than in the United States. These factors were partly already visible in the late 1960s. Declining returns weakened the potential benefits of adhering to the established commitment and coordination technology. A profits squeeze was accentuated by wage pressures against the background of high factor utilization which, in turn, dampened investment incentives and output growth.⁴⁴⁸ The wage explosions of the late 1960s can be interpreted not only as a lagged reaction of labour to the earlier period of wage restraint but also as the result of the change in bargaining power in favour of labour under conditions of full employment.⁴⁴⁹ The upshot is that the domestic economic environment was changing in a direction which would have probably led in the medium-term to a deterioration in economic performance.⁴⁵⁰ Other adverse factors were superimposed on this, namely the commodity and oil price shocks of 1972-1973 and the collapse of the Bretton Woods system. Although interpretations differ, the end result was that after the recession of 1973-1974 the growth momentum in western Europe during the period 1950-1973 was lost.⁴⁵¹

Not only was there a persistent and pervasive slowdown in the growth of per capita GDP, labour productivity and total factor productivity (TFP) after 1973 relative to the Golden Age, but the rate of catch up with the United States also decelerated sharply.⁴⁵² The

employment" (p. 19). This optimism, which supported the propensity to invest, was shattered in the recession of 1974-1975.

⁴⁴⁷ In a longer historical perspective, from 1870, the slowdown would appear more as a return to the trend before the First World War. For some authors this points to the exceptional nature of economic growth during the Golden Age and the importance of understanding the factors behind it. N. Crafts and G. Tonniolo, op. cit., p. 25.

⁴⁴⁸ This points at the same time to the difficulty of adapting the existing socioeconomic institutions to the new economic conditions. B. Eichengreen, op. cit., pp. 63-65.

⁴⁴⁹ A. Boltho, op. cit., p. 26.

⁴⁵⁰ It has been argued that the erosion of the Golden Age economic arrangements set in well before 1973 and that it would have been difficult to sustain them even in the absence of the oil shocks. A. Glyn, A. Hughes, A. Lipietz and A. Singh, "The rise and fall of the Golden Age", in S. Marglin and J. Schor (eds.), *The Golden Age of Capitalism* (Oxford, Clarendon Press, 1990), pp. 39-125.

⁴⁵¹ Moreover, the failure of governments to prevent the recession and later on stagflation probably eroded business confidence in the effectiveness of demand management policies thus creating a more uncertain environment for investment. A. Boltho, op. cit., p. 27.

⁴⁵² A. Maddison, op. cit., table 2.6. On the productivity slowdown see also UN/ECE, "Changing trends in productivity growth", *Economic Survey of Europe in 1981*.

tightening of policy in response to the second oil price shock in 1979 further restrained economic growth in the 1980s. "Eurosclerosis" became a catchword for describing the disappointing performance of the west European economies in the late 1970s and the first half of the 1980s. This analysis emphasized perceptions of the restraining effects of market distortions and the lack of flexibility, notably in the labour markets.

The 1990s were marked by the long expansion of the United States economy, following the recession of 1991. In contrast, there was a further slowdown in economic growth in western Europe against the background of macroeconomic adjustment policies adopted to cope with the inflationary consequences of German unification, the 1992 crisis in the ERM, and the striving to meet the Maastricht convergence criteria. Overall, these adverse macroeconomic conditions appear to have swamped the potential growth effects of the Single Market of 1992.

(ii) *Different perspectives of convergence*

(a) *Convergence to the United States per capita GDP*

Separating the period 1950-1998 into subperiods provides interesting insights into the relative strength of economic growth over time and across countries. This is so especially for the Golden Age during which there were significant variations in country growth. The following periods are considered here: 1950-1960, 1960-1973, 1973-1990 and 1990-1998.

1950-1960

In the 1950s per capita incomes in western Europe grew at an average annual rate of 4 per cent, some 2.5 percentage points higher than in the United States.⁴⁵³ All the European countries exceeded the United States growth rate, although to varying degrees (table 5.3.1). Among the four major economies, growth was relatively buoyant in west Germany and Italy, but more sluggish in France and the United Kingdom. In France, these were still years of reconstruction and consolidation, while for western Germany and Italy these were the most dynamic of the "economic miracle" years. In the United Kingdom, growth was restrained by a mutually reinforcing combination of low productivity and low competitiveness.⁴⁵⁴ The highest average per capita GDP

⁴⁵³ Gross domestic product (GDP) is a measure of output and income produced in the domestic economy. In contrast, gross national product (GNP) is a measure of income accruing to permanent domestic residents in a given period. The difference between GNP and GDP is accounted for by net factor incomes from the rest of the world. In general, the difference between GDP and GNP is relatively small among the group of countries covered here. The main exception is Ireland where real GDP per capita has been much higher than real GNP per capita since the mid-1980s. The difference amounted to some 12 percentage points in 1985 and some 18 percentage points in 1998. The main factor behind this large discrepancy is the repatriation of profits by multinational companies operating in Ireland.

⁴⁵⁴ M. Surrey, "United Kingdom", in A. Boltho (ed.), op. cit., pp. 528-553.

growth rate (about 7.5 per cent) among the industrialized countries in this period was in Japan. Growth was relatively moderate in several countries which were in the upper half of the income hierarchy (Belgium, Denmark, the Netherlands and Sweden).⁴⁵⁵

Among the five “peripheral” economies (Greece, Ireland, Portugal, Spain and Turkey) at the bottom of the income scale in 1950, there was buoyant growth in Greece. There was robust, albeit below average, growth in Portugal, Spain and Turkey suggesting that the potential for catch up in this period was not realized. This holds notably for Ireland which, together with the United Kingdom, had the lowest increase in per capita GDP among all the west European countries in the 1950s. In the case of Ireland and Spain it has been suggested that this reflects autarkic, inward-looking policies, which, *inter alia*, restrained access to more efficient technologies via international trade.⁴⁵⁶

On average, real GDP per capita in western Europe rose to some 60 per cent of the United States level in 1960, up from 45 per cent in 1950 (chart 5.3.1). The most conspicuous improvement was in west Germany, with a relative gain of 30 percentage points to 73 per cent of the United States income levels in 1960 (table 5.3.2).

1960-1973

Real GDP per capita in western Europe continued to expand at an average annual rate of about 4 per cent in this period, broadly unchanged from the 1950s. While the income gaps in 1960 pointed to the continued large potential for catch-up growth, actual progress in closing the gap was limited due to stronger growth in the United States. As a result, the average growth differential in favour of western Europe fell to only 0.7 percentage points in this period, down from 2.4 percentage points in the Golden Age.

Among the four major economies, there is a striking contrast between the strengthening of growth in France (which had entered its golden age in the late 1950s) and the significant slowdown (to below average growth) in Germany. In Italy, the rate of economic expansion remained very high and in the United Kingdom continued to be relatively disappointing. Japan remained the most dynamic among the industrialized countries, while Canada continued to grow slightly faster than the United States.

At the periphery, there was a striking improvement in economic growth in Greece, Portugal and Spain: these were the fastest growing economies in western Europe over the period 1960-1973, real GDP per capita rising at

an average annual rate of some 6-7 per cent. Together with the favourable performance of Italy, this period can be described as the “miracle years” of southern Europe. Growth also strengthened in Ireland, partly a reflection of the more outward looking policies pursued since the end of the 1950s, but it was still much less dynamic than in the other three countries (table 5.3.1).

On average, there was only minor progress in narrowing the real income gap between western Europe and the United States in the 1960s. For the 19 west European countries combined, real per capita GDP in 1973 was 62 per cent of the corresponding United States level, compared with 57 per cent in 1960. The outcome was somewhat better (from 60 to 67 per cent) for the aggregate of the current 15 member states of the European Union (EU-15), an average which hides still more favourable outcomes, i.e. relative gains of about 10 percentage points in Belgium, Finland, France and Italy, and even more (around 15 percentage points) in Greece, Portugal and Spain. In contrast to the general pattern, Turkey and the United Kingdom lost ground vis-à-vis the United States over this period. In Japan, real GDP per capita was 64 per cent of the United States level in 1973, up by more than 30 percentage points from 1960 (table 5.3.2). Japan achieved convergence with the average west European (but not the EU-15) income level by 1973.

1973-1990

Performance in this first subperiod following the Golden Age was strongly influenced by the two oil shocks and by macroeconomic adjustment policies. There was also a successive enlargement of the European Community from six to 12 member countries. Denmark, Ireland and the United Kingdom joined in 1973, followed by Greece (1981) and Portugal and Spain (1986). This deepening of economic integration of the peripheral economies with the “core” stimulated economic restructuring via foreign trade flows and foreign direct investment and helped to narrow further the technology gap.

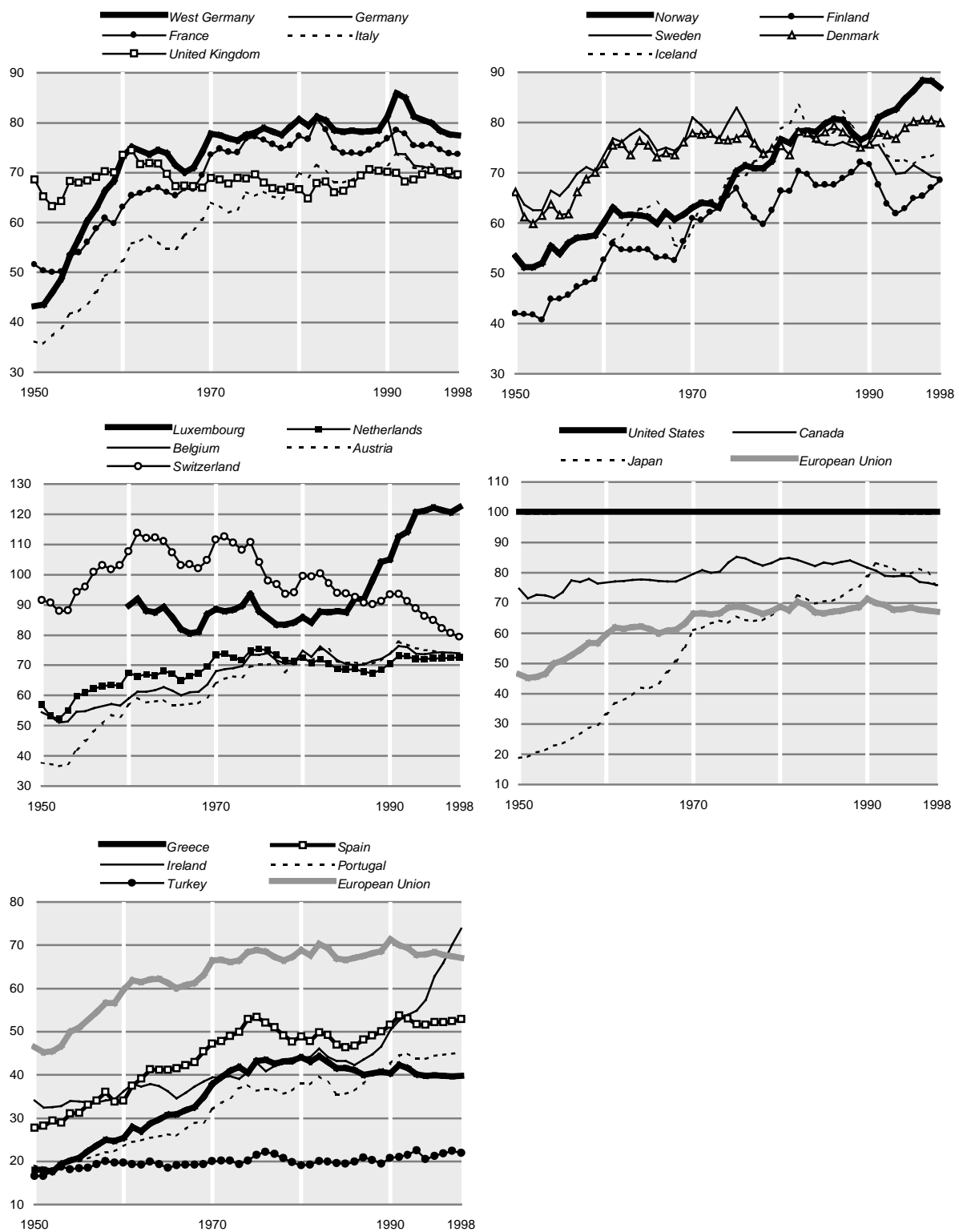
There was a general slowdown in the rate of economic expansion in the industrialized countries. In western Europe, real per capita GDP rose at only 1.9 per cent a year over this period, slightly higher than in the United States but only half the growth rate during the Golden Age. Italy continued to outperform the other three major economies and among the smaller economies there was robust growth in Austria, Luxembourg and Norway. The earlier dynamism at the periphery had also waned, partly a reflection of the closer alignment of their business cycles with the rest of western Europe. In Greece and Spain, performance was particularly poor compared with the previous period. In Portugal and notably Ireland, however, it was rather better. In fact, it is in this period that Ireland started to achieve the highest per capita GDP growth in western Europe. This was greatly assisted by large inflows of FDI by United States’ multinationals in the second half of the 1980s, their main intention being to use Ireland as a platform for serving the European Single Market planned for 1992.

⁴⁵⁵ This is, of course, a matter of perspective. These were still years of a golden age in these countries when viewed in the light of later performance.

⁴⁵⁶ L. Prados de la Escosura and J. Sanz, “Growth and macroeconomic performance in Spain, 1939-93”, pp. 355-387 and C. Ó Grada and K. O’Rourke, “Irish economic growth, 1945-88”, pp. 388-426, in N. Crafts and G. Tonniolo (eds.), *op. cit.*

CHART 5.3.1

The evolution of real GDP per capita, 1950-1998
(Indices, United States=100)



Source: See annex 1 to this chapter.

Note: Data for Germany up to 1990 refer to west Germany only.

The process of catching up with the United States slowed still further in this period (chart 5.3.1), although some countries continued to make considerable progress. In Luxembourg there was a boom in the second half of the 1980s, which led to its per capita GDP rising above that of the United States.⁴⁵⁷ There was also a marked narrowing of the gap in Finland, Iceland, Italy and Norway. In some countries (Denmark, the Netherlands, Sweden) this was a period of moderate regress although in Switzerland the fall in relative per capita incomes was quite sharp (table 5.3.2).

Among the peripheral economies Greece fell back, but Portugal and, to a lesser extent, Spain and Turkey advanced further. In Ireland, real per capita incomes reached 50 per cent of the United States level in this period, a gain of about 10 percentage points.

On average, west European real incomes were on average 35 per cent lower than in the United States in 1990 (30 per cent for the European Union). Japan pulled ahead of the EU in this period (chart 5.3.1).

1990-1998

In the 1990s there was a further slowdown in per capita income growth in western Europe to an annual average rate of 1.1 per cent. The outcome was the same in Japan. In the United States, the average increase was 1.7 per cent, unchanged from the preceding period, and so for western Europe as a whole and for Japan these were years of divergence from the United States rather than convergence (chart 5.3.1).

But there are some striking exceptions. In Ireland, the growth of real GDP per capita accelerated to an average annual rate of 6.6 per cent, reminiscent of the high growth rates experienced in west Germany, Greece, Italy, Portugal, Spain and Japan in their Golden Age (table 5.3.1). FDI in electronics and other high-tech sectors continued to be a major driving force behind this strong growth,⁴⁵⁸ which led to Ireland's per capita GDP rising to about 75 per cent of the United States level in 1998, up from 50 per cent in 1990. There were only slight gains in relative incomes in Portugal, Spain and Turkey, while the relative position of Greece continued to stagnate. Among the remaining countries, rapid growth petered out in Luxembourg, but the large positive margin of income per head over the United States was maintained. Norway made further significant progress in

narrowing the income gap, but among the four major economies, relative incomes stagnated in the United Kingdom and fell in the other three.

German unification in 1990 implied the merger of two states with very unequal economic strengths. GDP per capita in the eastern part of the country was less than half of the corresponding level in western Germany in 1990 (see table in annex 2 below). Given the relative size of the two economies this implied that per capita GDP in the unified Germany was some 12.5 per cent below the west German level. The overall impact on the average west European or EU per capita GDP was only about 2.5 percentage points. Progress in intra-German convergence was initially quite rapid following the deep recession in eastern Germany in 1991, but although the subsequent upturn was quite strong it did not lead to a sustained convergence of per capita GDP between the two parts of Germany (chart 5.3.2).

