

ARTICLES

LABOUR PRODUCTIVITY DEVELOPMENTS IN THE EURO AREA: AGGREGATE TRENDS AND SECTORAL PATTERNS

This article reviews the trends in aggregate labour productivity in the euro area since the early 1980s and explains them in terms of underlying sectoral developments. Understanding these trends is important in the context of growth comparisons with the United States and the growth objectives stated in the Lisbon agenda. The available data suggest that the decline in average labour productivity growth in the euro area between the 1980s and 1990s reflects lower growth in both capital deepening and total factor productivity. From a sectoral perspective, the decline was to a large extent due to lower productivity growth in the sector comprising financial intermediation and business services. Overall, the results suggest that the productivity performance of the euro area could be improved by removing structural impediments in the form of rigidities in labour and product markets.

I INTRODUCTION

In recent years, the analysis of developments in euro area labour productivity has received increased interest. This reflects to a large extent the impressive productivity performance of the US economy since the second half of the 1990s and the ensuing question why the developments in the euro area have been less favourable. In developed economies, growth in labour productivity is typically the single most important determinant of longer-term improvements in potential output and living standards. Achieving higher productivity growth is thus an important condition for meeting the objective stated in the March 2000 Lisbon agenda to make Europe the most competitive and dynamic knowledge-based economy in the world in the decade up to 2010. Europe's population is ageing and sustained higher growth per capita will be needed to finance expenditure on pensions and health care, and to preserve average living standards.

This article reviews the trends in euro area labour productivity since the early 1980s. The reason for choosing this period is twofold. First, harmonised national accounts data for the individual euro area countries are mostly available for the period since 1980. Second, the oil shocks of the 1970s coincided with a general setback in productivity growth, and the productivity performance in more recent years is thus better compared with developments since the early 1980s rather than those before. The article reviews both aggregate trends and sectoral patterns of labour

productivity growth, as the aggregate performance can be the result of changing developments at the sectoral level. For instance, factors such as globalisation, technological innovation and structural change may have had very different consequences for productivity growth across sectors.

Labour productivity describes the relationship between real output and the labour input used in its production. Labour input is typically measured in terms of persons employed or hours worked. In this respect, the analysis of productivity developments in the euro area is hampered by the fact that official euro area-wide data on hours worked in the total economy are not yet available. The same holds for data on important productivity determinants such as the capital stock. Against this background, the productivity data used in this article are compiled from various sources, including official Eurostat data, data from the European Commission, the Organisation for Economic Co-operation and Development and the Groningen Growth and Development Centre, as well as ECB estimates.

The analysis proceeds as follows. Section 2 discusses the trends in aggregate productivity growth in the period since the early 1980s and relevant sub-periods. Section 3 considers the dynamics of productivity in the main industrial and services sectors of the economy and relates them to the aggregate trends. Section 4 concludes, pointing to some policy issues that arise from the discussion.



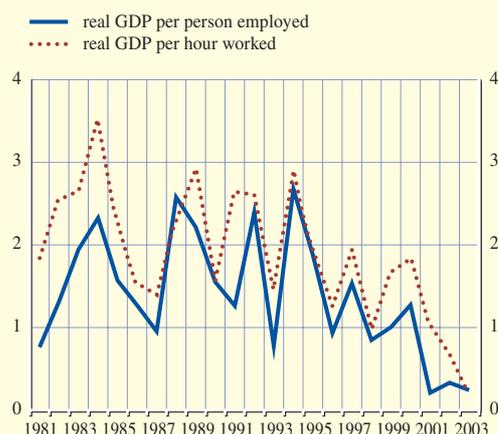
2 STYLISED FACTS OF AGGREGATE PRODUCTIVITY GROWTH IN THE EURO AREA SINCE THE EARLY 1980s

Recent international comparisons of productivity growth have mostly focused on the period since 1996, as the mid-1990s appear to reflect a change in trend productivity growth in the United States. However, productivity developments display considerable volatility over the economic cycle and changes in underlying trends are therefore difficult to discern (see Chart 1). As separating trends and cycles using statistical methods is often affected by measurement uncertainties, this article corrects for cyclical effects by focusing on average developments in pre-defined, longer-term economic cycles. Measured on the basis of real GDP growth, there have been two longer-term cycles in the euro area in the period since 1980, extending respectively from a trough in 1981 to a trough in 1993 and from there to another in 2003. For simplicity, these two periods will henceforth be referred to as the 1980s and the 1990s.

