

**Box 3****Developments in euro area labour productivity**

Developments in productivity have attracted much attention in recent years, especially in the context of the debate on the possible emergence of a so-called “new economy”. For practical reasons and for purposes of international comparability, average labour productivity (ALP) is often the preferred measure of productivity. As regards euro area developments, the focus is usually on productivity per person employed rather than per hour worked. However, this focus is to a certain extent misleading. In particular, measured on the basis of hours worked, euro area labour productivity growth has been clearly stronger than generally perceived.

In the second half of the 1990s, ALP decelerated in the euro area, but accelerated in the United States, and productivity growth became stronger in the United States than in the euro area. This clear difference in developments is apparent from labour productivity measured as GDP per person employed. However, the number of persons employed only gives a reliable representation of inputs if average hours worked per person remain constant over time. In addition, for international comparison, output per person employed is only a suitable measure if average hours worked per person exhibit the same pattern across economies. This is not the case when comparing the euro area and the United States. In the euro area, a trend decline in the average annual hours worked per person occurred over the past 20 years, which was not matched by a similar decline in the United States. Consequently, it appears that the much-debated difference in productivity growth in the second half of the 1990s was less pronounced than is generally assumed (Table A). Moreover, it should be kept in mind that ALP is highly pro-cyclical, and that the data in Table A are not cyclically adjusted. In the second half of the 1990s, the cyclical expansion experienced in the United States was stronger than that in the euro area, thus creating a bias in relative productivity developments in favour of the United States.

**Table A: Average labour productivity growth**

(average annual percentage change)

Basis	Period	Euro area	United States
Persons employed	1982-1989	2.0	1.4
	1990-1995	1.7	1.2
	1996-2001	1.1	1.7
Hours worked	1982-1989	2.6	1.2
	1990-1995	2.3	1.2
	1996-2001	1.7	2.0

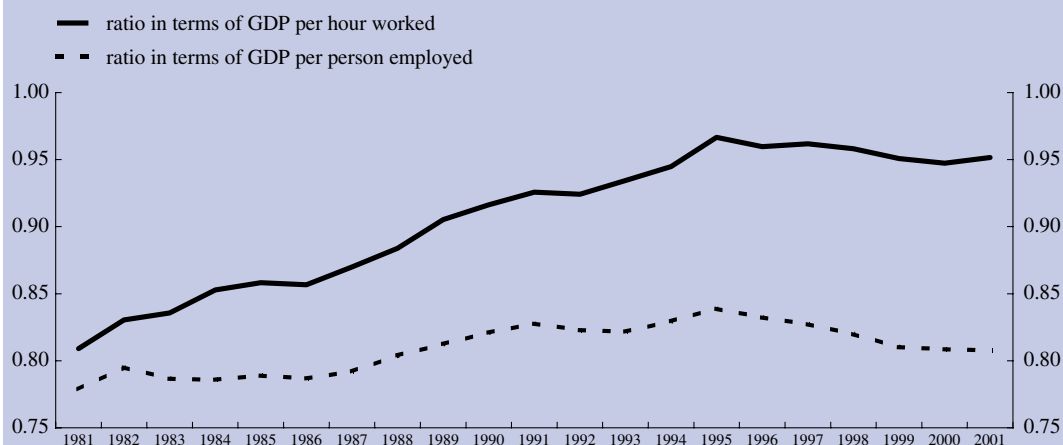
Source: ECB calculations based on national accounts and OECD data.

Another way to show that the picture presented by productivity developments depends on the specific measure used is to look at the ratio between productivity levels in the euro area and those in the United States. The chart below shows the ratios with regard to GDP per hour worked and GDP per person employed respectively. It can be seen that the convergence in the level of productivity on the basis of hours worked was faster than on the basis of persons employed. Moreover, since the mid-1990s, there has been a reversal in the development of the productivity differential in terms of persons employed, which is less pronounced according to the productivity per hour worked measure.