Prolonged recession led to an absolute fall in per capita incomes in Sweden and Switzerland, which translated into a sizeable increase of the income gap vis-à-vis the United States. In Canada the modest degree of catch up that had been achieved since 1950 was entirely reversed between 1990 and 1998 (chart 5.3.1).

(b) Convergence to the average capita GDP in the EU

Table 5.3.3 provides a different perspective by relating countries' GDP per capita to the EU average. Obviously, this change in the benchmark does not affect the relative positions of countries on the income scale but it does provide a more direct view of the degree of intra-EU convergence. Focusing on the periphery, there has been a steady convergence of real per capita GDP in Portugal and Spain on the EU average but the gap was still quite large in 1998. The long boom in Ireland has propelled its real per capita GDP⁴⁵⁹ above the EU average in the second half of the 1990s, up from a level of some 60 per cent in 1960 (see also chart 5.3.1). Greece has fallen back in the period since 1973, while Turkey's position relative to the EU average has only slightly improved in the past decade.

Beta convergence

Although the gains in real per capita GDP have varied significantly across countries in the period 1950-1998, there appears, nevertheless, to be an inverse relation between initial incomes and subsequent growth. Countries at the bottom of the income hierarchy in 1950 have, in general, tended to have more rapid growth in incomes than those at the top (chart 5.3.3).

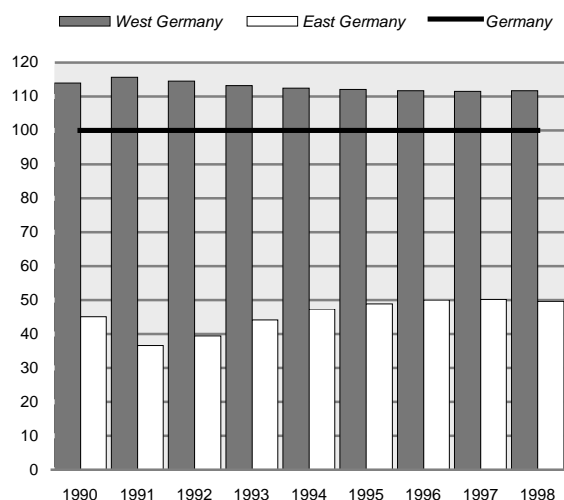
⁴⁵⁷ The main factors behind the very strong growth rate in Luxembourg were the financial sector and new activities in light manufacturing, communications, the media and R&D. Foreign direct investment played an important role against the background of active industrial and structural policies, which developed comparative advantages in the service sector.

⁴⁵⁸ FDI, also influenced by an active industrial policy, has been a key factor in Ireland's economic growth, but there were many other contributory factors. For a general discussion see F. Barry (ed.), *Understanding Ireland's Economic Growth* (Hampshire, MacMillan Press Ltd., 1999); A. Gray (ed.), *International Perspectives on the Irish Economy* (Dublin, Indecon Economic Consultants, 1997).

⁴⁵⁹ As noted above, there is a large discrepancy between GDP and GNP in Ireland. Real GDP per capita was some 110 per cent of the EU average in 1998, up from some 75 per cent in 1990. In contrast, real GNP per capita was some 93 per cent of the average EU real GDP per capita in 1998, up from around 65 per cent in 1990. On both measures, there has been a formidable rate of catching up.

CHART 5.3.2

Real GDP per capita in east and west Germany, 1990-1998
(Germany=100)



Source: Deutsches Institute für Wirtschaftsforschung (DIW) and Statistisches Bundesamt.

Note: Real GDP per capita at 1991 prices.

A regression analysis points indeed to a strong inverse relationship between initial income levels and subsequent growth for the period 1950-1998 (table 5.3.4). (The high R^2 indicates that the estimated regression line gives quite a good fit to the observed data.) If the periods before and after 1973 are considered separately, the relationship remains statistically significant, but there is a marked decline in the proportion of variation in the dependent variable (the change in incomes) which is “explained” by the regression for the post-1973 period. This is notably the case for the larger sample of 20 countries compared with the sample of 16 west European countries. This points to the importance of other variables influencing economic growth after 1973. The results, nevertheless, support the finding that the average rate of (absolute) convergence among OECD countries is about 2 per cent per annum over the long term.⁴⁶⁰

It is interesting to look at the positions of countries around the regression line because it allows their actual performance to be compared with the predictions of the regression equation (chart 5.3.4). For the full period 1950-1998, Japan’s growth rate was significantly stronger than expected while that of Turkey appears very disappointing. Among the other economies on the periphery of western Europe, Greece underperformed and Ireland overperformed, while Portugal and Spain were in line with the predictions. The chart also illustrates the below average long-term growth performance of Sweden, Switzerland and the United Kingdom.

⁴⁶⁰ The assumption is, of course, that OECD countries are approaching a rather similar long-run growth path given the broad similarity in their institutional structures, endowments of human capital, and, more generally, organizational capabilities.

TABLE 5.3.3

Real GDP per capita, 1960-1998
(European Union=100)

	1960	1973	1990	1998
France	106	111	108	110
Germany ^a	123	115	114	115
Italy	88	94	100	102
United Kingdom	123	104	98	104
Austria	95	99	104	109
Belgium	99	105	104	110
Denmark	120	115	106	119
Finland	88	95	100	102
Greece	43	63	57	59
Iceland	97	97	107	110
Ireland	61	59	71	110
Luxembourg	151	135	147	182
Netherlands	113	108	99	108
Norway	101	95	109	130
Portugal	39	55	60	67
Spain	57	75	72	79
Sweden	123	115	106	103
Switzerland	180	163	131	118
Turkey	33	29	29	33
Canada	129	121	114	113
United States	168	150	140	149
Japan	56	97	110	112
Western Europe	96	94	91	91
European Union	100	100	100	100

Source: See annex 1 to this chapter.

Note: Figures are rounded.

^a 1950-1990: west Germany.

But the pattern varies, sometimes considerably, when the periods 1950-1973 and 1973-1998 are considered separately. Thus, Greece overperformed and Ireland underperformed in the first period, while the inverse holds for the second period. It is noteworthy that the long-term growth performance of the United States fits the predictions of the regression very well.

Sigma convergence

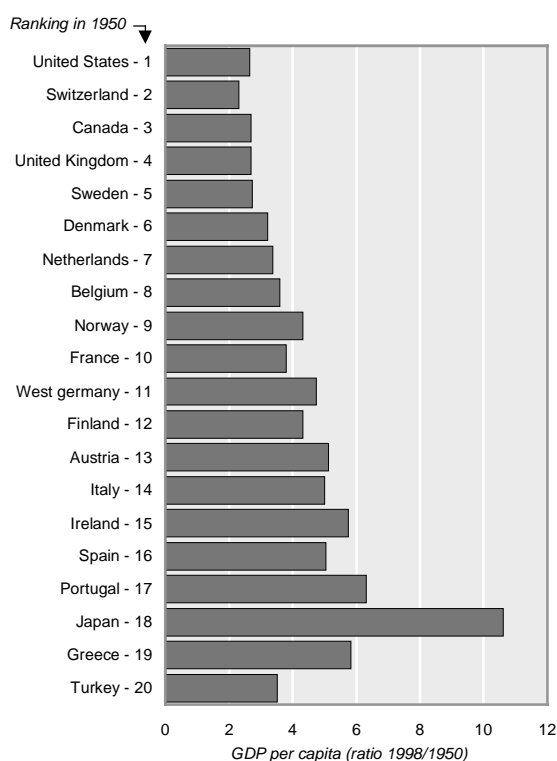
An alternative approach to convergence is to examine changes over time in the degree of inequality or dispersion of per capita GDP between countries, a measure which has become known in the growth literature as sigma convergence. There exist several ways of quantifying the inequality of income distributions but a commonly used measure is the standard deviation of the logarithms of per capita GDP.⁴⁶¹

Chart 5.3.5 shows the long-term evolution of sigma convergence since 1870 for three groups of countries. The first EU-5 group is composed of five of the six

⁴⁶¹ Alternative measures are the variance, the relative mean deviation and the Gini coefficient. For a discussion of the properties of these measures see A. Atkinson, “On the measurement of inequality”, *Journal of Economic Theory*, Vol. 2, 1970, pp. 244-263. It should be noted that taking logarithms reduces the deviation of incomes from the mean, but Sen argues that this also highlights differences at the lower end of the scale. A. Sen, *On Economic Inequality* (Oxford, Clarendon Press, 1997), Expanded Edition, p. 29.

CHART 5.3.3

Country rankings in 1950 and changes in real GDP per capita, 1950-1998



Source: See annex 1 to this chapter.

founding members of the European Community in 1957. (Luxembourg is excluded because data are available only from 1960). The second group (G-12) is composed of EU-5 and seven other western European countries. Finally, G-15 is G-12 plus Canada, Japan and the United States. For the period 1950-1998 the convergence of per capita incomes for the EU-15 (again excluding Luxembourg for 1950-1959) and a larger sample of 20 countries is shown. The general feature is for the degree of dispersion to increase with the size of the sample, but the evolution over time is broadly similar.

The EU-5 is a rather homogeneous group of countries in terms of standards of living and these countries have traditionally had close mutual trade links. There was a tendency for convergence before the First World War, but it set in only around 1900 and lasted for 15 years. The onset of the period of crisis in 1920-1921 and the Great Depression led to a decade of divergence, which was only partly reversed in the 1930s. There was, nevertheless, a slightly declining trend in the standard deviations between 1913 and 1938 (table 5.3.5). In the period 1938-1945 there was considerable divergence, reflecting the differential impact of the war on these economies. But this was almost entirely reversed during the reconstruction of 1945-1950.

TABLE 5.3.4

Cross-country regression analysis: the relationship between changes in real GDP per capita and initial real GDP per capita, 1950-1998

$$(Equation: [\log Y_T - \log Y_0] = a + b \cdot \log Y_0 + e_j)$$

Period	Estimated coefficients		R ²	SEE	Implied speed of convergence (β)
	A	b			
20 countries^a					
1950-1998	5.99 (0.80)	-0.55 (0.10)	0.65	0.23	0.017
1950-1973	4.36 (0.78)	-0.41 (0.09)	0.52	0.22	0.023
1973-1998	2.75 (0.88)	-0.24 (0.10)	0.27	0.16	0.011
16 countries^b					
1950-1998	6.54 (0.59)	-0.61 (0.07)	0.84	0.12	0.020
1950-1973	4.63 (0.65)	-0.44 (0.08)	0.70	0.14	0.025
1973-1998	4.87 (1.31)	-0.47 (0.14)	0.44	0.16	0.025

Source: UN/ECE secretariat.

Note: Figures in brackets are standard errors. The implied speed of convergence (β) was calculated according to the formula (1 - e^{-(β)T}) = b.

^a See table 5.3.1 (full sample excluding Iceland and Luxembourg; data for Germany refer to west Germany only).

^b Sixteen western European countries: 20 countries above less Canada, Japan, Turkey and the United States.

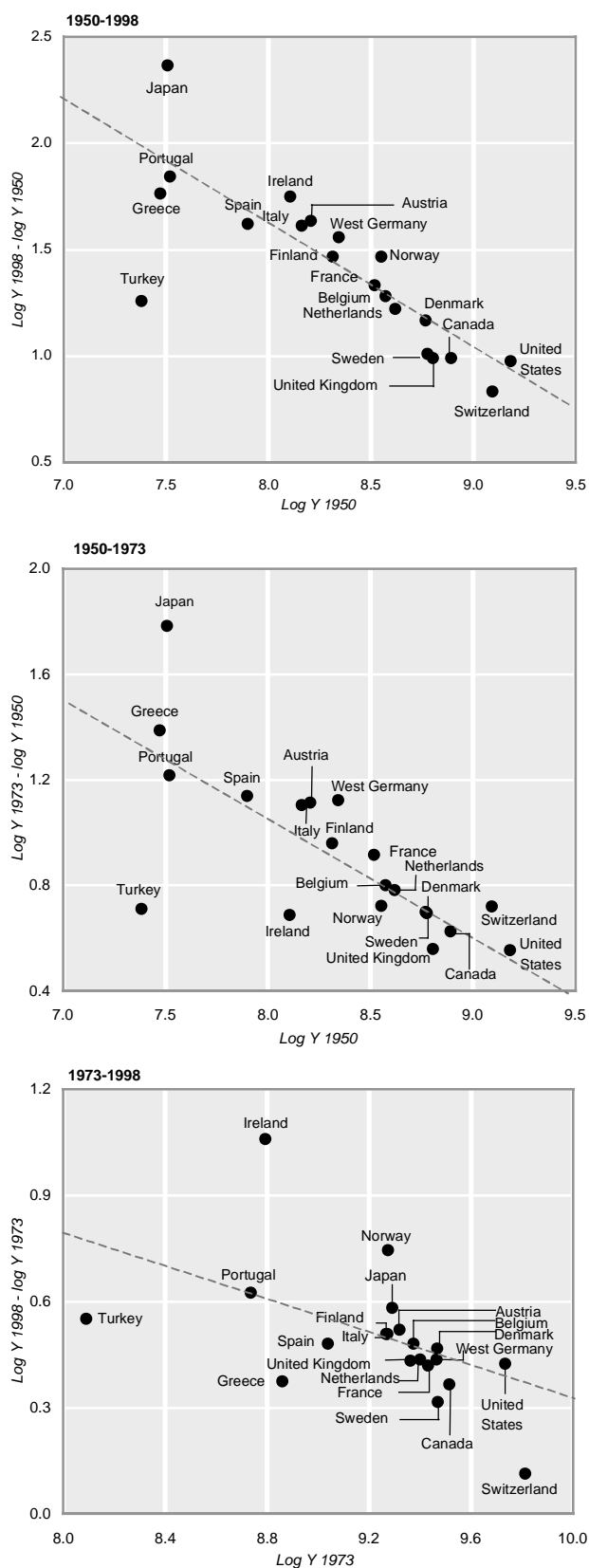
In the Golden Age there was a rapid narrowing of differences in per capita GDP, at a speed which was significantly above the “trend” between 1870-1913. For this small group of countries there was no difference in the speed of convergence in 1960-1973 compared with 1950-1960. Convergence slowed down, however, to a more moderate rate in the years after 1973. The factors impinging on the extent and changing speed of convergence are, of course, difficult to isolate. Certainly, convergence in the Golden Age, to a more or less large degree, was part and parcel of the general process of technological catch up. Technological diffusion, in turn, was facilitated by the progressive trade liberalization of intra-west European trade.⁴⁶²

A broadly similar pattern of sigma convergence can be seen for the other larger groups of countries. The general picture, however, is that the speed of convergence was most rapid between 1960 and 1973; thereafter there was a slowdown which was much more pronounced than in the EU-5 group. In fact, in both the Group of 12 western European countries (G-12) and in the G-15 there was a slight tendency for divergence between 1990 and 1998.

⁴⁶² Ben-David singles out trade liberalization as a main engine behind the decline of income dispersion in the postwar period, but his analysis does not control for the influence of other variables. D. Ben-David, “Equalizing exchange: trade liberalization and income convergence”, *The Quarterly Journal of Economics*, Vol. 108, No. 3, August 1993, pp. 653-679.

CHART 5.3.4

Absolute β convergence in developed market economies, 1950-1998
(Scatter diagrams)



Source: UN/ECE secretariat.

Chart 5.3.6 shows how the dispersion of per capita incomes within the European Union was affected by the increase in membership. The successive enlargements, from the original six member countries of the European Community in 1957 to 12 countries in 1986, have led to a significant rise in the dispersion of incomes. In fact, the standard deviation of the logs of per capita GDP in the 12 countries in 1986 exceeded that for the original six member countries by a factor of about 2.5. This reflected the significantly lower income levels in the economies of the periphery (Greece, Ireland, Portugal and Spain) than in the others. Only the latest enlargement (Austria, Finland, Sweden) in 1995 led to a fall in the level of dispersion. This historical pattern points to the significant increase in the dispersion of per capita incomes, which can be expected from the eastern enlargement of the European Union.