Table 1 shows that productivity growth in the euro area declined between the 1980s and the 1990s, irrespective of whether productivity is measured per person employed or on the basis of the number of hours worked. However, as the number of average hours worked per year has progressively declined since 1980,

Chart 1 Labour productivity in the euro area

(annual percentage changes)



Sources: ECB calculations based on data from Eurostat and the European Commission.

Data for hours worked are compiled from national data in the Groningen Growth and Development Centre and the Conference Board's Total Economy Database (February 2004) (<http://www.ggdc.net>).

productivity growth has generally been higher when measured per hour worked than per person employed. The stylised fact of a decline in euro area productivity growth between the 1980s and 1990s also holds irrespective of whether productivity is measured for the total economy or for a narrower aggregate such as the non-agricultural business sector. However, productivity growth in the business sector has been generally higher than in the overall economy.

Table 1 Labour productivity in the euro area

(percentage changes per annum)

Economic cycle	Total economy (based on real GDP)		Non-agricultural business sector ¹⁾ (based on real gross value added)	
	Per person employed	Per hour worked	Per person employed	Per hour worked
1980s	1.7	2.3	1.9	2.5
1990s	1.1	1.4	1.3	1.6
<i>Memo item</i> 1996-2003	0.8	1.2	0.9	1.2

Sources: ECB calculations based on data from Eurostat and the European Commission. Data for hours worked are compiled from national data in the Groningen Growth and Development Centre and the Conference Board's Total Economy Database (February 2004), and those in the Groningen Growth and Development Centre's 60-Industry Database (October 2003) (<http://www.ggdc.net>).

Note: The economic cycles are taken to run trough-to-trough from 1981 to 1993 and from 1993 to 2003.

1) Excludes agriculture, fishing and forestry, as well as services that are not purely market-related.

The different concepts of productivity need to be borne in mind when comparing the euro area with other economies, and notably that of the United States. In the case of the United States, productivity developments are typically discussed in terms of productivity per hour worked in the non-farm business sector, while official figures for the euro area refer to productivity per person employed for the total economy. Such a comparison would necessarily imply an upward bias in the productivity growth gap between the United States and the euro area.

Given that the delimitation between publicly provided services and purely market-related services differs across countries and changes over time, comparisons for the total economy may be more adequate. At the same time, the finding that in the period since the mid-1990s productivity growth continued to decline in the euro area while it increased in the United States is independent of the concept used. Box 1 shows that this divergence carries over to developments in real GDP per capita as a measure of living standards.

Box 1

THE RELATIONSHIP BETWEEN GROWTH IN LABOUR PRODUCTIVITY AND GDP PER CAPITA

Developments in an economy's average living standards are often measured in terms of real GDP per capita¹ and thus depend on how many persons have claims on what is produced rather than on how many persons or hours it takes to produce a certain amount of output. At the same time, the measures of GDP per capita (i.e. per head of the population) and GDP per hour worked are conceptually linked. The difference between them – reflecting hours worked per head of the population – denotes the degree to which potentially available labour is utilised in the production process. This box discusses the contributions of productivity and labour utilisation to growth in real GDP per capita in the euro area and compares them with those in the United States.

