Chapter 2
Economic growth and standards of living

2.1. Introduction

A nation's economic growth is determined by the rate of utilisation of the factors of production – capital and labour – and the efficiency of their use. Traditionally, economic growth in Europe has been characterised by increased use of capital relative to labour and by high productivity growth[3]. Productivity growth in particular has been notably higher than in the US throughout the past quarter century, reflecting a convergence process. However, in recent years new trends have emerged with output and productivity growth in the US outstripping that in the EU. This has raised important questions about the underlying determinants of these developments and their implications for growth and standards of living in the EU. It has also been recognised that, to reverse these developments, structural reforms and policies that support competitiveness and innovation are essential[4]. Competitiveness in the sense used in this report refers to the ability of an economy to provide its population with high and rising standards of living and high rates of employment on a sustainable basis[5]. These ambitions could be thwarted should productivity growth in the EU fail to accelerate in a sustainable manner.

Until recently, economic growth was analysed in a framework that essentially linked output to factor inputs (a production function). However, recent research on the determinants of growth has not only refined this framework but has also extended it and has considered a broader set of factors seen as contributing to growth. It has now become clear that, apart from the quantity and quality of factor inputs, other factors also play a crucial role in a process where economic dynamism and innovation flourish. Such factors include organisational characteristics, interactions between economic policies and economic agents, as well as relationships between economic agents. The analysis also points to a role that policy makers can play in creating an institutional framework that is conducive to innovative activity and enhanced human skills.

This chapter reviews evidence about recent EU performance with regard to various indicators reflecting competitiveness and standards of living, and compares the EU with the US and Japan. Annex 1 provides an overview of the various theories which examine the causes of economic growth. Annex 2 summarises the conclusions of the OECD's recent Growth Project.

2.2. GDP per capita as indicator of living standards

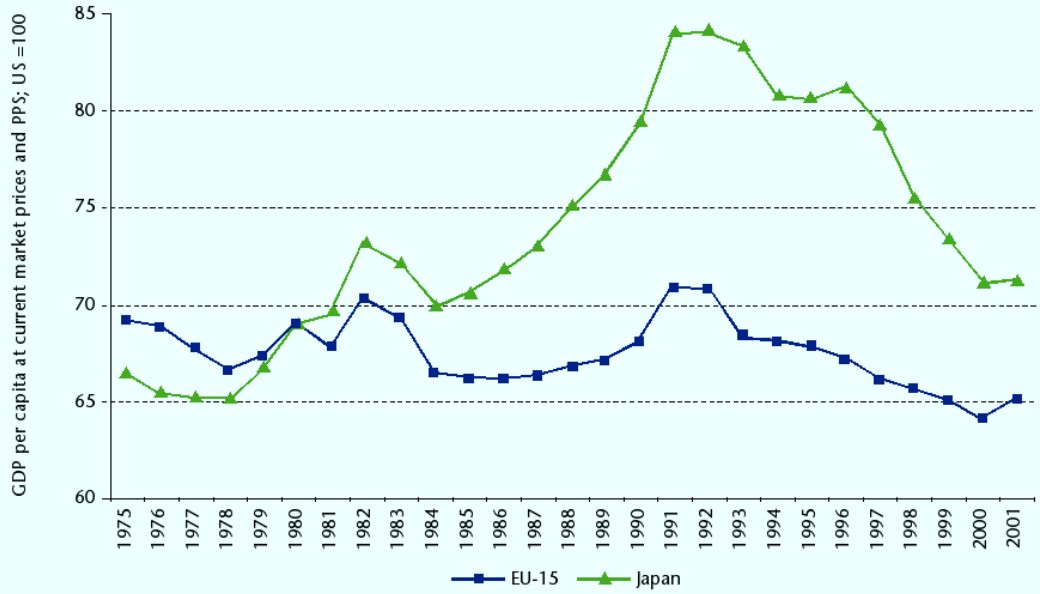
Over the past decade the EU has seen a sustained deterioration of its standards of living compared to the US, as measured by per capita gross domestic product (GDP). Graph II.1 shows that in 2000, the EU's relative standard of living compared to the US was lower than ever in the preceding quarter century. This undoubtedly reflects the exceptional growth performance of the US during the 1990s. Japan has also experienced a similar performance, but its relative position has deteriorated more sharply than that of the EU, and from a higher peak of around 85 per cent of the US level in the early 1990s.