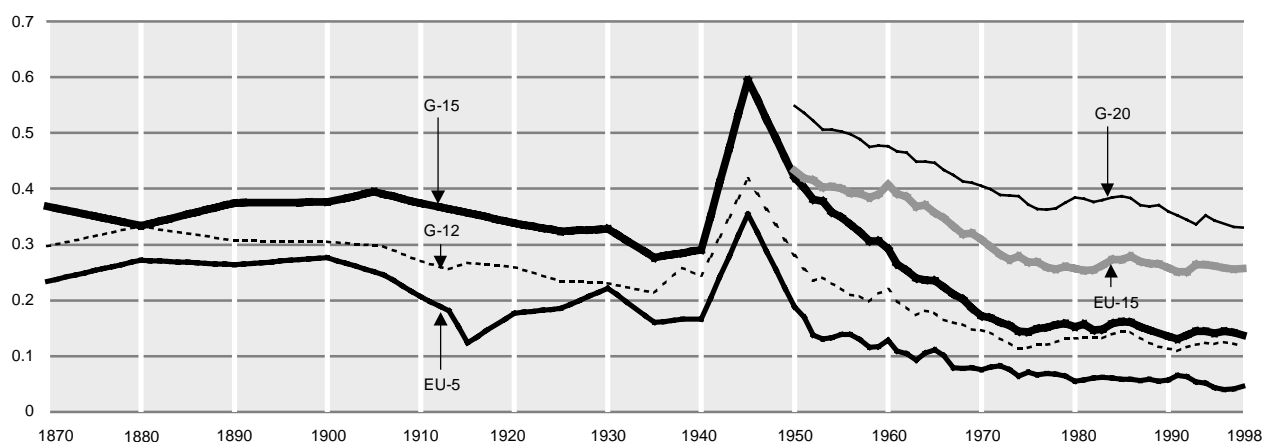
(iii) A summary view of the period 1950-1998

Despite considerable progress since 1950, there still remains a sizeable gap between real per capita GDP in the United States and in western Europe. This gap averaged some 40 per cent for the aggregate of 19 western European countries and 33 per cent for the EU in 1998. Most of the narrowing of the gap over nearly five decades was made between 1950 and 1973. The process of convergence has since slowed down considerably. The weakening of convergence after 1973 is associated with the impact of successive shocks to macroeconomic stability and longer-term growth expectations which, in turn, have reduced the incentives for fixed investment, the main carrier of technical change. Greater cyclical volatility can influence the longer-term growth performance via its impact on "learning by doing" and, thus, on human capital formation, both of which may slow down in periods of low growth or recession.⁴⁶³

Progress in convergence has been uneven across countries and over time, reflecting the specific interactions between domestic and international factors and their impact on the growth of individual countries. This underlines the fact that the longer-term growth performance of each country is a unique experience and, as such, hardly possible to emulate. Progress in convergence has been notably uneven at the periphery. It petered out into broad stagnation in Greece after 1973 and catch up never really took off in Turkey. In contrast, the performance of Portugal and Spain is more satisfactory, although the question always remains as to whether the outcome could have been even better. It is, of course, difficult to isolate and quantify the factors behind this differential performance, but the more favourable outcome for Portugal and Spain compared with Greece after 1973 has been associated, *inter alia*, with a greater emphasis on institutional adaptation,

⁴⁶³ This raises the issue of the effectiveness of countercyclical policies in smoothing the growth path. "Faut-il aller contre le cycle?", *La Lettre du CEPII*, No. 149, September 1996.

CHART 5.3.5

 Sigma convergence in developed market economies, 1870-1998
 (Natural logarithms)


Source: See annex 1 to this chapter.

Note: Standard deviations of the annual real per capita GDP (expressed in natural logarithms). Data for 1870-1950 are in five-year intervals. Annual data for 1950-1998.

G-12: Austria, Belgium, Denmark, Finland, France, Germany (west Germany until 1990), Italy, Netherlands, Norway, Spain (excluded in 1880), Sweden and United Kingdom.

G-15: G-12 plus Canada, Japan and United States.

G-20: G-15 plus Greece, Ireland, Portugal, Switzerland and Turkey.

EU-15: the 15 member countries of the European Union.

EU-5: Belgium, France, Germany (west Germany until 1990), Italy and Netherlands.

macroeconomic stabilization, structural reforms and trade liberalization in the former two countries, which at the same time created a more conducive environment for FDI.⁴⁶⁴

Ireland is the prime example of convergence, but its success has been the result of the favourable interaction of a host of specific factors, which are likely to be difficult to replicate elsewhere. And the question remains, of course, as to how long Ireland's current high growth rates, and its related attractiveness to foreign investors, can be sustained. Analysing the sources of Ireland's growth relative to Portugal and Spain does not lead to clear-cut conclusions.⁴⁶⁵ Relatively higher rates of factor accumulation (physical, human, R&D) have played a role and there is also a presumption that fiscal consolidation has had growth-enhancing effects. But a large part of Irish growth since 1985 is difficult to explain within the framework of a traditional growth accounting exercise, partly because of the difficulty of capturing the effects of FDI.

The empirical evidence points to the inter-relatedness of short-term cyclical developments and the longer-term growth performance. In fact, growth was

generally rather uneven over the period 1950-1998, with episodes of weaker growth followed by more or less long periods of sustained dynamism (or vice versa). This points to the role of country-specific characteristics, including (positive or adverse) shocks and policies in determining long-term growth outcomes apart from common factors such as technological change.⁴⁶⁶ Correlations of average growth rates across countries over larger periods are weak or even negative (table 5.3.6).

The differential growth performance has affected the income hierarchy of countries: some have moved up, others have fallen back (table 5.3.7). The main upward movers between 1960 and 1998 were west Germany and Japan (an increase by 9 ranks), followed by Norway (+8), and Ireland (+6). Countries which fell significantly behind are Sweden (-10), the United Kingdom (-9) and the Netherlands (-7). The four west European countries (Greece, Portugal, Spain, Turkey) which were at the bottom of the league in 1950 remained so (in the same order) in 1998. Although declining rank correlation coefficients (table 5.3.8) reflect the shifts in country positions, the overall pattern is, nevertheless, for broad stability.⁴⁶⁷

⁴⁶⁴ B. Larre and R. Torre, "Is convergence a spontaneous process? The experience of Spain, Portugal and Greece", *OECD Economic Studies*, No. 16, Spring 1991, pp. 169-198.

⁴⁶⁵ A. de la Fuente and X. Vives, "The sources of Irish growth", in A. Gray (ed.), *op. cit.*, pp. 112-134.

⁴⁶⁶ W. Easterly, M. Kremer, L. Pritchett and L. Summers, "Good policy or good luck?" *Journal of Monetary Economics*, Vol. 32, 1993, pp. 459-483.

⁴⁶⁷ All the Spearman rank correlation coefficients are statistically significant at the 1 per cent level.

TABLE 5.3.5

The speed of sigma convergence, 1870-1998
(Average annual rates of change)

	EU5	G12	G15	G20	EU15
1870-1998	-1.3	-0.7	-0.8	..	..
1870-1913	-0.6	-0.3	-	..	..
1913-1938	-0.3	-	-0.8	..	..
1938-1945	11.4	7.1	10.3	..	..
1945-1950	-11.9	-7.7	-6.8	..	..
1950-1960	-3.8	-2.4	-3.6	-1.4	-0.9 ^a
1960-1973	-3.9	-4.3	-4.8	-2.0	-3.0
1973-1998	-2.0	-0.1	-0.5	-0.6	-0.2

Source: UN/ECE secretariat.

Note: A negative sign indicates convergence.

EU-5: Belgium, France, west Germany, Italy and the Netherlands.

G-12: EU-5 plus Austria, Denmark, Finland, Norway, Spain, Sweden and the United Kingdom.

G-15: G-12 plus Canada, Japan and the United States.

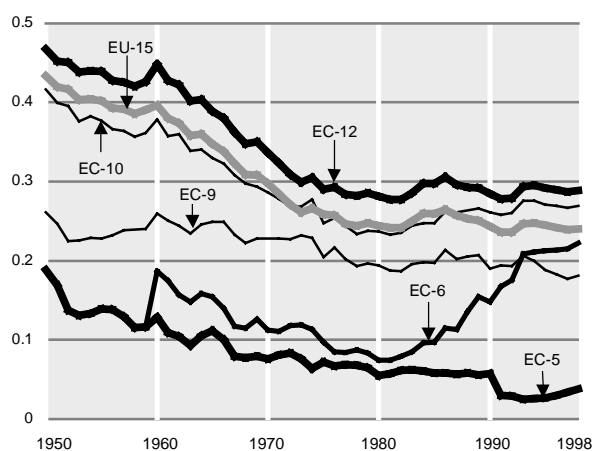
G-20: G-15 (excluding Luxembourg) plus Greece, Ireland, Portugal, Switzerland and Turkey.

EU-15: the 15 member countries of the European Union.

^a Excluding Luxembourg

CHART 5.3.6

The impact of wider EC/EU membership
on sigma convergence, 1950-1998
(Natural logarithms)



Source: UN/ECE secretariat.

Note: Standard deviations of the annual real per capita GDP (expressed in natural logarithms).

EC-5: Belgium, France, Germany (west Germany until 1990), Italy and Netherlands.

EC-6: EC-5 plus Luxembourg.

EC-9: EC-6 plus Denmark, Ireland and United Kingdom.

EC-10: EC-9 plus Greece.

EC-12: EC-10 plus Portugal and Spain.

EU-15: EC-12 plus Austria, Finland and Sweden.

The decline in the dispersion of per capita incomes has been accompanied by an increasingly close clustering of countries around the median per capita income. Thus, in 1950 only two out of 20 countries had a per capita income within a range of ± 10 per cent of the median (table 5.3.9). By 1973 the number had increased to nine and by 1998 to 14 countries. The ratio of maximum to minimum

TABLE 5.3.6

Stability of relative growth patterns, 1950-1998
(Pearson product moment correlation coefficients)

	1950-1960	1960-1973	1973-1990	1990-1998
1950-1960	1	0.582	0.275	-0.275
1960-1973		1	0.238	-0.097
1973-1990			1	0.601
1990-1998				1

Source: UN/ECE secretariat.

Note: Twenty countries. Correlation coefficient of average annual growth rates. Data for Germany are for west Germany only.

TABLE 5.3.7

Real GDP per capita, 1950-1998
(Country ranking)

	1950	1960	1970	1980	1990	1998	1998 ^a
Switzerland	2	1	1	2	3	5	5
United States	1	2	2	1	2	2	2
Luxembourg .....	..	3	3	3	1	1	1
Canada	3	4	5	4	4	7	6
Sweden	5	5	4	8	11	16	15
United Kingdom	4	6	10	16	17	15	14
Germany (west)	11	7	7	5	5	6	16
Denmark	6	8	6	10	10	4	4
Netherlands	7	9	9	13	16	14	13
France	10	10	8	7	8	12	11
Norway	9	11	14	9	7	3	3
Belgium	8	12	11	11	13	10	9
Iceland .....	..	13	17	6	9	9	8
Austria	13	14	13	12	12	13	12
Finland	12	15	16	17	14	17	17
Italy	14	16	12	14	15	18	18
Ireland	15	17	19	20	19	11	10
Spain	16	18	18	18	18	19	19
Japan	18	19	15	15	6	8	7
Greece	19	20	20	19	21	21	21
Portugal	17	21	21	21	20	20	20
Turkey	20	22	22	22	22	22	22

Source: See annex 1 to this chapter.

Note: Countries are listed according to the ranking in 1960.

^a Germany instead of west Germany.

income per capita fell only after 1973. For the west European group (i.e. excluding Iceland and Luxembourg) there is still a large gap between the top (Norway and Denmark) and the bottom (Turkey and Greece). In the European Union, the inclusion or exclusion of Luxembourg matters a lot for this ratio: excluding Luxembourg, there was a fall in the maximum-minimum ratio from 3.8 to 2 between 1950 and 1998; but the gap widens in the 1990s when Luxembourg is included.

There is ample evidence that the convergence to United States per capita income levels (and convergence within the group of followers) reflects to a large extent the catch up in total factor productivity. Neither capital deepening nor more rapid increases in labour force participation appear to have played a dominant role in western Europe.⁴⁶⁸ In fact,

⁴⁶⁸ S. Dowrick and D. Nguyen, "OECD comparative economic growth 1950-85: catch-up and convergence", *The American Economic*

TABLE 5.3.8

Real GDP per capita: stability of country rankings, 1950-1998
(Spearman rank correlation coefficients)

	1950	1960	1970	1980	1990	1998
1950	1	0.962	0.901	0.802	0.662	0.647
1960		1	0.953	0.874	0.741	0.671
			0.949	0.867	0.752	0.701
1970			1	0.919	0.794	0.663
				0.861	0.78	0.674
1980				1	0.919	0.777
					0.921	0.802
1990					1	0.854
						0.88
1998						1

Source: UN/ECE secretariat.

Note: First set of values: 20 countries excluding Iceland and Luxembourg; values in bold, 22 countries. Data for Germany are for west Germany only. All coefficients are significant at the 1 per cent level.

TABLE 5.3.9

Median income, density and sigma convergence, 1950-1998

	1950	1960	1973	1998
20 countries^a				
Median income ^b	4 600	6 800	11 400	18 800
Density ^c	2	4	9	14
Sigma ^d	0.55	0.48	0.39	0.33
Maximum/minimum ^e	6.0	5.5	5.6	4.6
Western Europe^f				
Median income ^b	4 200	6 700	11 200	17 900
Density ^c	2	4	7	10
Sigma ^d	0.50	0.47	0.40	0.34
Maximum/minimum ^e	5.5	5.5	5.6	4.0
European Union^g				
Median income ^b	4 100	6 700	11 600	17 900
Density ^c	2	3	7	10
Sigma ^d	0.43	0.46	0.27	0.26
Maximum/minimum ^e	-	3.8	2.4	3.1
Maximum/minimum ^{e,h}	3.8	3.1	2.0	2.0

Source: UN/ECE secretariat.

^a Twenty countries excluding Iceland and Luxembourg.

^b PPPs expressed in 1990 international dollars (figures are rounded).

^c Number of countries within a range of ± 10 per cent of the median income.

^d Standard deviation of log GDP per capita.

^e Rate of maximum to minimum per capita income.

^f Seventeen countries excluding Iceland and Luxembourg.

^g 1950: excludes Luxembourg.

^h Excludes Luxembourg.

growth accounting estimates for the seven major economies suggest that the proportion of growth explained by total factor productivity in France, Germany, Italy and the United Kingdom over the period 1960-1989 is within a range of 55-60 per cent and some

50 per cent in Japan.⁴⁶⁹ This compares with some 25 per cent for the United States and 21 per cent in Canada. Capital accumulation was the second most important source of growth in the four west European countries and Japan, but it was the dominant source in Canada and the United States. The remaining gaps in per capita GDP between the United States and other countries reflect a combination of differences in the levels of capital intensity and total factor productivity, the relative importance of which will vary from country to country. Recent data are not available, but for the six major economies mentioned above the productivity gaps in 1989 were significantly smaller than the GDP gaps. This points to the role that physical and human capital accumulations have played in maintaining the United States lead in per capita GDP.

5.4 Catching up and falling behind: the experience of the ECE transition economies

Economic transformation in the transition economies (the former centrally planned economies (CPEs)) should bring about a better allocation and greater efficiency in the use of resources. The more advanced reforming countries in the region have already made a notable progress in this direction. The initially strong popular support for radical reforms in these countries reflected the hope that incomes and living standards would rise fairly quickly to levels similar to those prevailing in the developed market economies of western Europe. To what extent have these hopes started to materialize and to what extent (if at all) have transition economies reduced the income gaps vis-à-vis western Europe? What has happened to the cross-country income distribution? Are the transition economies becoming more or less homogeneous as a group in terms of per capita income? How can these processes be expected to develop in the future? These are some of the questions that will be addressed in the rest of this chapter.