Decomposition of real GDP per capita in the euro area and the United States

(percentage changes per annum)

Economic cycle	Real GDP per capita a=b+c	Real GDP per hour worked b	Labour utilisation c=d+e	Hours worked per person employed d	Persons employed in total population e
1980s					
Euro area	1.8	2.3	-0.4	-0.6	0.2
United States	2.5	1.6	1.0	0.0	0.9
1990s					
Euro area	1.7	1.4	0.3	-0.3	0.6
United States	2.1	1.4	0.7	0.4	0.3
<i>Memo item</i>					
1996-2003					
Euro area	1.6	1.2	0.5	-0.4	0.8
United States	2.2	1.9	0.3	0.2	0.1

Sources: ECB calculations based on data from Eurostat, the European Commission, the Bureau of Labor Statistics and the Bureau of Economic Analysis. Data for hours worked are compiled from national data in the Groningen Growth and Development Centre and the Conference Board's Total Economy Database (February 2004) (<http://www.ggdc.net>).

Notes: Figures may not add up due to rounding. The cycles for the euro area are taken to run trough-to-trough from 1981 to 1993 and from 1993 to 2003, and those for the United States from 1982 to 1991 and from 1991 to 2001.

¹ Gross National Income (GNI) might be a better indicator of living standards as it takes into account net primary incomes from abroad. However, for the euro area as a whole the difference in growth rates of GDP and GNI is very small and does not affect the main findings based on real GDP.

Decomposing growth in real GDP per capita

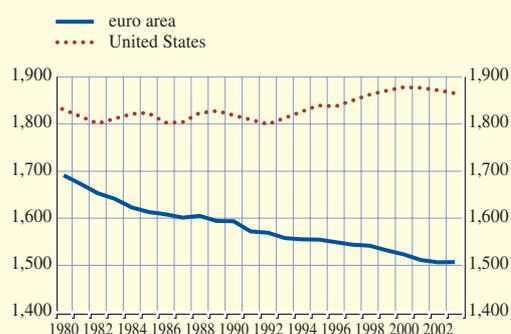
The previous table compares the contributions to growth in real GDP per capita in the euro area and the United States for the respective economic cycles in the 1980s and the 1990s as measured by real GDP. However, it should be noted that the variables referred to in the table may display somewhat different longer-term cycles to those in real GDP. The data show that since the early 1980s per capita growth in the euro area has on average been lower than in the United States. In the 1980s the gap was accounted for by diverging developments in the degree of labour utilisation, which were positive in the United States and negative in the euro area, while productivity growth per hour worked was higher in the euro area and strongly contributed towards a narrowing of the gap. This picture changed in the 1990s when the gap between the euro area and the United States in respect of growth in labour utilisation was much smaller, while at the same time the euro area's lead in productivity growth vanished. The developments in more recent years suggest that these relative shifts in the contributions to per capita growth have continued. In the period 1996-2003 productivity growth in the euro area fell behind that in the United States while growth in labour utilisation on average became stronger.

Decomposing labour utilisation

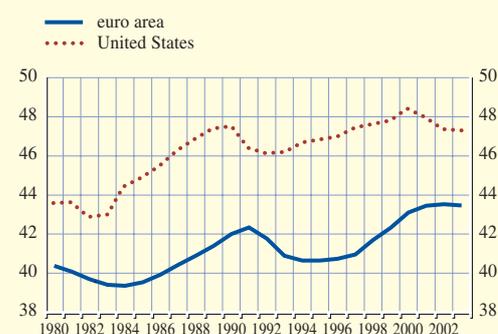
In the context of this accounting exercise, labour utilisation is measured as hours worked per head of the population. This can be further decomposed into hours worked per person employed and the share of employed persons in the total population. The data in the table show that growth in euro area labour utilisation has been dampened by declines in average hours worked but has been supported by the fact that an increasing part of the population is employed. The much lower level of working hours vis-à-vis the United States shown in the chart below is partly explained by fewer actual working days per year, while the widening of the gap reflects the shortening of statutory full-time working weeks and the rising share of part-time employment. In the United States these latter determinants have remained broadly stable. Despite some relative improvement in the euro area, the share of employed persons in the total population has