3 See Crafts and Toniolo (1996) and van Ark and Crafts (1996).

4 See point 5 of Presidency Conclusions for the Lisbon European Council on 23-24 March 2000, available on the website of the Council at: http://ue.eu.int/en/Info/eurocouncil/index.htm.

5 European Commission (1996 and 1998) adopted a concept of competitiveness along these lines. Clearly, this concept differs from what is conventionally understood to constitute competitiveness, that is, the relative price of a specific product or industry output originating in different nations in world markets. While important, the latter concept finds no counterpart where national competitiveness is concerned. Moreover, it implies that losses of competitiveness correspond to losses of output. While this may be correct for specific industries, it is not meaningful when a nation's competitiveness as a whole is under review.

Graph II.1: GDP per capita: widening gap vis-à-vis the US



Source: Commission services.

Table II.1: GDP per capita in EU Member States, US and Japan in 2001 (US=100)

Luxembourg	127	Finland	68	Spain	53
Ireland	80	Germany	68	Portugal	48
Denmark	78	United Kingdom	67	Greece	45
Netherlands	77	Italy	66	**EU-15**	**65**
Belgium	73	Sweden	66	United States	100
Austria	71	France	64	Japan	71

Source: Commission services.

The EU–15 aggregate conceals significant differences in the performance of individual Member States. Luxembourg has a per capita GDP nearly 30 per cent above the US level (Table II.1). In three Member States (Greece, Portugal and Spain), GDP per capita is between 45-55 per cent of the US level, while in the remaining eleven Member States, GDP per capita ranges from 60 per cent to 80 per cent of the US level.

During the 1990s, Ireland and Portugal converged further towards the EU average. In particular, Ireland has caught up in a spectacular manner. In the late 1980s, per capita GDP in Ireland was less than half that of the US. As a result of average annual GDP growth of over 7 per cent, Ireland now has the second highest per capita GDP in EU-15, second only to Luxembourg and at 80 per cent of the US level.

2.3. GDP growth

The second half of the 1990s was a period of solid growth in the EU. After declining in the first half of the 1990s, employment growth rebounded and the growth of GDP accelerated in all the Member States except Germany (see Table II.2). Yet, the US did even better in terms of both GDP growth and employment creation; similarly, labour productivity growth in the US was significantly higher than in the EU. A key question is why the EU has been unable to match the strong performance of the US.

In the second half of the 1990s, three Member States stood out with their high GDP growth: Ireland, Luxembourg and Finland registered annual growth rates of 5 per cent or above. Germany and Italy recorded the lowest annual growth rates, not exceeding 2 per cent. The EU average of 2 $\frac{1}{2}$ per cent compares

Table II.2: Growth of real GDP in EU Member States, US and Japan in 1975-2001
(average annual growth in per cent, ranked according to performance in 1995 – 2001)

	1975-1985	1985-1990	1990-1995	1995-2001
Ireland	3.5	4.6	4.7	9.1
Luxembourg	2.4	6.4	5.4	6.1
Finland	2.9	3.3	-0.7	4.9
Netherlands	1.9	3.1	2.1	3.7
Spain	1.6	4.5	1.5	3.7
Greece	2.1	1.2	1.2	3.5
Portugal	3.0	5.5	1.8	3.4
Sweden	1.5	2.3	0.6	2.9
United Kingdom	1.9	3.3	1.6	2.8
Belgium	2.1	3.1	1.5	2.8
Denmark	2.1	1.3	2.0	2.6
Austria	2.4	3.2	2.0	2.5
France	2.4	3.3	1.1	2.5
Italy	3.0	2.9	1.3	2.0
Germany	2.2	3.4	2.0	1.8
EU-15	2.3	3.2	1.5	2.6
United States	3.4	3.2	2.4	3.9
Japan	3.8	5.2	1.5	1.1

Source: Commission services.

to 4 per cent annual growth in the US.