Catching up, by definition, requires in the first place a differential growth of per capita incomes (a necessary, but not a sufficient condition for convergence); secondly, convergence with western Europe will only materialize if the transition economies maintain such a positive differential for a sufficiently long period of time. Such a development will be only sustainable in the medium and long term if the transition economies achieve and maintain not only high rates of economic growth but also rapid rates of improvement in factor productivity and productive efficiency.

⁴⁶⁹ C. Dougherty and D. Jorgenson, "International comparisons of the sources of economic growth", *The American Economic Review*, Vol. 82(2), May 1996, pp. 25-29. In this work different types of labour and capital are treated as separate factor inputs by constructing a constant-quality index of capital input and labour input, respectively.

Review, Vol. 79(5), December 1989, pp. 1010-1030. At the same time, they acknowledge that their analysis does not explain "a large part of the success of Japan, Germany, Austria and France up until 1973".

As noted earlier, long-run rates of growth (such as those derived from long-term output trends) are a theoretical abstraction and their information content does not relate to the immediate growth prospects of a country. Nevertheless, the long-run rate of growth is a useful concept as it sets the economic dynamics of a country in a specific and unique perspective. Thus, the starting point of the analysis is the assessment of the long-term growth rates of these countries (in the postwar period and during the process of economic transformation) as well as a quantitative evaluation of the degree to which there has been convergence or divergence in their per capita income levels.

(i) Long-term trends in per capita GDP growth in the former centrally planned economies and their successor states

The present level of understanding of economic growth in the ECE transition economies during the decades of the command economy and central planning still remains unsatisfactory. It is widely acknowledged that the official statistics of that period did not reflect accurately actual economic growth in the former CPEs and, as such, do not provide a sound basis either for comparisons over time or across countries. As a rule the official growth statistics were systematically biased upwards, a reflection of both the poor quality of the statistical data (in particular, since price inflation was for a long time an ideological taboo in many of these countries, the reported real data often contained an inflationary bias), and the deliberate distortions introduced by the authorities in an attempt to present a more rosy picture of the state of the economy. Other difficulties are related to the statistical methodology of the past: the statistics of the former CPEs were based on the Material Product Balance System (MPS), which was not directly comparable to the System of National Accounts (SNA) used in the western market economies. Moreover, even within the MPS system, economic statistics were often rendered meaningless by highly distorted relative prices. Finally, cross-country comparisons require internationally comparable national data which are not only statistically consistent but are also expressed in the same *numéraire*.⁴⁷⁰ The absence of market exchange rates in the planned economies was a major impediment not only to the direct conversion of national statistics but also to the implementation of other approaches, such as those based on purchasing power parities (PPPs).

Despite numerous attempts by independent researchers and analysts to establish internationally comparable output and income data for the former CPEs, the picture of the past remains patchy and incomplete. One of the practical problems related to the use of alternative estimates made in the past for the assessment of long-term trends is that they were usually point

estimates, reflecting outcomes for a given year or years. This is understandable, given the high cost of such exercises. However, while the results of such efforts were helpful for working comparisons in a given period they are not sufficient for analysing the longer-term growth performance of these economies.

Computing new, alternative estimates of past performance would obviously be a very ambitious task, which is outside the scope of the present study. Instead of trying to re-evaluate the historical growth path of the former CPEs, this section revisits the set of previously compiled estimates in an attempt to reconstitute a more general picture of their past performance. In addition, an attempt has been made – on the basis of extrapolation and simple statistical manipulations – not only to collect the scattered point estimates, but also to use them in order to generate estimates for longer time periods.

Past estimates of alternative, internationally comparable GDP figures for the former CPEs have been based on a number of approaches, the most common being:⁴⁷¹

- *Calculation of purchasing power parities (PPPs) for groups of countries*

This is probably the most soundly-based approach which – despite the inevitable caveats – in principle yields international comparisons that are widely accepted. However, it is data and resource demanding and usually presupposes the direct involvement of national statistical offices. The Statistical Division of the United Nations has initiated the most comprehensive international PPP-based studies.⁴⁷² Due to resource constraints such studies have only been made for benchmark years; regrettably, few of the former CPEs were involved in the early rounds of the studies undertaken within the United Nations system.⁴⁷³

- *Use of physical indicators (PI) as a basis for computing internationally comparable GDP levels*

The underpinning of this method is the conjecture (supported by considerable empirical evidence) that there

⁴⁷¹ For a critical assessment of the approaches used to compose internationally comparable estimates of income levels of the former CPEs and a summary of some of their results see E. Lancieri, "Dollar GNP estimates for central and eastern Europe 1970-90: a survey and a comparison with western countries", *World Development*, Vol. 21, No. 1, 1993, pp. 161-175.

⁴⁷² The International Comparison Project (ICP) was initiated in 1968 but its practical implementation started at the end of the 1970s.

⁴⁷³ The first European Comparison Programme (ECP) within the ICP covered 17 European countries and provided benchmark estimates for 1980 (Hungary, Poland and Yugoslavia participated in this exercise). Four more rounds of the ECP have been implemented since then providing benchmarks for 1985, 1990, 1993 and 1996, and covering an increasing number of countries. The latest, 1996, round includes 52 countries and includes most of the ECE transition economies. UN/ECE, *Economic Bulletin for Europe*, Vol. 31, No. 2, 1980 and *International Comparisons of Gross Domestic Product in Europe, 1985, 1990, 1993, 1996* (United Nations publications, Sales Nos. E.88.II.E.28, E.94.II.E.23, E.97.II.E.2, E.99.II.E.13).

⁴⁷⁰ Per capita GDP levels expressed in "international" dollars have become the standard operational indicator of most international comparisons.

exists a strong statistical association between the level of aggregate output (GDP) and the level of output of certain key products. In practice, the method is applied in the reverse direction: reported output data for a selection of products, measured in physical units, are used to estimate the level of GDP that corresponds to the output of such products, on the basis of the relationship between the two sets of data in a sample of market economies where both are available.

This method was designed to circumvent the statistical difficulties mentioned above, and assumes that the reported physical quantities of output, relatively well recorded by the statistical offices of the former CPEs, were not subject to such distortions (or, at least, not to the same degree).⁴⁷⁴ Over the years, the PI method was employed extensively by the ECE secretariat for the calculation of internationally comparable GDP estimates for the former CPEs.⁴⁷⁵

- *Re-evaluation of national accounts*

The idea behind this approach is to introduce adjustments directly into the national accounts data reported by the statistical offices of the former CPEs. It aims to eliminate, or at least reduce, the inherent distortions in the basic data by, for example, converting MPS into SNA, making proper deflation, imposing different price structures, etc.). In a second step – to make the results internationally comparable – the “adjusted” data are converted into dollars by applying conversion factors emulating market exchange rates.

The best known piece of research that relies on this approach (which – if properly followed – is even more resource demanding than the use of PPPs) is that of Paul Marer.⁴⁷⁶ This work, however, contains only one benchmark estimate (for 1980). Reportedly, the GDP estimates for the former CPEs published in the *Handbook of Economic Statistics* of the United States CIA are based on a similar approach.⁴⁷⁷

⁴⁷⁴ Despite its sound rationale, this method still tends to yield a systematic upward bias in the estimates. The reasons for this include: the fact that it does not take into consideration quality differences; the implicit assumption (which obviously does not hold in reality) of identical productive efficiency in the former CPEs and in market economies (the statistical coefficients that were applied to project GDP levels for the former CPEs were estimated on the basis of data for market economies); the implicit assumption of identical price structures; etc.

⁴⁷⁵ Three phases of this study were carried out, producing GDP estimates for selected benchmark years. UN/ECE, *Economic Bulletin for Europe*, Vol. 31, No. 2, 1980; UN/ECE, *Comparative GDP Levels, Physical Indicators, Phase III*, 1993 (United Nations publication, Sales No. GV.E.93.0.5).

⁴⁷⁶ P. Marer, *Dollar GNPs of the USSR and Eastern Europe* (Baltimore, The Johns Hopkins University Press, 1986).

⁴⁷⁷ A. Maddison, “Measuring the performance of a communist command economy: an assessment of the CIA estimates for the USSR”, *The Review of Income and Wealth*, Series 44, No. 3, September 1998, pp. 307-323 and E. Lancieri, op. cit.

- *Hybrid approaches, combining elements of the above (or similar) methods*

A typical hybrid approach is that of Robert Summers and Alan Heston to compute “PPP-compatible” GDP estimates for those former CPEs for which PPP-based figures were not directly available. They start with the PPP-based estimates for a control group of countries in order to compute a structural relationship between the PPP of a country and its exchange rate. This relation is then used to compute methodologically compatible GDP estimates for countries, for which only regular national accounts data (or even a proxy for them) are available.⁴⁷⁸ The comprehensive study of long-term economic development by Angus Maddison (which includes GDP estimates for some central and eastern European countries) is based on a similar methodology.⁴⁷⁹

The annex table summarizes alternative estimates of per capita GDP levels for the former CPEs (relative to the corresponding per capita GDP level in the United States) for the period 1950-1990. These estimates are the results of large research projects based on different methodologies and made at different times. Although probably not exhaustive, the table includes some of the best known and most widely used results, which can be regarded as representative of the main strands of research in this field.

An effort has been made to extend the time horizon of this comparative picture by splicing together the estimates of the past with internationally comparable estimates of GDP of these countries (or their successor states) after the start of economic transformation. For the most part, the estimates for the period after 1989 in the annex table are based on the results of the European Comparison Programme 1996 (ECP’96) which, in terms of country coverage, is the most comprehensive study of this sort that has been performed so far.⁴⁸⁰

Understandably, the splicing of pre- and post-transition estimates is subject to important qualifications, not the least of which are the changes in national boundaries that have taken place. The data in the annex table reflect weighted averages for the same territories in both periods. However, sovereign boundaries exert a profound impact on economic performance as a result of national policies, and thus the outcomes before and after the start of economic and political transformation reflect economic performance under different national regimes. Consequently, a mechanical aggregation of economic variables in cases of disintegration or reintegration of national states runs the risk of neglecting a considerably

⁴⁷⁸ R. Summers and A. Heston, “Improved international comparisons of real product and its composition: 1950-1980”, *The Review of Income and Wealth*, Series 30, No. 2, 1984, pp. 207-262 and “The Penn World Tables (Mark 5): an extended set of international comparisons, 1950-1985”, op. cit.

⁴⁷⁹ A. Maddison, *Monitoring the World Economy, 1820-1992*, op. cit.

⁴⁸⁰ ECP’96 provides a benchmark PPP-based estimate of GDP in 1996 for almost all ECE transition economies: the only ones not present are Bosnia and Herzegovina and Yugoslavia. UN/ECE, *International Comparisons of Gross Domestic Product in Europe, 1996* (United Nations publication, Sales No. E.99.II.E.13).

increased degree of heterogeneity. Hence, joining the pre- and post-transition trends should be regarded only as an attempt to provide a broad – although possibly superficial – picture of the long-term development of economic growth in this region.

One striking feature of the pre-transition figures presented in the annex table is the large dispersion in the alternative estimates of the GDP level in the former CPEs. Indeed, large discrepancies – resulting from different methodologies – are present even for countries such as Hungary that were considered to have had relatively more reliable statistics. These discrepancies highlight the considerable difficulties of analysing long-term growth trends in these countries.

Another problem is the partial character of the estimates: with the exception of the Maddison data set (which contains continuous time series for the postwar period), practically all the other projects have been limited to selected benchmark years. Even when more than one benchmark is available, the period covered by internally consistent estimates is often limited.

An attempt has been made to cope with these difficulties by grouping the available estimates and manipulating the source data so as to compile sets of benchmark estimates for the whole period 1950-1990 with an acceptable degree of internal consistency. Some selected results of this exercise are shown in table 5.4.1 where per capita income levels in the former CPEs are shown relative to the average of the present 15 EU member states. The simplest statistical manipulation is the computation of simple averages of all the available estimates for a given benchmark year (“estimate A”). The Maddison data are unchanged (“estimate C”). Some of the estimates (such as the PI estimates but also some of the PWT ones) are widely considered to be upward biased. To counter this, a selection of more “conservative” estimates has been made, the average of which is shown as “estimate D”; the missing data points in this latter estimate have been extrapolated on the basis of the average measured distance from other estimates in other benchmark years. “Estimate B” is the weighted average of all the available estimates, with a larger weight being given to the more conservative estimates. “Estimate E” is an extrapolation of the ECP’96 results on the basis of the officially reported growth rates in the period since 1989 (the year 2000 is projected using the forecasts reported in table 3.1.1 of this *Survey*).⁴⁸¹

Given the nature of the source data and the subsequent statistical manipulation, the results shown in table 5.4.1 can only be regarded as rough and provisional. Moreover, the ambiguity arising from the multiplicity of results remains, and the present level of knowledge on the topic does not allow any ranking of the different estimates according to reliability. In view of these limitations, it would not be acceptable to focus on any single estimate; instead, the likely range of values must be taken into account.

The four long-term series in table 5.4.1 (from A to D) reflect different degrees of “conservatism” and hence define lower and upper bounds for the absolute levels of per capita GDP in the former CPEs. Despite the differences in absolute levels, all four estimates imply similar, though not identical, long-term trends of economic growth and economic convergence during the postwar era.

The most striking finding from the results shown in table 5.4.1 – and which is evident even from a simple visual inspection of the numbers – is that there is no evidence of any catching up by the former CPEs and their successor states on the per capita income levels of the EU-15 during the 50-year period between 1950 and 2000. On the contrary, a comparison of per capita GDP in the initial and final years reveals instead evidence of falling behind; the latter is especially pronounced in the successor states of the Soviet Union after 1990. All the former CPEs have followed a broadly similar pattern of long-term growth of per capita income: it started with a catch-up phase which continued roughly until the middle of the 1970s and in the course of which the income gap vis-à-vis the EU-15 was gradually shrinking; after this point the gap started to widen again.

Quantitative measures of the actual degree of long-term convergence/divergence in per capita income levels (beta and sigma convergence) for the former CPEs and their successor states are shown in charts 5.4.1 and 5.4.2 (each chart shows estimates A and D, respectively).⁴⁸² Chart 5.4.1, which illustrates beta convergence, is presented in the form of scatter diagrams with linear regressions fitted to each set of data points.⁴⁸³ In turn chart 5.4.2 illustrates sigma convergence, the change in the cross-country variance of per capita income over time.⁴⁸⁴ Obviously, the limited number of data points (both in terms of the number of countries and benchmark years), as well as the large dispersion of the observations, reduce the statistical robustness of any conclusions that may be drawn from these exercises.⁴⁸⁵ Notwithstanding these limitations, however, the charts reveal a number of repeated and important characteristics of the long-term cross-country development of per capita income levels.⁴⁸⁶

⁴⁸² Since, qualitatively, all four estimates (from A to D) indicate similar convergence trends, only two are shown in the charts.

⁴⁸³ As noted in section 5.2, a downward sloping regression line is an evidence of beta convergence of per capita income levels over time (i.e. countries with lower levels of per capita income in the initial period tend to grow faster, and vice versa).

⁴⁸⁴ Again, a downward trend points to declining cross-country disparities and vice versa.

⁴⁸⁵ For these reasons the parameters of the fitted regression lines are not discussed here.

⁴⁸⁶ It should also be taken into account that in terms of the different convergence conjectures outlined in section 5.2, the charts depicting beta convergence are only relevant as regards the eventual identification of “absolute” (unconditional) convergence, that is, without controlling for the similarity in economic structures and the distance of each economy from a “steady state”.

⁴⁸¹ The data for the former GDR shown in table 5.4.1 for the period after 1990 (in “estimate A”) are based on recent official German statistics.