Components of labour utilisation in the euro area and the United States

Hours worked per person employed per year



Persons employed as a percentage of total population



Sources: ECB calculations based on data from Eurostat, the European Commission, the Bureau of Labor Statistics and the Bureau of Economic Analysis. Data for hours worked are compiled from national data in the Groningen Growth and Development Centre and the Conference Board's Total Economy Database (February 2004) (<http://www.ggdc.net>).

remained well below that in the United States. This reflects the fact that the unemployment rate is still around 3 percentage points higher than in the United States and that the labour force participation rate is still around 8 percentage points lower, the latter reflecting in particular lower participation of women and older persons.

Overall, the previous decompositions show that in the period since the mid-1990s the gap in per capita GDP growth vis-à-vis the United States reflects lower productivity growth. However, even with unchanged productivity growth the gap could be narrowed if labour utilisation in the euro area were to continue to increase faster than in the United States, as has been the case since the mid-1990s. The potential for catching up in this regard is large, as participation rates and average hours worked are relatively low and unemployment rates are relatively high. However, in view of the interlinkages between the individual components of labour utilisation, policy conclusions based on mechanical decompositions should be drawn with caution.

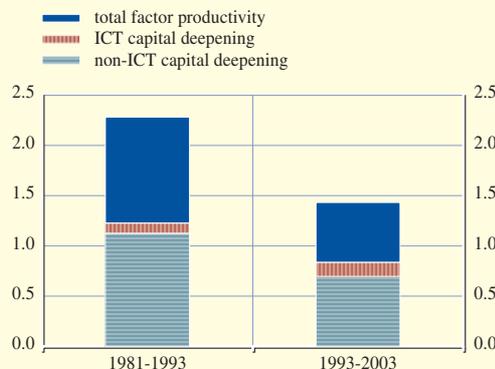
In the context of standard growth accounting frameworks, labour productivity growth can be explained in terms of the contributions from capital deepening and total factor productivity. Capital deepening denotes the increase in the use of physical capital per worker in the production process, while growth in total factor productivity measures the efficiency with which both capital and labour are used. The measurement of these two components is surrounded by considerable uncertainty, reflecting for instance the fact that no official euro area-wide data are available for hours worked, the capital stock, and the quality of labour and capital inputs. Moreover, assumptions are needed with regard to the underlying aggregate production technology and thus the shares that labour and capital have in total output. Chart 2 shows ECB estimates for the contributions to euro area labour productivity growth based on data for hours worked, capital-output ratios and factor shares from the Groningen Growth and Development Centre.

The chart shows that the decline in aggregate productivity growth of 0.9 percentage point between the 1980s and the 1990s stems from broadly similar declines in the contributions from capital deepening and total factor productivity. The higher rate of capital deepening in the 1980s followed a period of relatively strong real wage growth, which

fostered the substitution of capital for labour. In the 1990s real wages grew on average relatively moderately, slowing the substitution of capital for labour and allowing for higher employment growth. This was inter alia associated with an increase in lower-skilled employment, re-integrated from unemployment, which had a dampening impact on aggregate productivity growth. Against this background, it would appear that measured productivity growth is not exogenous to economic growth,

Chart 2 Contributions to growth in labour productivity per hour in the euro area

(annual average percentage points)



Sources: ECB calculations and estimates based on data from Eurostat and the European Commission. Data for hours worked are compiled from national data in the Groningen Growth and Development Centre and the Conference Board's Total Economy Database (February 2004) (<http://www.ggdc.net>). Capital-output ratios and ICT-to-capital ratios are taken from M.P. Timmer, G. Ypma and B. van Ark, "IT in the European Union: Driving Productivity Divergence?", GGDC Research Memorandum GD-67, October 2003, University of Groningen.

but rather is influenced by changes in the relative prices of labour and capital.