The following sections will discuss the main components of GDP growth in the EU, the US and Japan. It should be noted that population growth in the EU has been slower than in the US, implying that the growth differentials in GDP per capita are smaller than those in GDP growth. Nonetheless, as the preceding section showed, the US performance has been superior to that of the EU also in terms of GDP per capita growth.

2.4. Employment growth and labour productivity

GDP growth can be broken down into employment growth and growth in the average output per employed person. The former is illustrated by trends in the employment rate, i.e. the proportion of working-age persons who are in employment. The latter, average labour productivity, implicitly captures the impact on output growth of all variables other than employment growth, such as capital investment, technological progress, or increases in human capital.

Graph II.2 shows that Japan has an employment rate above those in the EU and the US, even though the sustained increase seen in the US in the 1990s brought its employment rate very close to the Japanese level. While the US and the EU had similar employment rates in the late 1970s, in subsequent years the US saw an increase of some 10 percentage points to approximately 75 per cent by 2001. The EU, in contrast, failed to raise its employment rate, which at present is 66 per cent. EU leaders, at their summit in Lisbon in March 2000, agreed on a target of raising the employment rate by 9 percentage points by 2010. This would roughly correspond to closing the actual employment gap with the US.[6, 7]

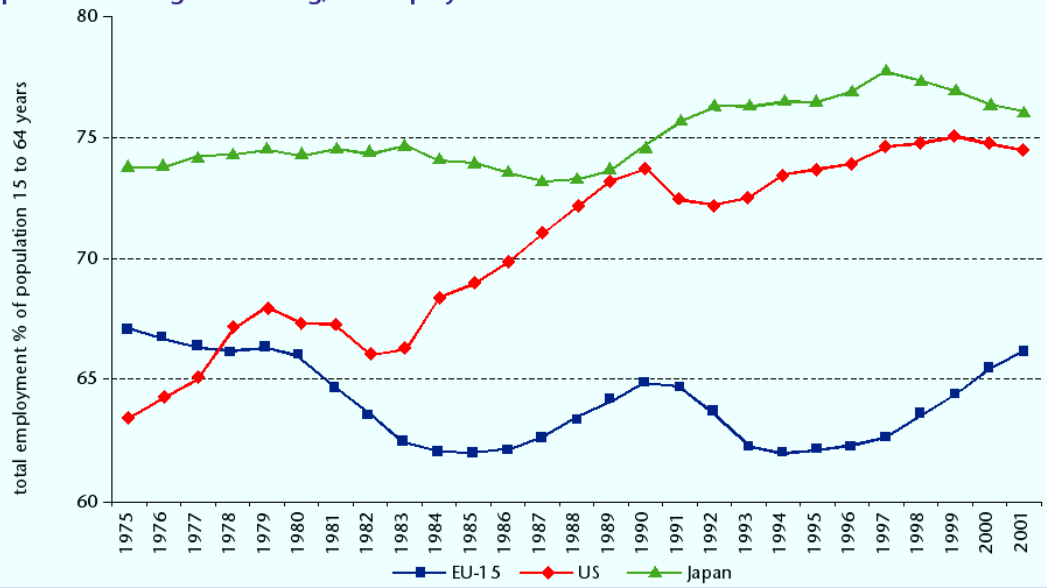
Strong employment growth has contributed significantly to US economic growth over the past decades. EU performance has been more variable. A study by the European Commission (2000) looked at the contribution of labour inputs to growth, using a broader definition of labour inputs than just the employment rate.[8] In the first half of the 1990s, the estimated contribution of labour inputs to growth in GDP per

6 This employment rate target is set on the basis of data from the Labour Force Survey, which differ from the national accounts definitions used elsewhere in this Chapter. The official target is to raise the employment rate from the 61 per cent in 2000 to as close as possible to 70 per cent by 2010 (both in terms of Labour Force Survey data).

7 Presidency Conclusions of the Stockholm European Council on 23-24 March 2001 and the Lisbon European Council on 23-24 March 2000, available on the website of the Council at: http://ue.eu.int/en/Info/eurocouncil/index.htm.