TABLE 5.4.1

Per capita GDP in the former centrally planned economies and their successor states relative to the European Union: averages and extrapolations of various estimates, 1950-2000
(Per capita GDP in the European Union=100)

	1950	1955	1960	1965	1970	1975	1980	1985	1989	1990	1995	2000 Projection
Albania												
A. Simple average of all estimates .....	..	..	..	..	20.6	24.4	23.4	22.7	12.1	9.3	..	..
B. Weighted average of various estimates .....	..	..	..	..	..	..	..	..	..	..	..	..
C. Maddison data .....	..	..	..	..	..	..	..	..	..	..	..	..
D. Extrapolation of conservative estimates .....	..	..	..	..	..	..	..	..	13.3	9.3	..	..
E. ECP'96 .....	..	..	..	..	..	..	..	..	17.8	15.4	13.7	14.8
Bulgaria												
A. Simple average of all estimates	39.4	41.8	47.7	55.1	54.7	56.6	51.7	53.0	40.9	35.6	..	..
B. Weighted average of various estimates	34.1	36.1	41.3	48.9	47.7	52.6	50.4	52.4	42.7	40.9	..	..
C. Maddison data	36.0	38.3	43.6	47.4	48.3	52.4	47.5	46.0	40.8	37.0	..	..
D. Extrapolation of conservative estimates	29.4	31.2	35.6	42.2	41.1	45.3	44.3	44.3	37.1	35.3	..	..
E. ECP'96 .....	..	..	..	..	..	..	..	..	34.5	31.6	28.4	24.2
Czechoslovakia^a												
A. Simple average of all estimates	90.9	82.0	88.1	83.6	74.9	78.3	70.3	71.0	61.8	54.2	..	..
B. Weighted average of various estimates	81.1	72.6	77.6	75.5	67.8	71.6	68.5	70.3	67.8	63.2	..	..
C. Maddison data	76.2	69.9	76.4	68.0	65.4	66.3	62.8	61.6	57.3	54.3	..	..
D. Extrapolation of conservative estimates	69.4	62.2	66.5	64.7	58.1	61.3	59.5	59.4	60.2	54.2	..	..
E. ECP'96 .....	..	..	..	..	..	..	..	..	64.9	62.4	56.9	56.3
German Democratic Republic^b												
A. Simple average of all estimates	83.0	94.3	81.9	82.0	76.4	81.5	79.8	82.0	71.8	61.8	67.1	64.9
B. Weighted average of various estimates	71.6	81.4	83.0	83.2	73.1	80.3	79.0	84.5	77.4	70.9	..	..
C. Maddison data .....	..	..	53.1	53.2	56.0	56.0	58.1	58.0	56.2	..	..	..
D. Extrapolation of conservative estimates	62.3	70.9	72.3	72.4	63.7	69.9	68.5	74.0	67.4	61.8	..	..
E. ECP'96 .....	..	..	..	..	..	..	..	..	..	..	..	..
Hungary												
A. Simple average of all estimates	61.9	61.1	61.3	63.3	58.6	61.2	57.1	57.7	50.8	42.6	..	..
B. Weighted average of various estimates	56.5	55.2	55.5	58.3	55.3	58.2	57.1	59.2	55.1	49.0	..	..
C. Maddison data	54.0	54.8	54.6	54.2	50.9	52.1	49.7	48.4	44.5	40.7	..	..
D. Extrapolation of conservative estimates	49.5	48.4	48.6	51.0	48.4	50.9	50.9	51.0	49.6	43.0	..	..
E. ECP'96 .....	..	..	..	..	..	..	..	..	56.7	53.7	47.9	52.9
Poland												
A. Simple average of all estimates	62.1	57.9	56.6	57.2	51.8	60.4	50.5	46.9	39.2	31.6	..	..
B. Weighted average of various estimates	55.0	52.9	51.9	53.4	48.6	55.3	50.1	48.0	40.7	37.1	..	..
C. Maddison data	53.3	49.7	48.2	46.2	44.8	52.1	45.2	41.8	37.3	32.8	..	..
D. Extrapolation of conservative estimates	48.1	44.9	44.0	45.3	41.3	46.9	43.7	39.5	34.9	31.4	..	..
E. ECP'96 .....	..	..	..	..	..	..	..	..	38.0	31.3	35.0	39.9
Romania												
A. Simple average of all estimates	33.0	31.7	34.5	39.1	35.1	39.7	38.8	39.5	30.6	24.7	..	..
B. Weighted average of various estimates	29.2	28.1	30.2	35.1	32.1	37.8	38.5	39.6	35.9	30.6	..	..
C. Maddison data	25.7	28.1	27.6	29.3	28.9	33.8	32.5	30.4	25.5	22.2	..	..
D. Extrapolation of conservative estimates	24.0	23.1	24.9	28.9	26.5	31.1	33.6	30.7	31.6	25.2	..	..
E. ECP'96 .....	..	..	..	..	..	..	..	..	39.2	36.1	32.8	26.5
SFR of Yugoslavia^c												
A. Simple average of all estimates	35.4	33.0	38.3	41.9	37.0	43.1	46.2	46.1	43.4	33.9	..	..
B. Weighted average of various estimates	31.2	29.0	34.1	38.2	37.2	43.3	47.1	46.1	46.0	35.8	..	..
C. Maddison data	33.7	31.8	35.9	37.0	37.0	42.1	46.3	44.7	38.8	35.0	..	..
D. Extrapolation of conservative estimates	29.4	27.3	32.0	35.9	35.0	40.8	47.0	40.5	42.5	33.7	..	..
E. ECP'96 .....	..	..	..	..	..	..	..	..	45.2	39.8	24.0	23.8
Soviet Union^d												
A. Simple average of all estimates	63.9	60.5	62.8	64.7	61.2	62.4	59.8	57.9	48.4	43.6	..	..
B. Weighted average of various estimates	57.0	53.8	56.9	60.7	57.4	59.7	60.3	57.5	49.2	48.4	..	..
C. Maddison data	61.7	58.9	58.9	56.9	56.4	55.1	50.7	49.6	46.4	44.1	..	..
D. Extrapolation of conservative estimates	51.2	48.3	51.1	54.5	51.6	53.6	57.4	48.4	43.6	43.5	..	..
E. ECP'96 .....	..	..	..	..	..	..	..	..	49.1	46.3	26.6	24.0

Source: UN/ECE secretariat calculations, based on the data presented in the table of annex 2 to this chapter. The data for the former GDR in the period after 1990 are from Statistisches Bundesamt, *Volkswirtschaftliche Gesamtrechnungen*, Fachserie 18, Reihe 1.1, Konten und Standardtabellen, 1998.

^a After 1993, Czech Republic and Slovakia.

^b After 1990, former GDR.

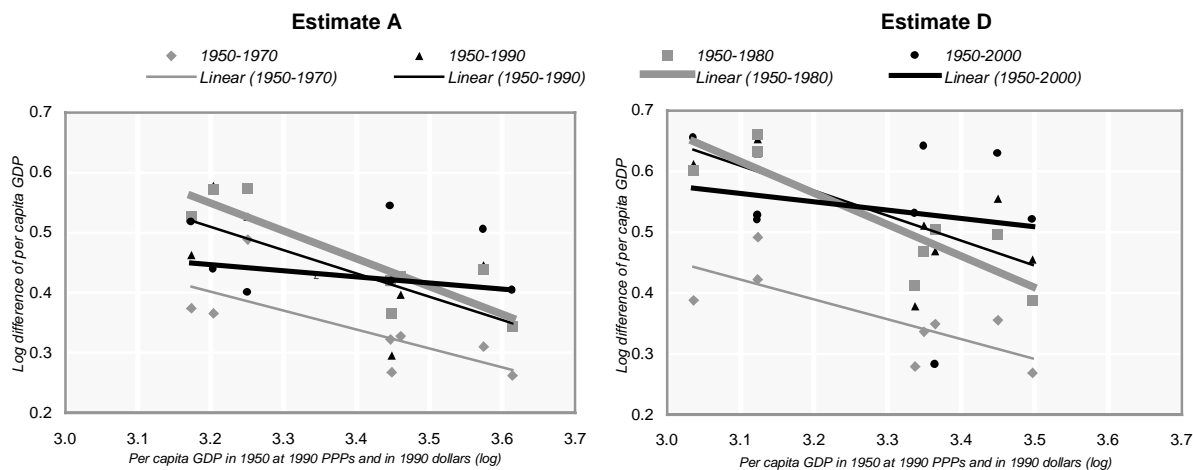
^c After 1992, Bosnia and Herzegovina, Croatia, Slovenia, The former Yugoslav Republic of Macedonia and Yugoslavia.

^d After 1991, CIS and Baltic states.

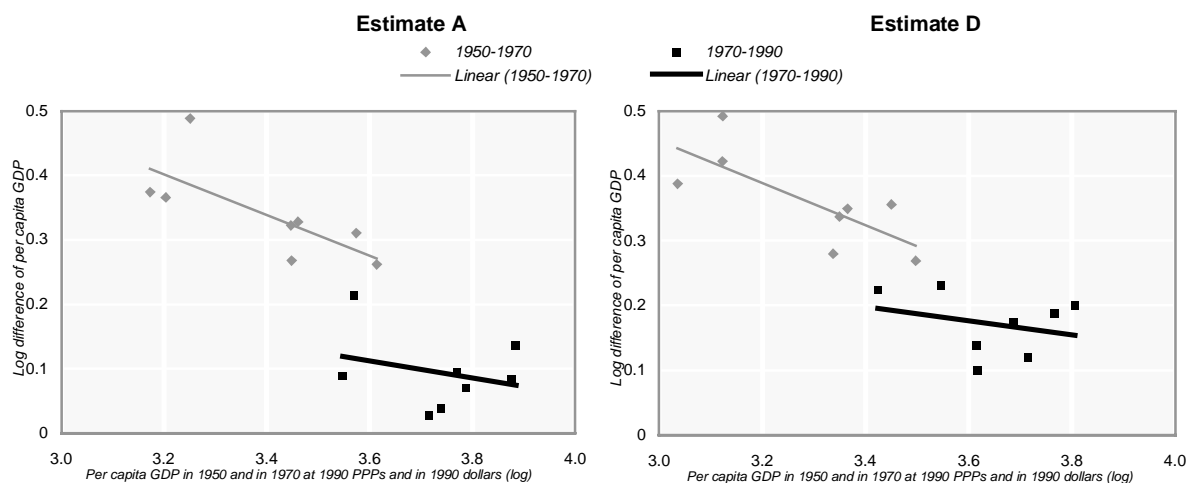
CHART 5.4.1

Beta convergence in the former centrally planned economies (CPEs) and their successor states and the European Union, 1950-2000
(Logarithms of per capita GDP in dollars)

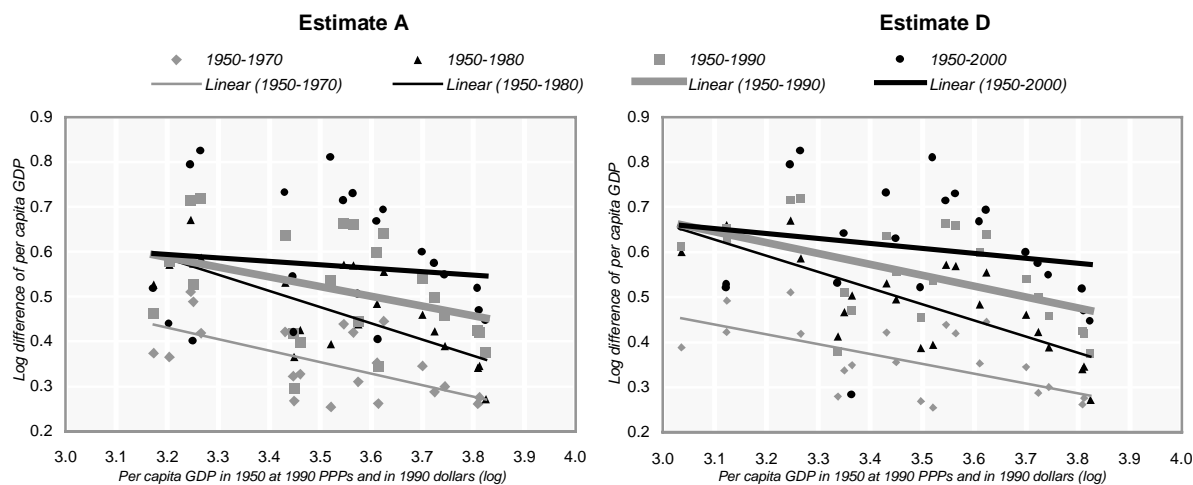
A. Former CPEs and their successor states, various subperiods between 1950 and 2000



B. Former CPEs, convergence between 1950-1970 and 1970-1990



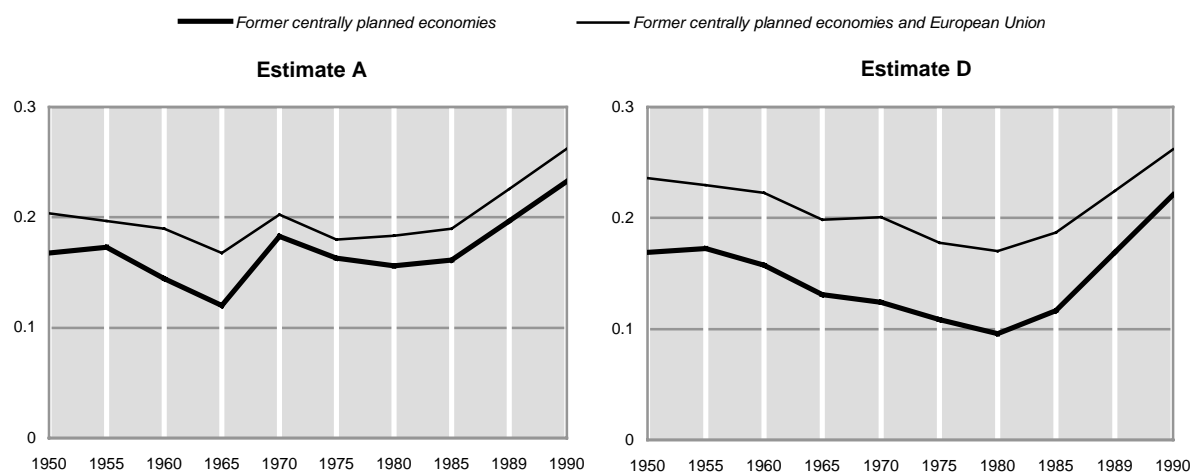
C. Former CPEs and their successor states and the European Union, various subperiods between 1950 and 2000



Source: UN/ECE secretariat calculations. For primary sources see the table in annex 2 to this chapter.

CHART 5.4.2

Sigma convergence in the former centrally planned economies and the European Union, 1950-1990
(Standard deviation of the logarithms of per capita GDP)



Source: UN/ECE secretariat calculations. For primary sources see the table in annex 2 to this chapter.

A general feature is the absence of any uniform or monotonic long-term trend towards convergence or divergence among the former CPEs: different patterns prevailed during different periods. As suggested by the convergence patterns for selected intervals of time (panel B of chart 5.4.1), and partly by the dynamics of sigma convergence (chart 5.4.2), at least three subperiods of contrasting patterns can be distinguished between 1950 and 1990: a period of relatively fast convergence within the group occurred in the 1950s and 1960s; this process slowed down during the 1970s; and during the 1980s the trend was reversed leading to a rapid rise in per capita income disparities among the former CPEs.⁴⁸⁷

The convergence of per capita incomes during the 1950s and 1960s partly reflects the different starting points of the various former CPEs and the effect of differential structural change. The poorer east European economies (Bulgaria, Romania and the former SFR of Yugoslavia) in this period embarked on a process of rapid industrialization, which involved the large-scale reallocation of resources to sectors of higher productivity. In contrast, this was not the case in Czechoslovakia, for example, which already before the Second World War was one of the most highly industrialized European economies. In addition, the Council of Mutual Economic Assistance (CMEA) was to some extent also a mechanism for transferring resources to its less developed member states.

⁴⁸⁷ Some recent studies have come up with similar but not identical results. For example, on the basis of a reassessment of the growth performance of the central and eastern European countries in the period 1970-1995, Estrin and Urga fail to find any evidence of convergence in the pre-reform period. S. Estrin and G. Urga, *Convergence in Output in Transition Economies: Central and Eastern Europe, 1970-1995*, Centre for Economic Policy Research Discussion Paper, No. 1616 (London), April 1997. As noted above, however, the results presented in this section provide strong evidence of convergence during the preceding two decades (1950-1970).

The notable divergence in per capita income growth during the 1980s appears to reflect the differential capacity of these economies to respond to the two oil shocks of the 1970s, which reached the former CPEs with a lag due to the dampening effect of the trade arrangements (in particular on price adjustments) within the CMEA. It also probably reflects the differences in national economic policies (such as, for example, the extent of various partial reforms and partial reorientation to other trading partners), that emerged in the 1960s and 1970s.