Real GDP growth was only slightly lower in the 1990s than in the 1980s, at 2.0% per annum compared with 2.2%, implying that the decline in productivity growth in the 1990s was almost fully compensated for by higher growth in employment and total hours worked. On the one hand, the data thus suggest that there has simply been a change in the employment content of growth. On the other hand, the data may be taken as suggesting that the euro area only achieved higher employment growth at the expense of lower productivity growth. This implies a clear difference compared with the United States where the second half of the 1990s saw both higher productivity growth and continued strong employment growth.

In this respect, a widely shared view is that the different productivity performances in the euro area and the United States reflect the different impact of new information and communication technologies (ICT).¹ Chart 2 shows that the contribution to euro area productivity growth associated with the pure accumulation of ICT capital rose slightly in the 1990s while that associated with the accumulation of other types of capital (referred to as non-ICT capital) declined considerably. At the same time, the stronger ICT capital deepening did not prevent growth in total factor productivity from declining. The likely positive impact from the technological advances associated with the production of ICT goods and from the improvements in overall efficiency associated with the use of ICT has thus not been strong enough to offset the downward impact of other factors.

This may simply reflect the fact that the scale of ICT-producing and using industries in the euro area is still too small to have a sizeable impact on growth in total factor productivity. In addition, both the innovation related to producing ICT and the use of ICT depend on the regulatory practices that affect the general functioning of the economy. Rigidities in euro

area product and labour markets may have inhibited businesses from fully exploiting the opportunities provided by ICT. This would also help to explain why euro area countries have benefited in an uneven way from ICT capital. In this respect, the differences in productivity growth developments across sectors discussed in the following section may reflect a different impact from technological innovation and structural rigidities.

3 SECTORAL PATTERNS OF PRODUCTIVITY GROWTH

This section examines sectoral productivity trends in order to help understand whether the decline in aggregate labour productivity growth in the euro area between the 1980s and 1990s was broadly based or whether it largely reflects developments in individual sectors and might thus be the result of specific factors.

The sectoral analysis is based on the available breakdown of euro area national accounts for the total economy. On the industry side, the breakdown includes construction and industry excluding construction (including mining, quarrying, manufacturing, and electricity, gas and water supply). The latter will henceforth be referred to as “industry”. On the services side, euro area-wide data are available for wholesale and retail trade and transport (which also includes repairs, hotels and restaurants and communication), finance and business services (which also includes real estate and renting services) and public administration (which also includes education, health and other community services). The first category will henceforth be referred to as “trade and transport”. The focus will be on those sectors that correspond to the non-agricultural business sector, but it should be noted that there are differences across countries and time in the extent to which some of the services subsumed under public

¹ This issue was for instance discussed in a recent workshop on “Divergences in productivity growth between Europe and the United States”, co-organised by the Banque de France, CEPII and Ifo and held at Royaumont Abbey, France, on 22-23 March 2004.

Table 2 Labour productivity per person employed by sector in the euro area

(percentage changes per annum)

Economic cycle	Non-agricultural business sector (based on real gross value added)				
	Total	Industry ¹⁾	Construction	Trade and transport ²⁾	Finance and business services ³⁾
1980s	1.9	2.4	1.3	1.3	0.2
1990s	1.3	2.6	-0.2	1.5	-0.9
<i>Memo item</i>					
1996-2003	0.9	1.9	-0.4	1.4	-1.1

Source: ECB calculations based on data from Eurostat and the European Commission.

Note: The cycles are taken to run trough-to-trough from 1981 to 1993 and from 1993 to 2003.

1) Includes mining, quarrying, manufacturing, electricity, gas and water supply.

2) Includes repairs, hotels and restaurants, communication.

3) Includes real estate and renting services.

administration are provided by private rather than public enterprises.

Table 2 provides a breakdown of productivity growth per person employed in the non-agricultural business sector, comparing the developments in the 1980s and the 1990s. The data suggest that the decline in productivity growth in the total economy is not broadly based at the sectoral level. While productivity growth per person employed declined markedly in the construction and the finance and business services sectors, reaching negative growth rates in the 1990s, it increased slightly in industry and in the trade and transport sector.