8 The European Commission (2000) breaks down the labour contribution to per capita GDP into four components: i) demography (share of those of working-age in total population); ii) labour force participation rate (share in working age population of those who work or are actively looking for a job); iii) extent of unemployment (total employment as proportion of the labour force); and iv) average hours worked per person in employment. In 1998, all these components except the proportion of working age persons in total population were more favourable in the US.

Graph II.2: Although increasing, EU employment rate far below US level



Source: Commission services.

Table II.3: Employment growth in EU Member States, US and Japan in 1975-2001, and employment rates in 2001 (average annual growth in per cent, ranked according to performance in 1995-2001)

	1975-1985	1985-1990	1990-1995	1995-2001	Employment rate in 2001
Ireland	0.0	1.1	1.9	5.1	68
Spain	- 1.6	3.3	- 0.5	2.8	59
Luxembourg	0.0	1.4	0.5	2.6	66
Netherlands	0.5	2.3	1.1	2.6	77
Finland	0.5	0.3	- 3.8	2.0	66
France	0.2	1.0	- 0.2	1.2	63
United Kingdom	- 0.2	1.8	- 0.9	1.2	71
Belgium	- 0.4	1.0	- 0.2	1.1	60
Italy	0.8	0.8	- 0.7	1.1	59
Denmark	0.5	0.1	- 0.5	1.0	76
Sweden	0.5	1.0	- 2.2	0.9	75
Greece	1.2	0.7	0.6	0.7	56
Germany	0.2	1.4	- 0.3	0.6	69
Austria	0.1	0.7	0.2	0.6	74
Portugal	- 0.3	1.1	- 0.5	0.4	73
EU-15	**0.1**	**1.4**	**- 0.5**	**1.2**	**66**
United States	2.2	2.0	0.9	1.4	75
Japan	0.9	1.0	0.7	0.0	76

Source: Commission services.

capita was negative in the EU, due to declining employment rates and reductions in working time. Although the average hours worked continued to decline, the overall labour contribution to EU growth turned positive in the second half of the decade, when employment increased and participation rates rose. Nevertheless, the labour contribution to per capita GDP growth in the second half of the 1990s was only one third of that in the US.

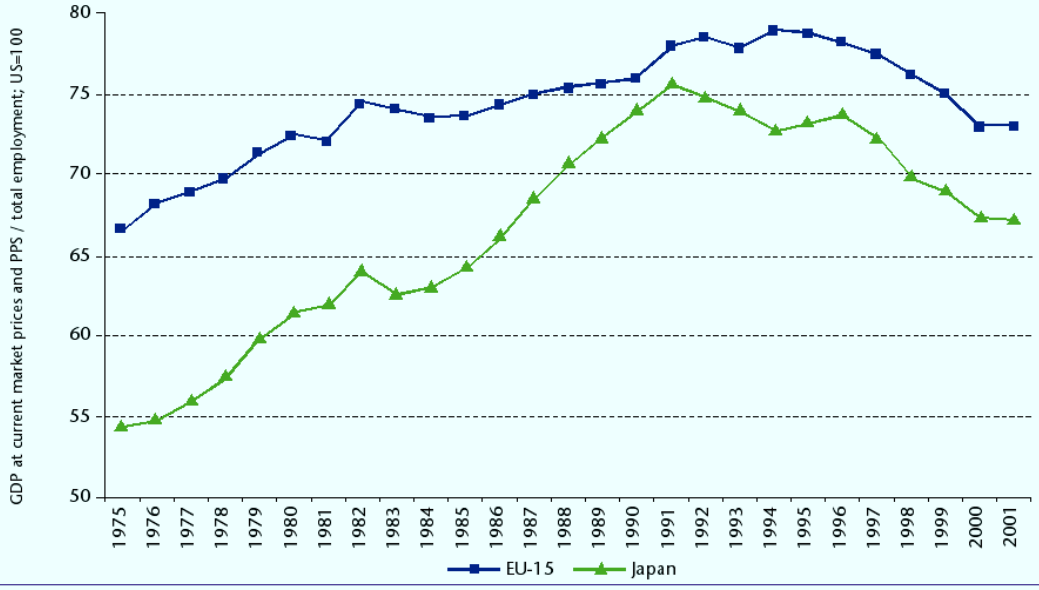
Estimates for 1998 indicate that lower labour utilisation in EU-15 accounted for two thirds of the gap with the US level of per capita GDP, while the remaining third was due to lower average labour productivity.[9] A variety of causes are behind the lower level of labour utilisation. While high unemployment is a major cause for concern, shorter working hours may instead reflect a social preference for leisure time over additional income.