Another recurrent – although somewhat unexpected – characteristic is the remarkable similarity in the convergence trends in two different cross-sections of the data: 1) within the group of the former CPEs and their successor states and 2) between this group and the EU member states. As can be seen in panels B and C of chart 5.4.1, whenever a tendency of economic convergence prevails (both in terms of beta and sigma convergence), it does so both within the former CPEs and between them and the industrialized west European countries. In turn, when this trend is reversed, the reversal is clearly observable in both cross-sections of the data.

Next, as illustrated by the dynamics of sigma convergence (panel B of chart 5.4.1), already before the actual start of economic transformation, there had emerged very large income disparities both among the former CPEs and especially between them and the developed market economies of western Europe (as represented by the EU-15). As a result, the eastern part of the continent was already characterized by high and increasing economic heterogeneity by the end of the 1980s. This finding is at odds with the widespread view that central planning and economic cooperation within the CMEA had instigated a relatively high level of economic homogeneity and a levelling of per capita income levels within the group. As discussed below, this divergence has deepened further since the onset of market reforms.

Finally, the regression lines depicting the long-term beta convergence trend between 1950 and 2000, and covering both the pre- and post-transition phases (panels A and C of chart 5.4.1), provide little indication of any convergence of per capita income levels between the initial and final years. Again, this conclusion holds for both per capita income disparities among the former CPEs and their successor states, and between them and the EU-15.

The estimated long-term changes in real per capita income levels in the former CPEs and their successor states can also be interpreted in terms of the implied patterns of (and the cross-country differences in) long-run rates of economic growth. The implied long-run rates of growth of per capita GDP in these countries for different intervals of time during the second half of the twentieth century are shown in table 5.4.2. The growth rates are based on the benchmark estimates of the income levels for the selected years.

The long-run rates of economic growth shown in table 5.4.2 clearly reveal the main factor behind the convergence patterns discussed above. Although the 1950s and, to some extent, the 1960s were periods of relatively fast economic growth in most of the former CPEs, growth rates were progressively slowing down during the decades that followed. In some of these countries the implied growth rates of per capita GDP turned negative already in the 1980s, a finding which is in stark contrast to the official statistics of that time.

The pace of economic growth over these five decades was quite uneven, with periods of rapid growth combined with long intervals of recession or decline. This uneven rhythm contrasts with that of growth in the industrialized countries which, as suggested by the corresponding figures for the United States, Germany and the EU-15 (also shown in table 5.4.2), has on average been much smoother. However, disregarding the differences in intermediate periods, the results shown in table 5.4.2 imply that the average rates of growth of per capita GDP in the former CPEs and their successor states for the whole period 1951-2000 (the last column of the table) have not been too different from those in the developed market economies. The main exception in this regard has been the former Soviet Union and its successor states, where the average growth rate of per capita income during the second half of the twentieth century has been notably lower, mostly because of the unprecedented output decline during the 1990s.

The growth rates referring to the last decade (1991-2000) shown in table 5.4.2 require some special comment due to the specific nature of their computation. As with the other implied growth rates shown, they were computed from the data for two benchmark years (namely, 1990 and 2000), but there are some specific methodological differences in the estimates of the two end years. The 1990 data are based on the computed (alternative) estimates of the past (that is, the period under central planning), as shown in table

5.4.1. But the final benchmark value is based on the results of ECP'96 which have then been extrapolated on the basis of the official GDP growth rates during the last decade (and projections for the year 2000). Hence these growth rates can be regarded as an alternative to the official figures for the transition economies during the last decade, even for the countries that continued to exist in their former national boundaries.

(ii) Convergence and divergence during the decade of transition

As repeatedly emphasized in various issues of this *Survey*, the ECE transition economies have followed, from the very start of their economic and political transformation, very divergent paths of growth (chart 5.4.3). The reasons for this are complex and despite extensive research, there are not so far any clear-cut explanations.⁴⁸⁸

Whatever the causes of these highly differentiated patterns of economic growth, the outcomes in terms of achievement are evident: while some transition economies have embarked on a path of sustained recovery, others are still struggling with the transformational recession. Thus, by 1999 most central European transition economies had either regained or were close to their pre-transition GDP levels (and Polish GDP was almost 22 per cent higher than 10 years earlier); at the same time in countries such as Georgia, the Republic of Moldova, Ukraine and Yugoslavia, GDP in 1999 was a mere one third of its pre-transition level (chart 5.4.3).⁴⁸⁹ Coupled with the large differences in per capita income that had emerged already in the 1980s, developments in the 1990s led to a further increase in the economic heterogeneity of the transition economies.

⁴⁸⁸ The "mainstream" approach to this issue has been to attempt to identify causal links between output performance and the *speed* at which "stabilization", "economic reforms" and "liberalization" have taken place during the transition. See, for example, World Bank, *From Plan to Market: World Development Report 1996* (New York, Oxford University Press, published for the World Bank); S. Fischer, R. Sahay and C. Vegh, "Stabilization and growth in transition economies: the early experience", *Journal of Economic Perspectives*, Vol. 10, No. 2, Spring 1996, pp. 45-66; M. de Melo, C. Denzler, A. Gelb and S. Tenev, *Circumstance and Choice: The Role of Initial Conditions and Policies in Transition Economies*, World Bank Policy Research Working Paper, No. 1866 (Washington, D.C.), December 1997. For a critical assessment of this approach and its findings see B. Heybey and P. Murrell, "The relationship between economic growth and the speed of liberalization during transition", *Policy Reform*, Vol. 3, 1999, pp. 121-137. Other studies have devoted considerably greater attention to the role of history, geography and initial conditions, as well as to the importance of institutions and incentives during the transition from plan to market. See J. Stiglitz, "Reflections on lessons from transition" (mimeo), 1999; K. Poznanski, "Post-communist transition as institutional disintegration: explaining the regional economic recession", *Acta Oeconomica*, Vol. 50, Nos. 1-2, 1999, pp. 1-36. The UN/ECE secretariat has also persistently stressed in this *Survey* the importance of these factors both for the recovery of economic growth and for the success of the whole transformation process.

⁴⁸⁹ Note that these outcomes – as well as the economic dynamics during the 1990s presented in this section – reflect growth rates as reported by the official national statistics in the period after 1990. These differ from the alternative estimates quoted at the end of the previous section.

TABLE 5.4.2

Estimates of the implied long-run rates of growth of GDP per capita in the former centrally planned economies and their successor states, 1951-2000

(Annual average rates of growth of real GDP measured in 1990 dollar prices and 1990 PPPs)

	1951- 1960	1961- 1970	1971- 1980	1981- 1990	1991- 2000	1951- 1970	1961- 1980	1971- 1990	1981- 2000	1951- 1980	1961- 1990	1971- 2000	1951- 1990	1961- 2000	1951- 2000
Albania															
A. Simple average of all estimates .....	..	..	3.9	-5.7	5.0	..	..	..	-0.5	..	..	0.9	..	..	..
B. Weighted average of various estimates ....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
C. Maddison data .....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
D. Extrapolation of conservative estimates ....	..	..	..	..	4.5	..	..	..	..	..	..	..	..	..	..
Bulgaria															
A. Simple average of all estimates	6.2	5.4	2.0	-1.1	-2.9	5.8	3.7	2.4	-2.0	4.5	2.1	-0.7	3.1	0.8	1.9
B. Weighted average of various estimates	6.2	5.5	3.1	0.1	-3.7	5.8	4.3	2.9	-1.8	4.9	2.9	-0.2	3.7	1.2	2.2
C. Maddison data	6.2	5.1	2.4	-0.1	-3.0	5.6	3.7	2.4	-1.6	4.5	2.4	-0.3	3.4	1.0	2.0
D. Extrapolation of conservative estimates	6.2	5.5	3.3	-0.1	-2.3	5.8	4.4	2.8	-1.2	5.0	2.9	0.3	3.7	1.6	2.5
Czechoslovakia ^a															
A. Simple average of all estimates	3.8	2.3	1.9	0.0	1.4	3.1	2.1	1.8	0.7	2.7	1.4	1.1	2.0	1.4	1.9
B. Weighted average of various estimates	3.7	2.6	2.6	1.5	0.1	3.1	2.6	2.2	0.8	3.0	2.3	1.4	2.6	1.7	2.1
C. Maddison data	4.2	2.4	2.1	0.8	1.8	3.3	2.3	2.1	1.3	2.9	1.8	1.6	2.4	1.8	2.2
D. Extrapolation of conservative estimates	3.7	2.6	2.8	1.6	1.5	3.1	2.7	2.1	1.5	3.0	2.3	2.0	2.7	2.1	2.4
German Democratic Republic ^b															
A. Simple average of all estimates	4.0	3.3	3.0	0.2	1.4	3.6	3.1	2.6	0.8	3.4	2.1	1.5	2.6	1.9	2.4
B. Weighted average of various estimates	5.7	2.7	3.3	1.3	0.3	4.2	3.0	2.7	0.8	3.9	2.4	1.7	3.2	1.9	2.7
C. Maddison data .....	..	4.5	2.9	..	..	..	3.7	3.0	2.4	..	..	2.6	..	3.1	..
D. Extrapolation of conservative estimates	5.7	2.7	3.3	1.4	1.7	4.2	3.0	2.7	1.5	3.9	2.4	2.1	3.2	2.3	2.9
Hungary															
A. Simple average of all estimates	4.0	3.5	2.3	-0.1	2.9	3.8	2.9	2.1	1.4	3.3	1.9	1.7	2.4	2.2	2.5
B. Weighted average of various estimates	4.0	4.0	2.9	1.0	1.8	4.0	3.4	2.7	1.4	3.6	2.6	1.9	2.9	2.4	2.7
C. Maddison data	4.3	3.3	2.3	0.4	3.9	3.8	2.8	2.0	2.1	3.3	2.0	2.2	2.5	2.5	2.8
D. Extrapolation of conservative estimates	4.0	4.0	3.0	1.0	3.0	4.0	3.5	2.6	2.0	3.7	2.7	2.4	3.0	2.8	3.0
Poland															
A. Simple average of all estimates	3.2	3.1	2.3	-1.6	2.9	3.1	2.7	1.6	0.6	2.8	1.2	1.2	1.7	1.6	2.0
B. Weighted average of various estimates	3.5	3.3	2.8	-0.6	1.9	3.4	3.1	2.0	0.7	3.2	1.8	1.4	2.3	1.9	2.2
C. Maddison data	3.1	3.2	2.6	-0.6	3.0	3.2	2.9	2.1	1.2	3.0	1.7	1.7	2.1	2.1	2.3
D. Extrapolation of conservative estimates	3.2	3.3	3.1	-0.8	3.6	3.3	3.2	1.9	1.4	3.2	1.9	1.9	2.2	2.3	2.5
Romania															
A. Simple average of all estimates	4.6	4.2	3.6	-1.4	1.3	4.4	3.9	2.6	-0.1	4.1	2.1	1.1	2.7	1.9	2.4
B. Weighted average of various estimates	4.5	4.6	4.4	0.5	-0.6	4.6	4.5	3.2	-0.1	4.5	3.1	1.4	3.5	2.2	2.7
C. Maddison data	4.9	4.5	3.7	-1.1	2.8	4.7	4.1	2.8	0.8	4.4	2.3	1.8	3.0	2.4	2.9
D. Extrapolation of conservative estimates	4.5	4.6	5.0	0.2	1.0	4.6	4.8	2.9	0.6	4.7	3.3	2.1	3.6	2.7	3.1
SFR of Yugoslavia ^c															
A. Simple average of all estimates	5.0	3.6	4.8	0.2	-3.2	4.3	4.2	3.1	-1.5	4.5	2.9	0.6	3.4	1.3	2.0
B. Weighted average of various estimates	5.1	4.9	5.0	0.5	-3.7	5.0	5.0	3.5	-1.6	5.0	3.5	0.5	3.9	1.6	2.3
C. Maddison data	4.8	4.3	4.9	-0.3	-2.7	4.6	4.6	3.6	-1.5	4.7	2.9	0.6	3.4	1.5	2.1
D. Extrapolation of conservative estimates	5.1	4.9	5.6	-0.2	-3.0	5.0	5.3	3.2	-1.6	5.2	3.4	0.7	3.8	1.8	2.4
Soviet Union ^d															
A. Simple average of all estimates	4.0	3.7	2.3	-0.7	-4.7	3.8	3.0	2.0	-2.7	3.3	1.8	-1.1	2.3	0.1	0.9
B. Weighted average of various estimates	4.1	4.1	3.0	-0.2	-5.3	4.1	3.6	2.3	-2.8	3.7	2.3	-0.9	2.8	0.4	1.1
C. Maddison data	3.7	3.5	1.5	0.8	-4.6	3.6	2.5	1.9	-1.9	2.9	1.9	-0.8	2.4	0.3	0.9
D. Extrapolation of conservative estimates	4.1	4.1	3.6	-0.8	-4.2	4.1	3.9	2.0	-2.5	3.9	2.3	-0.5	2.7	0.6	1.3
<i>Memorandum item:</i>															
United States	1.6	2.9	2.2	1.9	1.9	2.2	2.5	2.2	1.9	2.2	2.3	2.0	2.1	2.2	2.1
Germany (west)	7.1	3.5	2.6	2.0	1.2	5.3	3.0	2.4	1.6	4.4	2.7	1.9	3.8	2.3	3.2
European Union (west Germany)	4.1	4.0	2.5	2.1	1.6	4.1	3.3	2.6	1.8	3.6	2.9	2.1	3.2	2.5	2.9

Source: UN/ECE secretariat calculations, based on the data presented in the table of annex 2 to this chapter.

Note: Data from ECP'96 have been used in all estimates for the period after 1990 except for the former GDR for which the data for the period after 1990 are from Statistisches Bundesamt, *Volkswirtschaftliche Gesamtrechnungen*, Fachserie 18, Reihe 1.1, Konten und Standardtabellen, 1998. Data for the European Union member states and the United States were obtained from the sources listed in annex 1 to this chapter. The data for 2000 are projected values.

^a After 1993, Czech Republic and Slovakia.

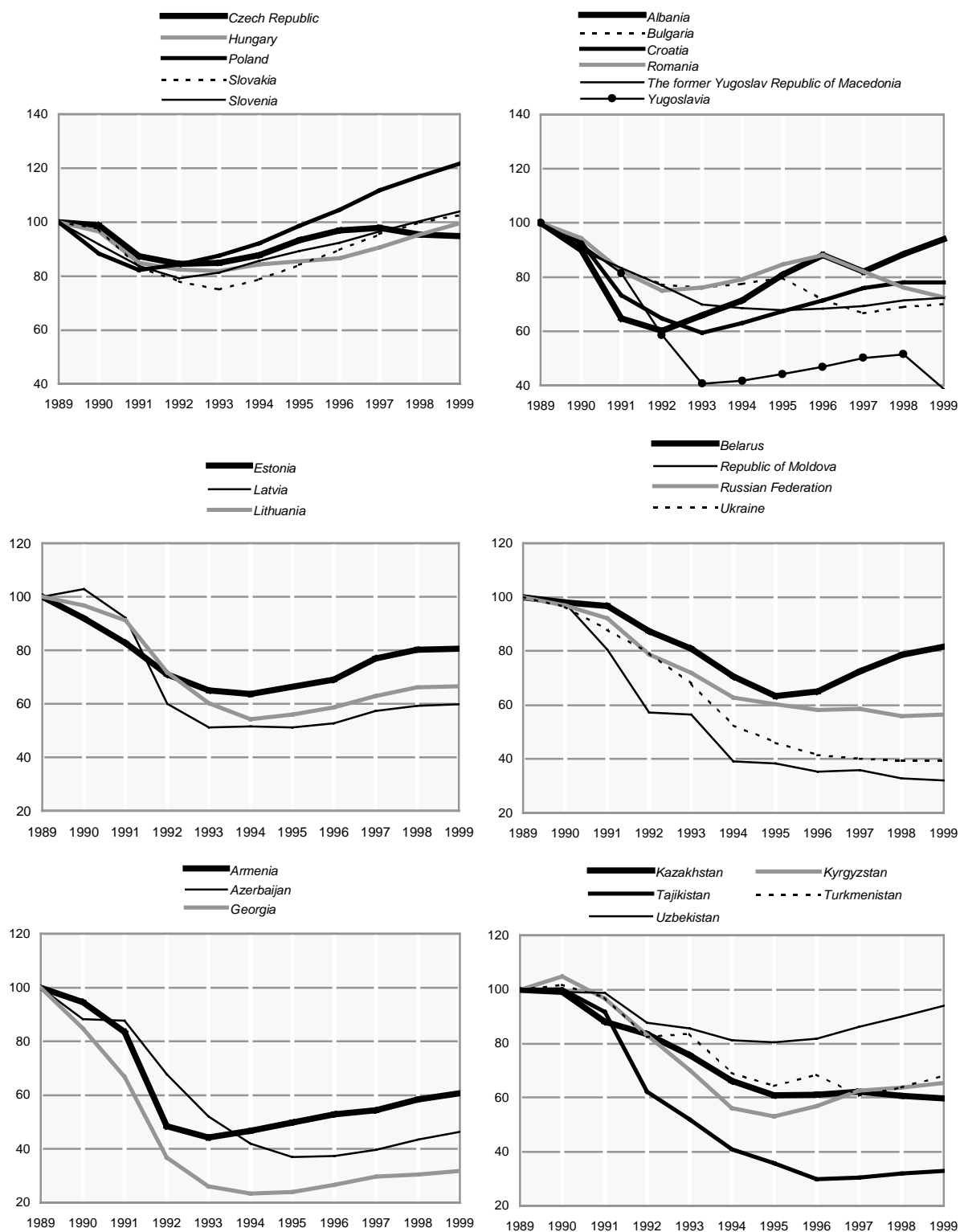
^b After 1990, former GDR.