As was shown in Table 1, moving from productivity per person employed to productivity per hour worked has an upward impact on average labour productivity growth but does not alter the fact that productivity growth declined in the 1990s. At the sectoral level, this upward revision affects all sectors, but as expected particularly services (not shown in Table 2). For instance, in the 1990s average productivity growth in the trade and transport sector of 1.5% per person employed would increase by more than one-third when measured per hour worked, while in industry the upward effect from 2.6% would be around one-ninth. This is mainly due to the much stronger increase in part-time employment in the services sectors. Indeed, the data available on part-time employment for the period since the mid-1990s

suggest that the share of part-time employment in the total economy increased by 3 percentage points to around 16.5% in 2003. This reflects an increase by around 1 percentage point to 6.7% in industry and by 3 percentage points to 17.8% in market-related services.

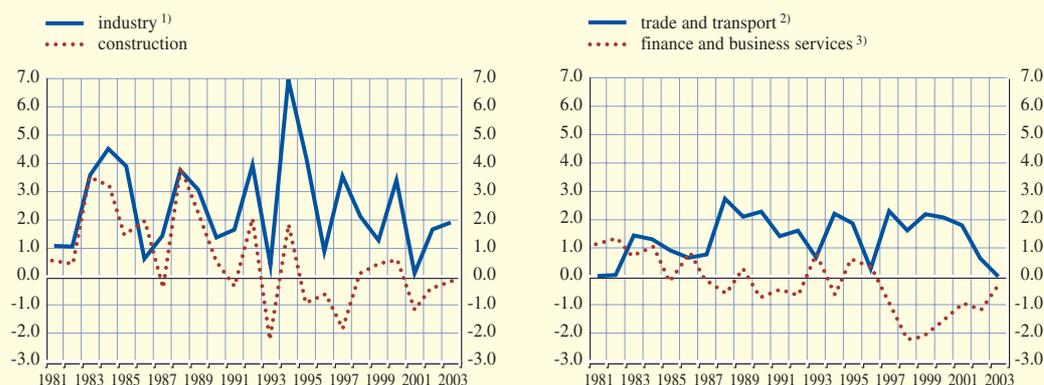
Chart 3 shows the pattern of productivity growth per person employed over time for the individual sectors of the non-agricultural business sector. Trend developments are difficult to discern, in particular for the sectors, such as industry, which show a relatively high variability in productivity growth. However, the data seem to confirm that the two sectors showing a clear downward trend in productivity growth are the finance and business services sector and the construction sector, while industry and the trade and transport sector show a relatively stable mean over time.

The different patterns of productivity growth per person employed raise two types of question. The first is the question to what extent the productivity growth performance reflects developments in output or employment. The second question relates to the extent to which developments in overall productivity can be attributed to compositional changes across sectors.

Starting with the first question, the increase in productivity growth in industry and in the trade and transport sector between the 1980s and

Chart 3 Labour productivity per person employed by sector in the euro area

(annual percentage changes)



Source: ECB calculations based on data from Eurostat and the European Commission.

1) Includes mining, quarrying, manufacturing, electricity, gas and water supply.

2) Includes repairs, hotels and restaurants, communication.

3) Includes real estate and renting services.

1990s essentially reflects a rise in average output growth. Employment growth continued to decline in industry, although to a lesser extent, and was unchanged in the trade and transport sector. By contrast, the decline in productivity growth in the construction sector and in the finance and business services sector – to a negative rate of growth in the 1990s – is mainly attributable to a decline in average output growth, while at the same time employment growth increased. In construction the divergence between activity and employment developments probably reflects to some extent country-specific developments that affect the comparison between longer-term cycles. One example could be the strong impact of German unification on developments in the construction sector, another the fiscal consolidation efforts in the run-up to Monetary Union, which in some euro area countries were associated with lower public expenditure on construction investment.