9 See European Commission (2000).

Among the Member States, employment rates range from 56 per cent in Greece to 77 per cent in the Netherlands (Table II.3). The Netherlands, Sweden and Denmark have employment rates comparable to or higher than the US. Since the mid-1990s, employment increased at the highest rate in those five Member States which registered the highest GDP growth rates in the EU (Ireland, Luxembourg, Finland, the Netherlands and Spain).

The long term trend in the EU towards catching up with the US in labour productivity came to an end in the mid-1990s, when the productivity gap started to widen again (Graph II.3). In the second half of the decade, the rapid acceleration of labour productivity growth in the US and the simultaneous slowdown in the EU led to a new widening of the productivity gap vis-à-vis the US (see Table II.4). Of the EU Member States, only Luxembourg has a higher level of labour

Graph II.3 : Labour productivity in the EU falls further vis-à-vis the US



Source : Commission services.

Table II.4 : Labour productivity in EU Member States, US and Japan in 1975-2001

(average annual growth of GDP/employed person in per cent, ranked according to performance in 1995-2001)

	1975-1985	1985-1990	1990-1995	1995-2001	Labour productivity in 2001 (US=100)
Ireland	3.5	3.5	2.7	3.9	87
Luxembourg	2.3	5.0	4.9	3.4	145
Portugal	3.3	4.4	2.3	2.9	48
Finland	2.4	3.0	3.2	2.9	76
Greece	1.0	0.5	0.7	2.7	59
Austria	2.3	2.5	1.9	1.9	70
Sweden	1.0	1.2	2.8	1.9	67
Belgium	2.5	2.1	1.7	1.6	92
United Kingdom	2.2	1.5	2.5	1.6	72
Denmark	1.6	1.2	2.5	1.5	76
France	2.3	2.2	1.2	1.3	78
Germany	2.0	2.0	2.3	1.2	71
Netherlands	1.4	0.8	1.0	1.0	72
Italy	2.2	2.0	2.0	0.9	82
Spain	3.2	1.2	2.0	0.9	65
EU-15	**2.2**	**1.8**	**2.0**	**1.3**	**73**
United States	1.2	1.2	1.5	2.5	100
Japan	2.9	4.1	0.8	1.1	67

Note: Growth rates were calculated on the basis of GDP at constant 1995 prices and national currencies, while the 2001 productivity levels are based on GDP at current market prices and PPS.

Source: Commission services.

Table II.5: Employment and labour productivity growth, 1995-2001

		Employment growth		
		< average	Close to average	> average
Labour productivity growth	< average		Italy	Spain
	Close to average	Germany Japan	Belgium UK Denmark France	Netherlands
	> average	Greece Portugal Austria	US Sweden	Ireland Finland Luxembourg

Note: On both axes, countries are compared to the average annual growth rate in EU-15 in 1995-2001. Total employment growth in the Member States ranged from 0.4 per cent to 5.1 per cent p.a. The category 'close to average' includes countries with a growth rate of +/-0.4 p.p. around the EU average of 1.2 per cent.
Labour productivity growth ranged from 0.9 per cent to 3.9 per cent p.a. among the Member States. The category 'close to average' includes countries with a growth rate of +/-0.3 p.p. around the EU average of 1.3 per cent.

Source: Commission services.

productivity than the US. In the majority of the Member States, labour productivity is currently between 60-80 per cent of the US level.

Table II.5 illustrates the breakdown of GDP growth in the Member States into employment growth and labour productivity growth.[10] Countries are classified in groups according to whether their performance was above, close to or below the average. The benchmark for these comparisons is the average EU growth rate of the respective variable. In Ireland, Luxembourg and Finland, high GDP growth in the second half of the 1990s was associated with both strong employment growth and rapidly rising labour productivity. These three Member States registered the highest GDP growth rates in the EU.