Where does the difference in ALP developments between the euro area and the United States come from? Two factors are generally distinguished to explain labour productivity growth: capital deepening and growth in total factor productivity (TFP), a measure of the overall efficiency of the economic process. As regards capital deepening, for example, the increase in investment in information and communication technologies (ICT) is largely deemed to lie at the root of the acceleration in ALP in the United States. However, this factor seems to explain only a small part of the difference in ALP growth developments between the United States and the euro area. In a recent growth accounting exercise, it was found that the contribution of ICT capital to real GDP growth was not very different in the euro area and the United States – once adjusted for differences in deflating methodologies (Table B).

The increase in ALP growth in the United States is in part also ascribed to an acceleration, from the first to the second half of the 1990s, of total factor productivity. Over this period, TFP appears to have decelerated in the

### Relative levels of productivity: euro area versus the United States<sup>1)</sup>



Source: ECB calculations based on national accounts and OECD data.

Note: international comparisons of levels of productivity are hampered by a range of measurement issues. As a result, the series are indicative mainly of developments in relative productivity levels rather than of relative levels per se.

1) The relative level of productivity is defined as the euro area level as a percentage of the United States' level, in 1996 purchasing power parities.

euro area. TFP may thus explain most of the difference between labour productivity developments in the euro area and those in the United States. In this context, it should be noted that the measure of TFP growth used here implicitly also includes changes in the quality of labour. In a situation of increasing labour market flexibility associated with increasing employment also of relatively low-skilled and inexperienced people, the average quality of labour input will be lower than in a situation in which these people would not enter employment. Hence, the decrease in measured TFP growth in the euro area in the second half of the 1990s probably also reflects the rise in employment of relatively low-skilled and inexperienced workers. Moreover, the acceleration of employment between the first and the second half of the 1990s was stronger in the euro area than in the United States, implying some bias in the differential in measured TFP growth in favour of the United States.

**Table B: Contribution to growth in the euro area and the United States; comparison of studies**

(percentage points)

	Country/area	Period	Contributions to output growth <sup>1)</sup>	
			ICT capital <sup>2)</sup>	TFP growth <sup>3)</sup>
<b>Vijselaar/Albers</b>	euro area	1991-95	0.38	1.25
		1996-99	0.73	0.40
<b>Oliner/Sichel<sup>4)</sup></b>	United States	1991-95	0.57	0.92
		1996-99	1.10	1.47
<b>Jorgenson/Stiroh<sup>5)</sup></b>	United States	1990-95	0.40	0.73
		1995-98	0.75	1.24

Source: Vijselaar and Albers (2002) "New Technologies and Productivity Growth in the Euro Area", ECB Working Paper No. 122.

1) Vijselaar/Albers: GDP; Oliner/Sichel: non-farm business sector output; Jorgenson/Stiroh: private domestic output.

2) Using an alternative US-based deflator for euro area investment in IT equipment to increase comparability.

3) Including changes in labour quality.

4) Oliner and Sichel (2000) "The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?", *Journal of Economic Perspectives*, 14(4).

5) Jorgenson and Stiroh (2000) "Raising the Speed Limit: US Economic Growth in the Information Age", *Brookings Papers on Economic Activity*, 1.

This notwithstanding, the acceleration in TFP in the United States can be attributed to several other factors as well, including sector-specific TFP developments, and factors such as spillover effects or network externalities related to the use of ICT. Moreover, like labour productivity, total factor productivity is known to be highly pro-cyclical, and the data in Table B are not cyclically adjusted.

Whereas it is difficult to quantify the effects of the various explanations for the recent difference in TFP growth, it is highly unlikely that biases in measured TFP growth can explain all, or most, of it. The sectoral composition of TFP and other structural factors which influence the use of technology could help explain at least part of the difference in TFP and, thereby, ALP growth. In particular, the ICT-producing manufacturing sector has shown a very strong acceleration in TFP, and this sector is substantially larger in the United States than in the euro area. Moreover, it is commonly believed that other business sectors in the United States are in a better position to exploit new technological opportunities owing to its more flexible product, capital and labour markets.

Finally, it is important to note that the main stylised facts regarding GDP per hour worked, as discussed in this box, are based on data constructed by the ECB from national accounts and OECD sources. These stylised facts are to some extent different from those emerging from readily available data (in this case, GDP per person employed). Thus, it reinforces the importance of improving the coverage of official euro area data in order to obtain a clear and generally accepted view of actual developments.