In the case of finance and business services the decline in productivity growth between the 1980s and the 1990s and the negative rate of growth appear to reflect to a large extent the productivity performance in services related to real estate activities and in “other” business services. By contrast, for services related to

financial intermediation productivity growth seems to have declined to a much lesser extent and it has remained clearly positive. Productivity developments in services related to real estate activities and in “other” business services should be assessed with some caution as real estate activities reflect primarily developments in actual and imputed rents and because productivity in “other” business services may be partly affected by the outsourcing of low-productivity jobs from industry.

The question of the impact of compositional changes examines the extent to which the rising employment share of the services sector, which has shown lower productivity growth than industry, is responsible for the decline in overall productivity growth. A rough estimate indicates that almost half of the decline in labour productivity growth in the non-agricultural business sector is explained by the falling employment share of industry and, at the same time, the gain in the share of employment in finance and business services. By contrast, the increasing share of employment in trade and transport offsets part of this effect. As regards the productivity effect within sectors, which accounts for the other half of the decline in overall productivity growth, this is driven by

the fall in productivity both in construction and in finance and business services, which is partly counterbalanced by a stronger increase in industry and in trade and transport.

The results of this accounting exercise cannot be taken as implying that a trend decline in euro area productivity growth is unavoidable. On the one hand, the services sector in the euro area is still in a catching-up process as regards the share in total employment reached for instance in the United States. In that sense, the secular shift in production from industry to services

implies a continued high employment content of economic growth in the medium term. On the other hand, the euro area has not benefited to the same extent as the United States from the gains in productivity associated with the production and diffusion of ICT goods. Therefore, there is room to increase productivity growth in ICT-producing and using sectors. The latter aspect is elaborated upon in Box 2, which refers to the widening of the productivity growth gap between the euro area and the United States that characterised the second half of the 1990s.

Box 2

SECTORAL LABOUR PRODUCTIVITY DEVELOPMENTS IN THE EURO AREA AND THE UNITED STATES

While the aggregate productivity performance in the euro area has weakened over the more recent period, a more detailed analysis shows remarkable cross-sector differences in labour productivity growth. These differences in sectoral productivity growth may also explain the aggregate divergence between the euro area and the United States starting in the mid-1990s. Making use of the OECD Structural Analysis Database (STAN), these sectoral differences are described below. However, only the period 1985-2000 is covered. Due to differences in the data source, the results may not be fully comparable with those in the tables of the main text.

The rise in productivity growth in the United States in the second half of the 1990s can be shown to reflect to some extent productivity improvements in high-technology manufacturing sectors, especially those that produce ICT goods. These improvements were not visible to the same extent in the euro area, where productivity growth in the high-technology industries increased less than in the United States (see Table A).

Table A Labour productivity by sector in the euro area and the United States

(per person employed; percentage change per annum)

	euro area		United States	
	1986-1995	1996-2000	1986-1995	1996-2000
Manufacturing	2.8	2.7	3.2	5.6
<i>of which:</i>				
High-technology industries	3.1	3.6	5.1	11.1
Utilities	3.3	6.9	3.0	2.4
Business sector services	1.4	0.9	1.1	4.2
<i>of which:</i>				
Wholesale and retail trade	1.8	0.5	1.3	7.6
Telecommunication	5.2	13.8	3.9	4.6
Finance and insurance	1.6	3.7	1.2	6.5

Sources: OECD and ECB calculations.

It is noteworthy that while the euro area experienced decreasing labour productivity growth in both manufacturing and business sector services, at a more disaggregated level, movements in the opposite direction appear. This is particularly true for ICT-producing manufacturing sectors (mainly high-technology industries) and some ICT-using business sector services (telecommunication, finance and insurance) but also for the utilities sector where labour productivity growth has increased in recent years.