The fourth and fifth in terms of GDP growth were the Netherlands and Spain: growth in these two countries was based mainly on a solid increase in employment, while labour productivity increased only moderately. Above-average growth of labour productivity in Portugal and Greece reflects their continuing catch-up with the rest of the EU; despite rapid productivity growth, their productivity levels are still clearly below the EU average (Table II.4). The performance of the five largest Member States was below, or close to, the EU average.

2.5. Capital deepening and technological progress

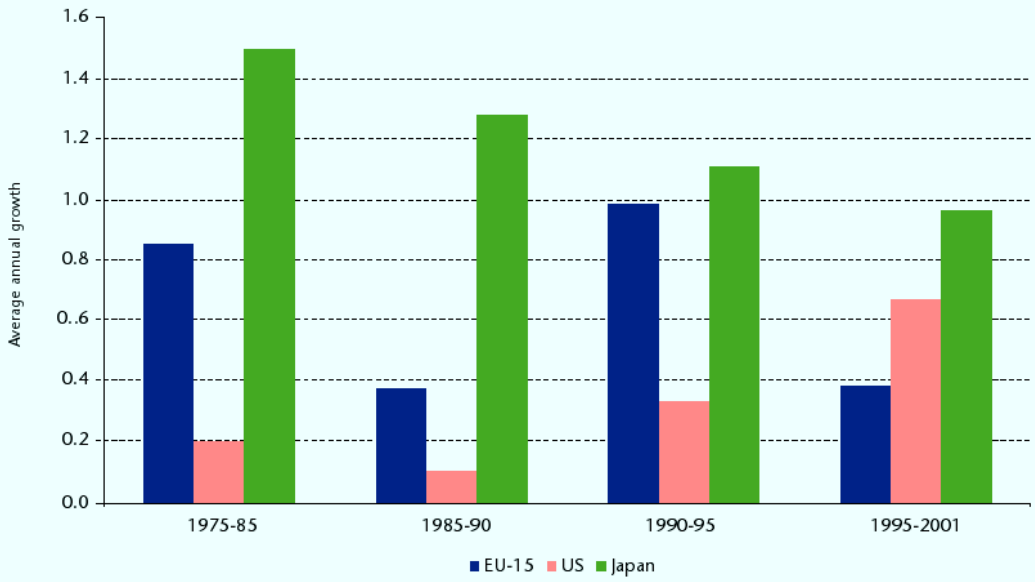
Labour productivity growth is determined by capital deepening, i.e. growth in the stock of capital per employed person, and by technological progress, measured by growth in total factor productivity (TFP).

Capital deepening is a long-term process determined primarily by investment. In the short run, changes in employment can have a great impact on the capital/labour ratio. An increasing capital/labour ratio in the EU helped it to catch-up with the US in terms of labour productivity until the mid-1990s (Graph II.4 and Table II.6). It should, however, be stressed that declining employment explains a considerable part of the increase in the capital/labour ratio in the first half of the 1990s.

In the second half of the 1990s, capital deepening was very rapid in the US, whereas there was a clear slowdown in the EU. The rise in US investment was linked to the rapid increase in the quality of information and communication technology (ICT) products, combined with a steep decline in their relative price, which decisively boosted ICT investment.[11]

10 Annex 1 to Chapter IV provides more information on the national developments and strategies of individual Member States.
11 For more information on ICT investment in the EU and the US see Chapter III.

Graph II.4: Capital deepening in EU, US and Japan



Note: The figures indicate how much (in percentage points) capital deepening, or the substitution of capital for labour, contributed to overall labour productivity growth. See also footnote 12.

Source: Commission services.

For the EU Member States, changes in the capital/labour-ratio in 1995-2001 were strongly correlated with changes in employment. Portugal, Greece and Austria, where capital deepening was most marked, were among the weakest performers in terms of employment growth (Tables II.3 and II.6). The opposite is true for Ireland, the Netherlands and Finland, where strong employment growth led to a declining capital/labour-ratio. In contrast, the US registered rapid growth regarding both employment and investment; both factors contributed significantly to US economic growth in the second half of the 1990s.