^c After 1992, Bosnia and Herzegovina, Croatia, Slovenia, The former Yugoslav Republic of Macedonia and Yugoslavia.

^d After 1991, CIS and Baltic states.

CHART 5.4.3

GDP in the central European transition economies, 1989-1999
(Indices, 1989=100)



Source: UN/ECE secretariat calculations, based on national statistics.

The quantitative assessment of convergence or divergence among the transition economies during the 1990s is based on the same methodology as described in the previous sections of this chapter. With respect to the data used, however, the approach has been somewhat different. Thanks to the availability of PPP-based estimates of per capita GDP for almost all transition economies (produced in the course of the European Comparison Programme 1996), these have been taken as the main starting point for cross-country comparisons of per capita income levels.⁴⁹⁰ In turn, the GDP levels in 1996 from ECP'96 have been used to extrapolate (using the officially reported GDP growth rates) the implied PPP-compatible levels of GDP and per capita GDP for the whole period 1989-2000 (the estimate for the last year is based on current forecasts).

Some of the indicators of economic convergence in the period after 1989 are shown in charts 5.4.4 and 5.4.5. Two sets of diagrams illustrating beta convergence are given in chart 5.4.4, with the aim of separating, in the second set, the distorting effect of the deep recession that initially affected all the transition economies. It should be recalled here that the concept of economic convergence is essentially a long-term notion and, as such, a decade is a rather short period that cannot necessarily be regarded as representative of the eventual direction of the longer-run trend. The quantitative estimates presented here therefore permit only limited inferences about catching up or falling behind. For the same reason the measure of beta convergence has been confined to the transition economies and no attempt has been made to measure beta convergence vis-à-vis the EU-15 during the 1990s.

Given the differences in output growth, it is not surprising that the measure of beta convergence within the whole group of transition economies (panel A of chart 5.4.4) suggests that the dominant trend in this period has been one of economic divergence and increasing disparities in per capita incomes. This tendency prevails whether measured over the whole period 1989-2000 or just for the period after 1993.

The picture is somewhat different when beta convergence is measured for selected clusters of transition economies. This is illustrated in panel B of chart 5.4.4 where the transition economies are divided into three subregions: central Europe and the Baltic states; south-east Europe; and the CIS countries. The charts suggest that within each of these subregions convergence rather than divergence has been the prevailing trend, especially in the period 1993-2000.

The estimates of sigma convergence (chart 5.4.5) suggest a similar pattern of change in relative per capita incomes during the 1990s. Notably, when measured on the whole set of transition economies, the variation in per capita GDP is much higher than for selected subgroups of

countries (the left panel of chart 5.4.5). In other words, while the ECE transition economies as a whole have become increasingly heterogeneous in terms of per capita incomes, it is possible to identify subregions that are relatively (and in some cases increasingly) homogenous. No firm conclusions can be drawn from this development (due to the short time horizon), but, if such a tendency were to strengthen, it would lead to increasing divergence between distinct regional groups of countries.⁴⁹¹

The right-hand panel of chart 5.4.5 illustrates sigma convergence between the transition economies and the EU-15 during the 1990s. The overall trend, for the transition economies taken as a group is for increasing divergence from the average GDP per capita in western Europe. The same is true for most of the subgroups of transition economies (not shown in the chart). The exception however is the group of central European transition economies which display increasing sigma convergence vis-à-vis the EU-15 during this period (shown separately in the right-hand panel of chart 5.4.5).

(iii) Concluding remarks: implications for the future

The empirical analysis of long-term changes in per capita income levels in the ECE transition economies, however rough and tentative they may be, do provide some weak evidence of long-term (absolute) convergence. Estimates of long-run rates of growth of per capita GDP and their cross-country variation suggest such an outcome both within the transition economies as a group and in relation to some of the west European economies. The only time, however, during the second half of the twentieth century when convergence in per capita income levels has prevailed among the former centrally planned economies was in the 1950s and 1960s. In general, over the longer period of several decades, the pace of change in the relative income positions has been rather uneven. The start of economic and political transformation after 1989 has brought about turbulent changes and growing evidence of economic heterogeneity and divergence in per capita income levels. Only a small group of central European transition economies has displayed any tendency to converge on the per capita GDP levels of the market economies of western Europe.

What are the implications of these findings for the future pattern of growth in the transition economies? As already mentioned, long-run rates of growth in the past do not necessarily contain relevant information regarding the short-term growth potential of any given country. Even as regards the long-run horizon, the record of past growth may have limited significance if an economy undergoes profound structural and institutional change.

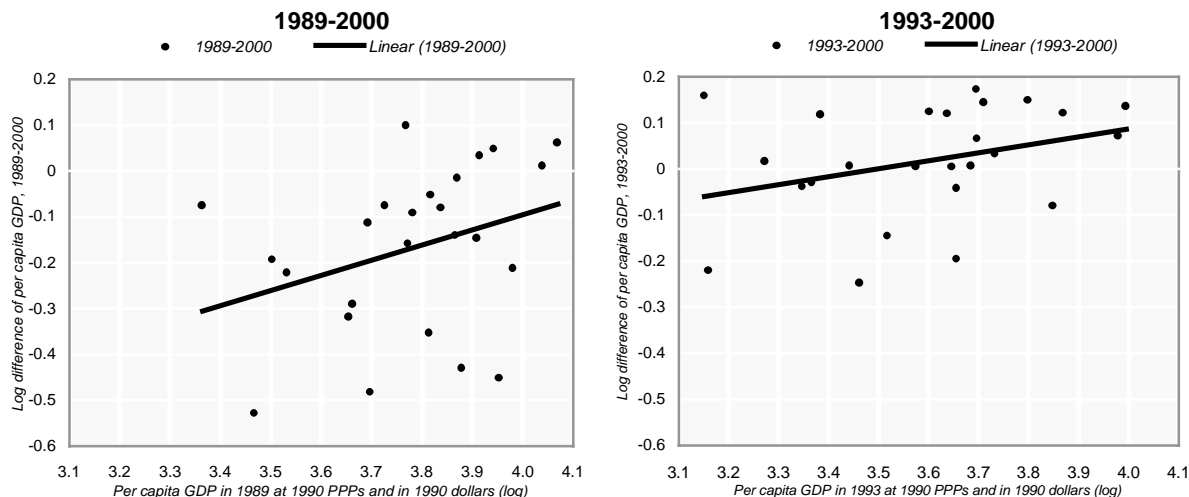
⁴⁹⁰ The dollar GDP estimates for Bosnia and Herzegovina and Yugoslavia (which are not included in ECP'96) for the 1990s are extrapolations based on pre-transition assessments, their quality is probably not very high.

⁴⁹¹ In fact such a trend resembles the development pattern that has been named in the literature "club convergence", that is, a process in which a subset or "club" of countries tend to converge among themselves but where the different "clubs" do not necessarily converge to the same steady-state level of per capita income. S. Durlauf and D. Quah, op. cit.; A. Desdoigts, "Patterns of economic development and the formation of clubs", *Journal of Economic Growth*, Vol. 4, September 1999, pp. 305-309.

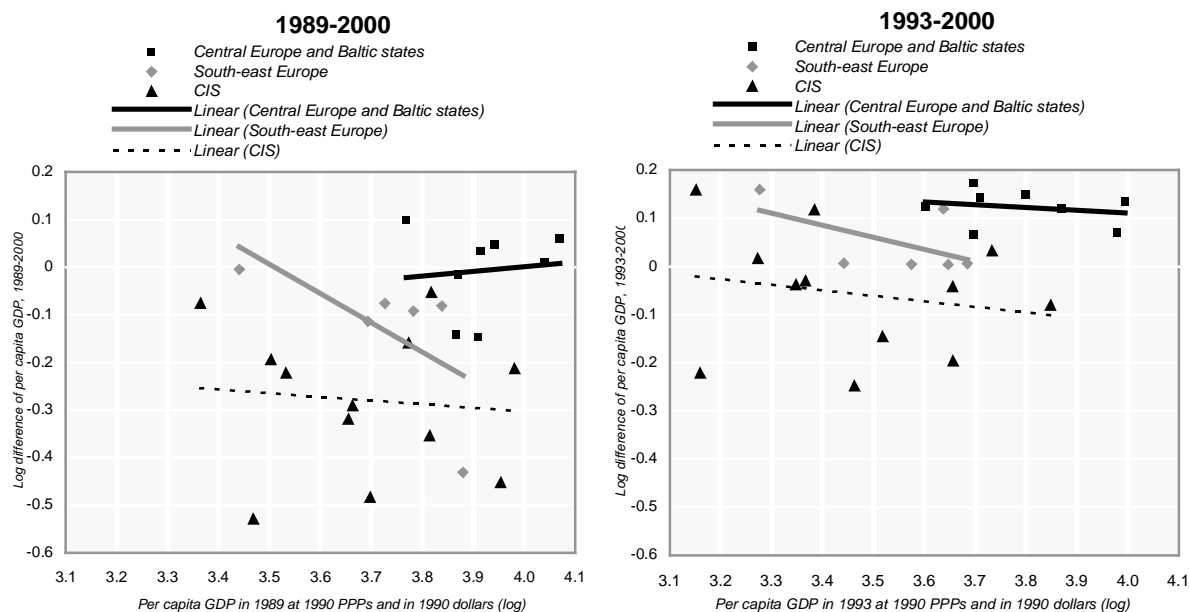
CHART 5.4.4

Beta convergence in the ECE transition economies, 1989-2000
(Logarithms of per capita GDP in dollars)

A. All ECE transition economies



B. ECE transition economies by subregions



Source: UN/ECE, *International Comparisons of Gross Domestic Product in Europe, 1996* (United Nations publication, Sales No. E.99.II.E.19); UN/ECE secretariat calculations.

Still, more often than not, the experience of many countries has shown that long-run rates of growth tend to be rather stable over time: radical changes of regime and the rapid repositioning of individual countries in terms of their international ranking by per capita income are more the exception than the rule.⁴⁹²

In the academic literature, the motive behind the empirical analysis of economic convergence – and, in general, of the patterns of long-term economic growth of

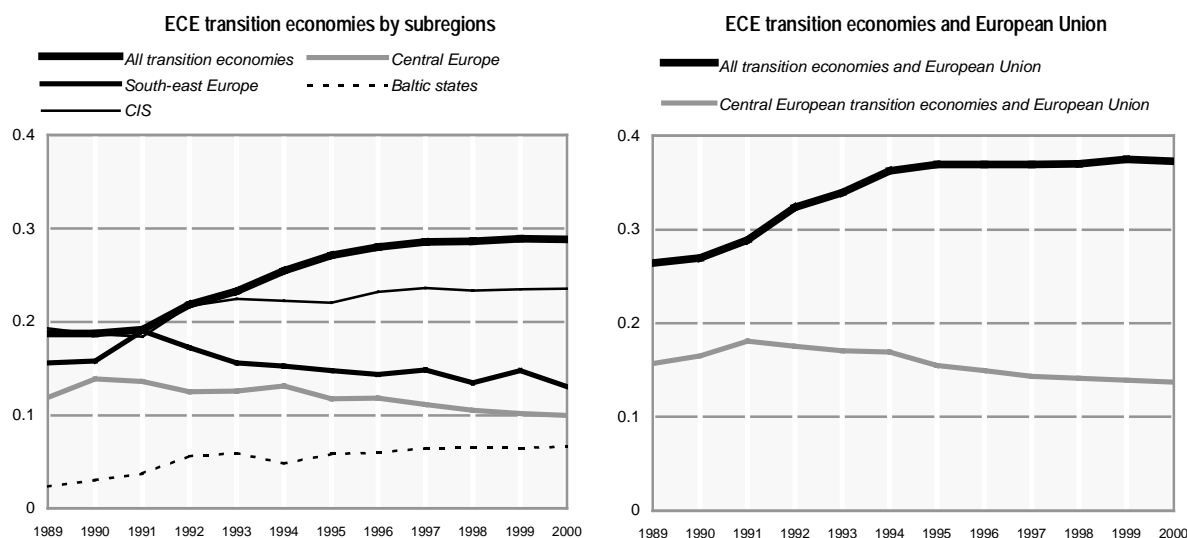
different countries – has been not only to seek a better understanding of the past but also to try to project the future, especially over a longer time horizon. The methodological approach has been to seek out statistical associations between long-run rates of economic growth and various, putative casual factors, estimated on large samples of pooled country data.⁴⁹³ Following this

⁴⁹² For a useful discussion of this issue see UNCTAD, *Trade and Development Report 1997*, op. cit., pp. 78-86.

⁴⁹³ Probably the most well-known and widely-quoted results in this strand of the literature are to be found in the works of R. Barro, “Economic growth in a cross section of nations”, *Quarterly Journal of Economics*, Vol. 106, No. 2, May 1991, pp. 407-433 and R. Levine and D. Renelt, “A sensitivity analysis of cross-country growth regressions”, op. cit.

CHART 5.4.5

Sigma convergence in the ECE transition economies and the European Union, 1989-2000
(Standard deviation of the logarithms of per capital GDP)



Source: UN/ECE, *International Comparisons of Gross Domestic Product in Europe, 1996* (United Nations publication, Sales No. E.99.II.E.19); UN/ECE secretariat calculations.

approach, a number of studies have attempted to project the future long-term growth trends in the transition economies, and in particular have focused on the time required to catch up with west European income levels. Research in this area has been growing rapidly, especially in view of the implications of a number of transition economies joining the EU in the not-too-distant future.⁴⁹⁴

Despite the fact that such projections vary considerably, most of them suggest that the process of convergence with west European per capita income levels is likely to be long and difficult. The time required to reach such a target is estimated in decades, even for the more advanced transition economies and under the more optimistic growth scenarios. Moreover, as discussed in section 5.3, the experience of some of the present EU member states has shown that EU membership by itself is not a sufficient condition for catching up quickly with the more developed European economies.

