

ICT's contribution to labour productivity

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The Finnish economy has undergone considerable structural change since the recession of the early 1990s. This restructuring is still in progress, as the GDP-shares of primary and secondary production are decreasing in favour of private services. During the 1990s, manufacturing of information and communications technology (ICT) equipment, led by Nokia, took its place alongside the traditionally strong industrial sectors – manufacturing of wood products, pulp and paper products and the traditional metal industry. Finnish labour productivity in manufacturing industry surpassed that in the United States in the 1990s, as Finland closed the technology gap vs the technology frontier. By 2002, the Finnish overall labour productivity was 90% of the US level and 94% of the EU 15 level.¹

Capital usage has also become markedly more efficient compared with earlier decades. Labour productivity growth rates have varied considerably across sectors. Robust growth was posted in electronics, telecommunications and financial intermediation in the second half of the 1990s, and in the first two of these sectors also in the 2000s. By contrast, productivity growth in the traditional metal industry has been much slower than in previous years. For the whole economy, labour productivity growth (excl. electronics) moderated in 2000–2004 to just 1.8% per annum (Table 1). The weakening of labour productivity growth during this millennium is also clearly reflected in

the slower long-term growth of GDP per hour worked (Chart).

In the United States, labour productivity has continued to grow at a robust pace in recent years. For this reason it is useful to compare productivity growth in Finland vs the United States and other EU countries. Of particular interest is the contribution of ICT sectors to total labour productivity growth, since rapid productivity growth

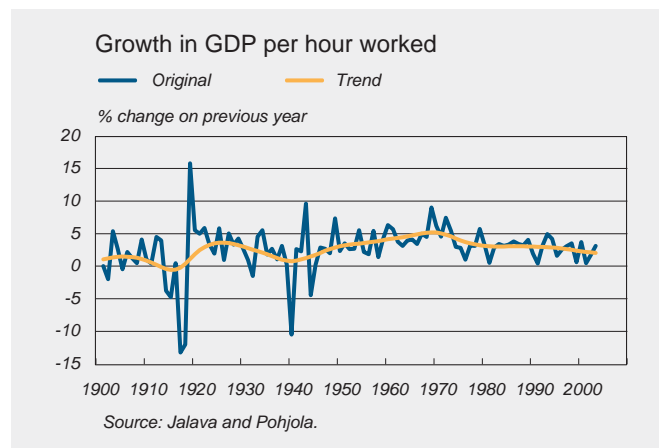
Table 1.

Labour productivity growth by economic sector, 1976–2004, %

	1976–2004	1995–1999	2000–2004
Whole economy	3.0	2.3	2.4
Whole economy excl. electronics	2.8	1.9	1.8
Industry	5.2	3.5	5.2
Industry excl. electronics	4.5	1.9	2.8
Forest industry	6.1	3.3	3.8
Paper industry	6.4	3.7	4.6
Graphics industry	3.2	3.3	2.8
Machine and metal industry	3.4	1.0	2.1
Manufacture of basic metals	6.3	4.5	3.7
Electronics industry	8.8	12.2	13.2
Construction	1.0	-1.3	-0.3
Trade	3.3	4.5	3.7
Transport and communication	3.5	3.9	3.9
Land transport	1.9	1.5	1.9
Telecommunications	8.6	13.8	10.2
Financial intermediation and insurance	3.2	7.0	-2.3

Source: Statistics Finland.

Chart.



¹ McGuckin and van Ark (2005).

in electronics is acutely important for Finland. In this article, market production is broken down into three groups of industries. The first comprises ICT production; the second primary production, industry (excl. ICT) and construction; and the third comprises services (excl. ICT). The article begins by analysing developments in these industry groups in Finland. The concluding sections assess developmental trends in the Finnish economy in terms of labour productivity up to 2008.

Market production, ICT and productivity

Real value added in market production actually grew on average by 5.6% per annum in 1995–2000 (Table 2). Labour input was reduced considerably during the recession, and hence its contribution to economic growth was considerable – about 2.3 percentage points per annum – immediately after the recession. This is exceptional since long-term historical evidence shows that Finnish economic growth has been associated with labour-saving technical

change.² Accordingly, capital productivity growth has been close to zero in previous decades, while labour productivity has increased. However, labour productivity – the ratio of value added to labour input – did not post as high growth rates in 1995–2000 as in the pre-recession period. Nonetheless, the 3.3 percentage point contribution meant that labour productivity continued to serve as the engine of economic growth. Output growth in the ICT sectors was a striking 20% per annum. Somewhat surprisingly, the production sectors (primary production, industry and construction) posted slower growth than in the service sector.

Market production growth halved in the first four years of the current decade. Value added in ICT increased by ‘only’ 6% per annum, as the manufacture of mobile phones and other communication equipment became a mature industry. Production and service sectors also grew slower in 2000–2004 than in 1995–2000, with the

² Jalava and Pohjola (2004).

Table 2.

Value added growth in market production, 1995–2004, %			
Finland	1995–2000	2000–2004	Change, %-pts
<i>Value added</i>			
Market production	5.6	2.4	-3.2
ICT sector	20.8	6.1	-14.7
Production sectors (excl. ICT)	3.7	0.9	-2.8
Service sectors (excl. ICT)	4.2	2.4	-1.8
<i>Contribution from hours worked</i>			
Market production	2.3	-0.2	-2.5
ICT sectors	8.2	0.0	-8.2
Production sectors (excl. ICT)	0.9	-2.0	-2.9
Service sectors (excl. ICT)	2.9	1.3	-1.6
<i>Contribution from labour productivity</i>			
Market production	3.3	2.6	-0.7
ICT sectors	12.6	6.1	-6.5
Production sectors (excl. ICT)	2.9	2.9	0.0
Service sectors (excl. ICT)	1.3	1.1	-0.2

Source: Own calculations based on GDP data for July 2005.

latter sector achieving the faster growth. The service sector also managed to increase its labour input. Labour productivity growth in market production decreased on average to 2.6% per annum in 2000–2004, which is exceptional also from a long-term perspective. Finland last experienced such low productivity growth before the wars.