Growth in total factor productivity (TFP) is measured by the difference between output growth and the growth of inputs (weighted average of labour and capital).[12] An increase in total factor productivity means that more output can be produced with a given level of labour and capital inputs. As a residual, TFP growth incorporates the effects of changes in the degree of factor utilisation, innovation and technological progress, or measurement errors. Furthermore, as the present method of calculating labour productivity growth does not take into account changes in the quality of inputs (such as better capital goods or an improvement in the educational attainment and skills of the labour force), such changes are also reflected in TFP growth. One of the key factors enhancing TFP in recent years has been investment in new ICT capital goods which have a higher marginal product than many other capital goods.[13] Finally, cyclical factors are also likely to have an impact on TFP growth – in periods of rapid growth, the degree of factor utilisation tends to be higher and vice versa.

Graph II.5 illustrates the growth of total factor productivity in the EU, the US and Japan. A comparison with Graph II.4 shows that TFP growth was by far more important than capital deepening in explaining labour productivity growth in both the EU and the US in the second half of the 1990s. In EU-15, TFP growth slowed somewhat, while the US registered a strong acceleration. Japan's TFP growth collapsed in the 1990s.

Table II.7 presents total factor productivity growth rates in the Member States, which are ranked in descending order according to their performance in the

12 The relationship between output and inputs can be described by a production function for the economy as a whole. Assuming that the production function is of the Cobb-Douglas type, the rate of output growth (y) depends on: the rate of growth of labour inputs (e) – measured by the growth in total employment; the rate of the growth of capital input (k) – measured by the growth of the capital stock; and a residual which is total factor productivity growth (TFP; Graph I.5 and Table 1.5). The equation reads:
$y = TFP + \alpha e + (1-\alpha)k$
where α denotes the partial elasticity of output with respect to labour. As the rate of growth of labour productivity corresponds to the difference between the growth of output (y) and of labour (e), subtracting (e) from both sides of the equation yields the desired division of the rate of growth of labour productivity:
$y - e = TFP + (1-\alpha)(k-e)$
where (k-e) corresponds to the rate of growth of the capital-labour ratio and measures the speed of capital deepening. Multiplied by (1- α), this expression measures the effect of the substitution of capital for labour (Graph I.4 and Table I.4) on labour productivity growth.

13 Chapter III deals with ICT and its impact on productivity, while Chapter IV discusses the role of ICT, knowledge and innovation for productivity growth in manufacturing.

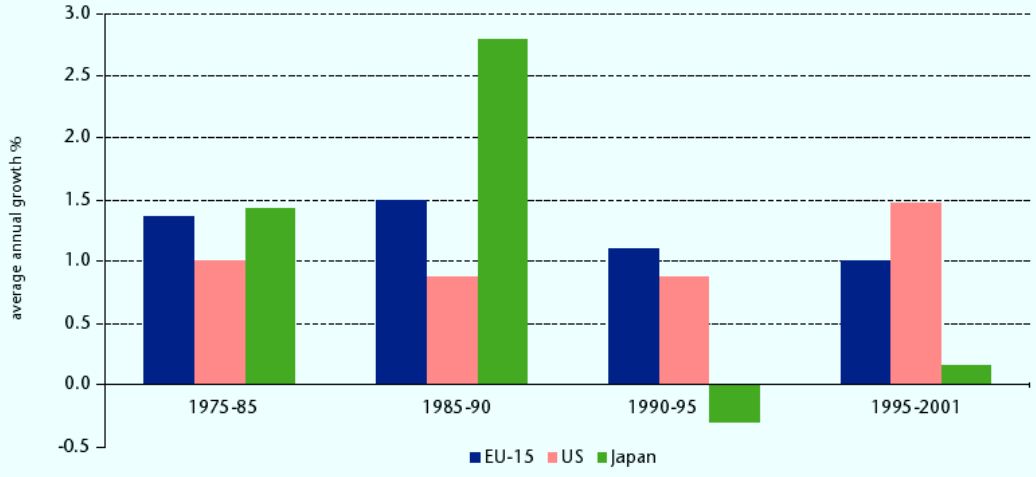
Table II.6: Capital deepening in EU Member States, US and Japan in 1975-2001
(average annual contribution to labour productivity growth in percentage points; ranked according to performance in 1995-2001)