The main prerequisite for convergence in Europe is a rapid and sustained rate of growth of the transition economies. Although their past experience may not be very encouraging, the start of economic transformation has created an opportunity for breaking with the past and for establishing a favourable environment for growth and catching up. Notwithstanding the ongoing debate in the literature related to the sources of long-term growth, there seems to be relatively wide agreement on the general

importance of several proximate factors. These are: investment in physical and human capital (and hence savings); investment in research and development and infrastructural development; the human factor proper (population growth); openness to trade (although there is no consensus on the direction of causality between growth and trade); the development and upgrading of financial systems; and maintaining a generally acceptable distribution of wealth within each country; as well as a range of institutional, social and political factors.⁴⁹⁵

As to policy implications and conclusions, regrettably, neither economic theory nor policy practice have discovered “easy fixes” and practical recipes for success in accelerating the process of catching up. Past experience has shown that previous “growth miracles” have always combined country-specific factor endowments, prudent and forward-looking public policies, specific geographic location and, often, a lucky coincidence of circumstances, all of which have always been placed in a specific historic context. Ex-post, growth miracles can be explained but it is next to impossible to reproduce them; new success stories may draw from the lessons of past ones, but they will always contain unique and innovative elements. What is clear, however, is that the potential for catching up and economic convergence in Europe exists, and it is up to imaginative political leaders and creative policy makers in the transition economies to find the keys to success.

⁴⁹⁴ S. Fischer, R. Sahay and C. Vegh, *How Far is Eastern Europe from Brussels*, IMF Working Paper WP/98/53, April 1998 and *From Transition to Market: Evidence and Growth Prospects*, IMF Working Paper WP/98/52, April 1998 (Washington, D.C.); A. Brzeski and E. Colombatto, “Can eastern Europe catch up”, *Post-Communist Economies*, Vol. 11, No. 1, March 1999, pp. 5-25; N. Campos, “Back to the future: the growth prospects of transition economies reconsidered” (mimeo), March 1999.

⁴⁹⁵ For a comprehensive survey of these issues see J. Temple, op. cit. Other useful recent surveys on the sources of growth include S. Durlauf and D. Quah, op. cit.; R. Levine, “Financial development and economic growth: views and agenda”, *Economic Journal*, Vol. 107, May 1997, pp. 783-799; F. Rodríguez and D. Rodrik, “Trade policy and economic growth: a skeptic’s guide to the cross-national evidence” (<http://www.ksg.harvard.edu/rodrik>), April 1999, to name only a few.

ANNEX 1

Principal statistical sources for western Europe, North America and Japan

(1) GDP at 1990 prices, 1960-1998

- The measure of GDP corresponds to the United Nations System of National Accounts (SNA) 1968, except for Canada, Denmark and Norway for which data are based on the 1993 SNA.
- The main data source was OECD, *National Accounts, Main Aggregates, 1960-1997*, Vol. 1 (Paris), 1999; updates for 1998 were made by the ECE secretariat.
- *United States*: United States Department of Commerce, Bureau of Economic Analysis, *Survey of Current Business* (Washington, D.C.), September 1999 (downloaded from www.bea.doc.gov/bea/pub).
- *Germany*: data for east and west Germany as from 1991 were compiled from Statistisches Bundesamt, *Volkswirtschaftliche Gesamtrechnungen, Fachserie 18, Reihe 1.1. Konten und Standardtabellen*, 1998.
- For Austria, Canada, France, Germany, Luxembourg, Spain, Turkey and the United States the source provides real GDP measured in prices of a year different from 1990. These series were arithmetically switched to the 1990 price level by the ECE secretariat.

(2) Purchasing power parities

- OECD, *National Accounts*, op. cit., pp. 174-175.

(3) Population

- United Nations, *World Population Prospects, The 1998 Revision, Volume I: Comprehensive Tables* (United Nations publication, Sales No. E.99.XIII.9).

(4) Real GDP per capita (in 1990 purchasing power parities)

- Data for 1960-1998 were calculated by the ECE secretariat. Data for 1950-1959 were obtained by splicing this series (in 1960) with Maddison's data. A. Maddison, *Monitoring the World Economy, 1820-1992* (Paris, OECD, 1995), pp. 194-199, tables D1a-D1b.

ANNEX 2

**Per capita GDP in the former centrally planned economies and their successor states relative
 to the United States: summary of available estimates, 1950-2000**
(Per capita GDP in the United States=100)

	1950	1955	1960	1965	1970	1975	1980	1985	1989	1990	1995	2000 Projection
Albania												
European Comparison Programme
ECP'96	12.2	10.8	9.6	10.0
Physical indicators	15.2	16.8	16.1	15.1	..	..	..	..
Penn World Tables
Maddison
World Bank	12.2	..	..	..	6.6	..	..	..
Marer
PlanEcon	6.0	5.8	..	..
WEFA
CIA
Alton
Fischer-Sahay	2.9	..	..
Bulgaria												
European Comparison Programme
ECP'96	23.7	22.1	19.9	16.4
Physical indicators	18.2	20.9	27.7	36.0	35.2	40.2	41.2	43.0	..	..	..	..
Penn World Tables	20.0	23.8	31.8	36.3	41.3	47.1	43.0	40.8	..	..	..	..
Maddison	16.7	19.6	26.0	29.0	32.1	36.1	32.7	30.7	28.0	25.9	..	..
World Bank	28.8	36.5	..	23.5	..	..	..
Marer	31.3	..	..	..	..	..
PlanEcon	31.1	28.9	27.3	25.0	..	..
WEFA	30.2	..	25.5	..	..
CIA	36.9	42.6	39.3	38.7	38.0	..	..	..
Alton	29.9	..	..	24.3	..	..
Fischer-Sahay	26.5	..	..
Czechoslovakia^a												
European Comparison Programme
ECP'96	44.5	43.7	39.8	38.2
Physical indicators	43.4	42.4	50.8	55.6	48.6	54.9	54.9	52.3	..	..	..	..
Penn World Tables	48.0	47.7	61.4	56.6	60.7	64.6	61.4	59.2	..	..	..	..
Maddison	35.5	35.8	45.6	41.7	43.5	45.7	43.3	41.1	39.3	38.0	..	..
World Bank	45.2	49.3	51.2	..	38.8	..	..	..
Marer	41.7	..	..	..	..	..
PlanEcon	41.6	39.7	38.2	37.8	..	..
WEFA	39.5	..	35.8	..	..
CIA	51.0	55.0	52.7	52.5	51.3	..	..	..
Alton	40.3	..	..	36.3	..	..
Fischer-Sahay	36.0	..	..
German Democratic Republic^b												
European Comparison Programme
ECP'96
Physical indicators	44.7	48.3	57.0	60.5	51.0	59.2	60.1	57.9	..	..	..	..
Penn World Tables	32.5	..	57.9	57.8	61.8	69.0	69.2	69.7	..	..	..	..
Maddison	31.7	32.6	37.3	38.6	40.0	38.7	38.6	..	..	..
World Bank	50.5	53.3	63.2	..	..	..	..	..
Marer	52.0	..	..	..	..	..
PlanEcon	47.9	48.0	46.3	39.1	..	..
WEFA	50.7	..	42.6	..	..
CIA	53.5	60.6	61.1	62.9	63.1	..	..	..
Alton	46.4	..	..	48.1	..	..
Fischer-Sahay

(For source and notes see end of table.)

ANNEX 2 (continued)

Per capita GDP in the former centrally planned economies and their successor states relative
to the United States: summary of available estimates, 1950-2000
(Per capita GDP in the United States=100)

	1950	1955	1960	1965	1970	1975	1980	1985	1989	1990	1995	2000 Projection
Hungary												
European Comparison Programme ..	..	..	..	..	..	..	38.2	33.3	..	28.0	..	..
ECP'96 .....	..	..	..	..	..	..	..	..	38.9	37.6	33.5	35.9
Physical indicators	27.3	28.7	33.4	38.9	39.3	43.4	45.6	43.8	..	..	..	..
Penn World Tables	33.9	37.2	43.7	44.4	46.4	49.9	48.3	46.0	..	..	..	..
Maddison	25.1	28.0	32.6	33.3	33.8	35.9	34.2	32.3	30.6	28.5	..	..
World Bank .....	..	..	..	..	32.4	34.6	36.8	..	32.0	..	..	..
Marer .....	..	..	..	..	..	..	38.6	..	..	..	..	..
PlanEcon .....	..	..	..	..	..	..	32.8	31.2	29.2	27.2	..	..
WEFA .....	..	..	..	..	..	..	..	37.5	..	31.5	..	..
CIA .....	..	..	..	..	43.0	46.9	45.5	45.1	43.8	..	..	..
Alton .....	..	..	..	..	..	..	34.1	..	..	28.0	..	..
Fischer-Sahay .....	..	..	..	..	..	..	..	..	..	28.1	..	..
Poland												
European Comparison Programme ..	..	..	..	..	..	..	35.6	26.2	..	22.5	..	..
ECP'96 .....	..	..	..	..	..	..	..	..	26.1	21.9	24.5	27.0
Physical indicators	28.6	29.7	34.2	38.7	34.7	39.0	38.9	34.0	..	..	..	..
Penn World Tables	33.3	33.8	38.4	38.2	41.2	50.4	43.9	39.2	..	..	..	..
Maddison	24.8	25.5	28.8	28.4	29.8	35.9	31.1	27.9	25.6	23.0	..	..
World Bank .....	..	..	..	..	28.4	35.5	34.3	..	24.2	..	..	..
Marer .....	..	..	..	..	..	..	32.8	..	..	..	..	..
PlanEcon .....	..	..	..	..	..	..	27.1	24.4	21.9	18.0	..	..
WEFA .....	..	..	..	..	..	..	..	28.4	..	23.4	..	..
CIA .....	..	..	..	..	38.3	47.4	41.9	38.8	36.8	..	..	..
Alton .....	..	..	..	..	..	..	27.5	..	..	19.9	..	..
Fischer-Sahay .....	..	..	..	..	..	..	..	..	..	26.3	..	..
Romania												
European Comparison Programme ..	..	..	..	..	..	..	..	..	..	15.3	..	..
ECP'96 .....	..	..	..	..	..	..	..	..	26.9	25.3	23.0	18.0
Physical indicators	17.6	18.0	22.1	29.1	26.4	31.7	33.8	30.2	..	..	..	..
Penn World Tables	16.4	..	23.2	24.9	27.2	33.5	34.6	34.1	..	..	..	..
Maddison	12.0	14.4	16.5	18.0	19.2	23.3	22.4	20.3	17.5	15.5	..	..
World Bank .....	..	..	..	..	18.8	16.9	20.6	..	16.3	..	..	..
Marer .....	..	..	..	..	..	..	23.6	..	..	..	..	..
PlanEcon .....	..	..	..	..	..	..	19.4	18.1	16.5	13.6	..	..
WEFA .....	..	..	..	..	..	..	..	22.8	..	16.9	..	..
CIA .....	..	..	..	..	25.3	31.5	32.6	32.7	27.8	..	..	..
Alton .....	..	..	..	..	..	..	26.9	..	..	18.2	..	..
Fischer-Sahay .....	..	..	..	..	..	..	..	..	..	16.3	..	..
SFR of Yugoslavia ^c												
European Comparison Programme ..	..	..	..	..	..	..	33.3	31.2	..	24.1	..	..
ECP'96 .....	..	..	..	..	..	..	..	..	31.0	27.8	16.8	16.1
Physical indicators	16.8	17.4	23.0	28.3	26.8	32.9	34.3	30.4	..	..	..	..
Penn World Tables	16.9	17.2	24.2	26.1	30.6	36.3	41.5	40.4	..	..	..	..
Maddison	15.7	16.3	21.5	22.7	24.6	29.0	31.9	29.8	26.7	24.5	..	..
World Bank .....	..	..	..	..	13.2	18.8	23.1	..	31.0	..	..	..
Marer .....	..	..	..	..	..	..	23.1	..	..	..	..	..
PlanEcon .....	..	..	..	..	..	..	31.1	28.9	27.3	25.0	..	..
WEFA .....	..	..	..	..	..	..	..	21.0	..	17.1	..	..
CIA .....	..	..	..	..	27.7	31.2	35.1	33.4	33.0	..	..	..
Alton .....	..	..	..	..	..	..	32.8	..	..	23.9	..	..
Fischer-Sahay .....	..	..	..	..	..	..	..	..	..	..	..	..

(For source and notes see end of table.)

ANNEX 2 (concluded)

Per capita GDP in the former centrally planned economies and their successor states relative to the United States: summary of available estimates, 1950-2000
(Per capita GDP in the United States=100)

	1950	1955	1960	1965	1970	1975	1980	1985	1989	1990	1995	2000 Projection
Soviet Union ^d												
European Comparison Programme ..	..	..	..	..	..	..	..	..	..	30.4	..	..
ECP'96 .....	..	..	..	..	..	..	..	..	33.7	32.4	18.6	16.3
Physical indicators	30.2	29.9	37.2	43.7	39.6	42.6	42.6	40.0	..	..	..	..
Penn World Tables	30.2	32.9	40.1	41.1	47.4	51.0	49.3	50.0	..	..	..	..
Maddison	28.7	30.2	35.2	34.9	37.5	37.9	34.9	33.1	31.9	30.9	..	..
World Bank .....	..	..	..	..	36.3	34.8	40.1	..	30.3	..	..	..
Marer .....	..	..	..	..	..	..	36.9	..	..	..	..	..
PlanEcon .....	..	..	..	..	..	..	30.9	29.1	26.1	23.7	..	..
WEFA .....	..	..	..	..	..	..	..	35.4	..	32.0	..	..
CIA .....	..	..	37.6	39.1	42.8	48.5	46.3	44.0	44.2	..	..	..
Alton .....	..	..	..	..	..	..	48.1	..	..	41.9	..	..
Fischer-Sahay .....	..	..	..	..	..	..	..	..	..	22.3	..	..

Source: European Comparison Programme: UN/ECE, *Economic Bulletin for Europe*, Vol. 31, No. 2, 1980 and *International Comparisons of Gross Domestic Product in Europe, 1985, 1990* (United Nations publications, Sales Nos. E.88.II.E.28, E.94.II.E.23).

ECP'96: UN/ECE, *International Comparisons of Gross Domestic Product in Europe, 1996* (United Nations publication, Sales No. E.99.II.E.13).

Physical indicators: UN/ECE, *Economic Bulletin for Europe*, Vol. 31, No. 2, 1980; UN/ECE, *Comparative GDP Levels, Physical Indicators, Phase III* (United Nations publication, Sales No. GV.E.93.0.5), 1993.

Penn World Tables: R. Summers and A. Heston, "Improved international comparisons of real product and its composition: 1950-1980", *The Review of Income and Wealth*, Series 30, No. 2, 1984, pp. 207-262; "A new set of international comparisons of real product and price level estimates for 130 countries, 1950-1985", *The Review of Income and Wealth*, Series 34, No. 1, 1988, pp. 1-25; and "The Penn World Tables (Mark 5): an extended set of international comparisons, 1950-1985", *The Quarterly Journal of Economics*, Vol. 106, No. 2, May 1991, pp. 327-368.

Maddison: A. Maddison, *Monitoring the World Economy, 1820-1992*, Development Centre Studies (Paris, OECD, 1995).

World Bank: E. Lancieri, "Dollar GNP estimates for central and eastern Europe 1970-90: a survey and a comparison with western countries", *World Development*, Vol. 21, No. 1, 1993, pp. 161-175; M. de Melo, C. Denzier, A. Gelb and S. Tenev, *Circumstances and Choice: The Role of Initial Conditions and Policies in Transition Economies*, World Bank Policy Research Working Paper, No. 1866 (Washington, D.C.), December 1997.

Marer: P. Marer, *Dollar GNPs of the USSR and Eastern Europe* (Baltimore, The John Hopkins University Press, 1986).

PlanEcon: J. Vanous (ed.), "How big are the Soviet and east European economies?", *PlanEcon Report*, Vol. 6, No. 52 (New York), December 1990.

WEFA: The WEFA Group, *World Economic Outlook 1991* (Washington, D.C.), 1991.

CIA and Alton: *Handbook of Economic Statistics*, as quoted in UN/ECE, *Comparative GDP Levels ...*, op. cit.

Fischer-Sahay: S. Fischer and R. Sahay, "The transition economies after ten years", paper presented at the conference Ten Years After: Transition and Growth in Post-communist Countries (Warsaw), 15-16 October 1999.

^a After 1993, Czech Republic and Slovakia.

^b After 1990, former GDR.

^c After 1992, Bosnia and Herzegovina, Croatia, Slovenia, The former Yugoslav Republic of Macedonia and Yugoslavia.

^d After 1991, CIS and the Baltic states.