However, the better labour productivity performance of the US economy reflects particularly strong improvements in specific (ICT-using) business sector services, and in particular those related to retail and wholesale trade and to financial intermediation, which also have a much higher share of total gross value added and employment than in the euro area. Despite the improvements in productivity growth in some of these services sectors – such as telecommunication – in the euro area during the second half of the 1990s, their performance did not match that of the United States.

In addition to a weaker productivity performance in high-technology, ICT-related manufacturing and services sectors, part of the lower aggregate productivity growth in the euro area can also be attributed to a lower specialisation in these industries (see Table B).

While some industrial restructuring in favour of high productivity growth sectors seems to have taken place in the euro area, the significantly higher employment share of ICT sectors in the United States points to a stronger contribution from US ICT sectors to aggregate productivity growth. Consequently, a reallocation of resources in the euro area towards ICT-producing and using sectors would allow the euro area to close some of the gap with the United States. Facilitating industrial restructuring therefore bears the potential to contribute to stronger labour productivity growth in the euro area, in particular in ICT-using services sectors such as wholesale and retail trade.

Table B Employment shares by sector in the euro area and the United States

(as a percentage of total economy employment)

	euro area		United States	
	1986-1995	1996-2000	1986-1995	1996-2000
Manufacturing	22.4	19.5	15.2	13.4
<i>of which:</i>				
High-technology industries	8.3	7.0	6.1	5.3
Utilities	0.9	0.7	0.7	0.6
Business sector services	34.6	37.8	43.9	45.7
<i>of which:</i>				
Wholesale and retail trade	14.7	15.1	23.7	23.5
Telecommunication	1.6	1.4	1.8	1.7
Finance and insurance	3.1	3.0	4.5	4.3

Sources: OECD and ECB calculations.

4 CONCLUSION

This article discussed the trends in labour productivity growth in the euro area in the period since the early 1980s. A stylised fact seems to be the continuation of the secular decline in productivity growth in the euro area in the 1990s, by contrast with the improved productivity performance in the United States since the mid-1990s. The continued decline in euro area productivity growth is a feature that results independently of the measure of labour input used, i.e. persons employed or hours worked, and of the economic aggregate chosen, i.e. the total economy or the non-agricultural business sector. Overall, the decline in aggregate productivity growth between the 1980s and the 1990s appears to be accounted for by a lower contribution from both capital deepening and total factor productivity.

The sectoral results show that the decline in aggregate productivity growth is not broadly based across sectors. In particular, labour productivity per person employed remained broadly stable in manufacturing and in trade and transport in the 1990s compared with the 1980s, while it declined to negative rates of growth in construction and in the finance and business services sector.

While the long-term average of labour productivity growth for the euro area has been similar to that of international competitors, there has been some divergence vis-à-vis the US economy in the period since the second half of the 1990s. The continued slowdown of productivity growth in the euro area can be partly explained by a stronger increase in employment compared with earlier periods, reflecting rising labour force participation and the re-integration into the labour market of unemployed persons. However, unlike in the United States, the downward pressure on productivity growth associated with strong employment growth has not been compensated for by an increase in total factor productivity growth. One reason for a decline rather than an increase of total factor productivity growth in

the euro area seems to have been that the impact from the production and use of ICT capital has thus far been relatively subdued. This can be partly related to the fact that the ICT-using services sectors, which have contributed significantly to aggregate productivity growth in the United States, are still relatively small in the euro area.

These past trends in euro area productivity growth make a rapid and forceful implementation of the Lisbon agenda even more urgent. Only if the euro area can manage to reap the benefits of innovation and the widespread diffusion of new technologies will it be able to improve its long-term prospects for productivity growth. In this respect, stimulating further product market competition, for instance by reducing existing barriers to market entry, in particular in services industries, could provide incentives to speed up innovation and productivity growth. In addition, more forceful reforms of labour markets and the educational system will help to improve and increase the supply of qualified employees, which represents an important additional factor in fostering firm productivity growth.