	1975-1985	1985-1990	1990-1995	1995-2001
Portugal	1.5	0.8	1.1	1.1
Greece	1.1	0.7	0.6	0.8
Austria	1.0	0.6	1.0	0.7
Germany	0.8	0.2	1.0	0.5
Belgium	1.1	0.5	0.9	0.4
United Kingdom	0.6	0.2	0.8	0.4
Luxembourg	0.6	0.1	0.8	0.4
Denmark	0.5	0.7	0.5	0.4
Italy	0.7	0.6	0.9	0.3
Spain	1.7	0.2	1.3	0.3
France	1.0	0.7	0.9	0.3
Sweden	0.5	0.4	1.0	0.0
Ireland	1.7	0.5	0.1	-0.1
Netherlands	0.9	0.1	0.4	-0.1
Finland	0.9	1.0	1.4	-0.4
EU-15	**0.9**	**0.4**	**1.0**	**0.4**
United States	0.2	0.1	0.3	0.7
Japan	1.5	1.3	1.1	1.0

Note: The figures indicate how much (in percentage points) capital deepening, or the substitution of capital for labour, contributed to overall labour productivity growth. See also footnote 12.

Source: Commission services.

Graph II.5: Total Factor Productivity Growth in EU, US and Japan



Source: Commission services.

period 1995-2001. The data confirm that European TFP growth exceeded by a considerable margin the US rate in the period 1975-1995. However, during the past six years the pattern has been reversed, with the US forging ahead.

Ireland and Finland posted exceptionally high TFP growth rates in the second half of the 1990s. Greece, Sweden, Portugal, Luxembourg and Austria also registered average TFP growth at or higher than the US rate during this period. All the best performers were small Member States, while the large EU countries performed quite weakly – Germany, Italy and Spain especially poorly.

Table II.7 : Total Factor Productivity Growth in EU Member States, US and Japan in 1975-2001
(average annual growth in per cent, ranked according to performance in 1995-2001)

	1975-1985	1985-1990	1990-1995	1995-2001
Ireland	1.8	2.9	2.6	4.0
Finland	1.5	2.0	1.8	3.3
Greece	-0.2	-0.1	0.1	1.9
Sweden	0.5	0.8	1.7	1.9
Portugal	1.8	3.6	1.3	1.8
Luxembourg	1.6	3.1	1.9	1.6
Austria	1.3	1.9	1.5	1.5
Belgium	1.3	1.6	0.8	1.2
United Kingdom	1.6	1.3	1.7	1.2
Denmark	1.2	0.5	2.0	1.2
France	1.4	1.7	0.6	1.1
Netherlands	1.1	1.1	1.0	1.1
Italy	1.3	1.5	1.2	0.7
Germany	1.2	1.7	1.1	0.7
Spain	1.6	1.0	0.6	0.5
EU-15	**1.4**	**1.5**	**1.1**	**1.0**
United States	1.0	0.9	0.9	1.5
Japan	1.4	2.8	-0.3	0.2

Source : Commission services.

2.6. Concluding comments

An estimated two-thirds of the EU gap with the US GDP per capita level results from lower levels of labour utilisation, while the remainder is due to lower labour productivity in the EU. While part of the lower utilisation of labour reflects shorter working hours in the EU and may be considered as a matter of social choice, the higher level of unemployment constitutes a cause for concern. The EU leaders have set an employment rate target, calling for a 9 percentage point increase in the EU's employment rate between 2000 and 2010. While higher employment is needed in order to catch up with the US GDP per capita levels, in the longer run productivity growth will be the key to achieving higher standards of living.

Labour productivity in the EU had converged towards the US level for several decades. However, the mid-1990s marked a turning point in this process. A rapid acceleration of productivity growth in the US coincided with a deceleration in the EU and led to a renewed widening of the productivity gap, thus erasing to some extent the convergence gains made. EU performance in the second half of the 1990s was not by itself especially discouraging, with GDP growth accelerating and employment rising. The central issue is to explain why the US could still do significantly better in both respects. For an explanation, it is necessary to review the causes behind the differing productivity performances. This is the task of the following two chapters, which review the evidence on the impact of ICT investment on productivity and growth, and analyse the factors behind productivity growth in the manufacturing sector respectively.

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