ICT and productivity in Finland, EU and the United States

The contributions of different sectors' productivity to labour productivity growth in market production can be estimated by adding sectoral productivity growth rates weighted by respective values added shares plus the labour-input reallocation term³:

$$(1) \quad d \ln LP = \sum_i w_i d \ln LP_i + R^H$$

³ See van Ark and Inklaar (2005).

where d denotes annual change, \ln natural logarithm, LP labour productivity, i the individual industry, weight \bar{w}_i the average (over two consecutive years) share of nominal value added for industry i . The term R^H , which denotes reallocation of labour input, is positive when employment shifts from low productivity industries to high productivity industries.⁴

Table 3 shows that the declining rate of labour productivity growth between the second half of the 1990s and the past few years can be traced largely to weaker productivity growth in ICT industries. This means that ICT equipment manufacturing has become a mature industry in which components are highly standardised mass market products. The

⁴ Term R^H is residual obtained by subtracting the weighted sum of sectoral labour productivities from labour productivity for the whole economy.

Table 3.

Sectoral contributions to labour productivity growth in market production, 1995–2004			
	1995–2000	2000–2004	Change, %-pts
<i>Finland</i>			
Labour productivity in market production, of which contribution from:	3.3	2.6	-0.7
ICT sectors	1.3	0.8	-0.5
Production sectors (excl. ICT)	1.2	1.0	-0.2
Service sectors (excl. ICT)	0.6	0.6	0.0
Reallocation	0.2	0.2	0.0
<i>EU15</i>			
Labour productivity in market production, of which contribution from:	2.2	1.1	-1.1
ICT sectors	0.8	0.5	-0.3
Production sectors (excl. ICT)	0.8	0.6	-0.2
Service sectors (excl. ICT)	0.6	0.1	-0.5
Reallocation	0.0	-0.1	-0.1
<i>United States</i>			
Labour productivity in market production, of which contribution from:	3.4	3.6	0.2
ICT sectors	1.2	1.1	-0.1
Production sectors (excl. ICT)	0.5	0.9	0.4
Service sectors (excl. ICT)	1.8	2.0	0.2
Reallocation	-0.1	-0.3	-0.2

Sources: Own calculations based on GDP data for July 2005; van Ark and Inklaar (2005) for data on EU15 and United States.

manufacture of ICT equipment is moving to low-wage countries. As a consequence, the shares of these industries in GDP and employment are no longer necessarily increasing. Thus the contribution to labour productivity growth is likely to remain smaller than at present.

The contribution of productivity growth in production industries has also decreased. The contribution of the service sector has remained at 0.6 percentage point. This in itself is positive, especially since the GDP-share of services is continuously increasing.⁵

The contribution of structural change – RH in (1) – to productivity growth is small, only 0.2 percentage point per annum. However, it should be noted that, in contrast to other EU countries and the United States, the contribution of structural change is clearly positive in Finland. If the positive structural change, as measured by this method, continues over the next 10 years, this will help to narrow the productivity gap between Finland and the US.

Productivity growth decelerated even more sharply in EU15 than in Finland – by as much as 1.1 percentage points. Contributions from all sectors decreased in EU15. The most significant decrease, -0.5 percentage point, was observed in the contribution from the service sector. ICT and production sectors also contributed less to productivity growth in 2000–2003 than in 1995–2000. In contrast, productivity growth did not slow down

in the United States, where the annual growth rate was a rapid 3.6%. This was 0.2 percentage point higher than in 1995–2000. Productivity growth improved in both the production and service sectors. The contribution of the ICT sector somewhat decreased, and the structural change term also fell slightly, to -0.3 percentage point.

As can be seen from Table 3, the most significant difference between Finland and EU countries vs the United States stems from the productivity contribution of the service sector.

Productivity growth in 2005–2008

In the Bank of Finland forecast, productivity is measured as production per person employed. Production and employment indicators enable a rough projection of prospects.

Production growth in the electronics industry is expected to continue in Finland, albeit imported inputs are likely to increase. There are, at least so far, no clear signs of ICT services becoming a strong engine of growth. Hence it is to be expected that the contribution of ICT to productivity growth will remain smaller in the forecast period, 2006–2008, than the 0.8 percentage point contribution in 2000–2004. In practice, this will mean that, as regards manufacturing of mobile phones and communication equipment, a larger part of the productivity growth will occur abroad. Productivity growth in telecommunications is likely to continue also over the next few years, although tight competition gives little room for value added growth.

⁵ Baumol (1967) pointed out that productivity and GDP growth slow down when resources shift from manufacturing to services because the share of resources in the low-productivity sector increases.

On the other hand, there is strong pressure to increase productivity in production sectors such as forest industry, so that increases in contributions from these sectors are likely to compensate for slower productivity growth in ICT sectors during the forecast period. Labour productivity growth in services is estimated to remain unchanged. Taken together, these estimates suggest that labour productivity growth in market production will not accelerate notably from that of the first half of the 2000s.

Concluding remarks

Labour productivity growth in Finland slowed down notably in the 2000s. Compared with the latter half of the 1990s, the deceleration in productivity growth was caused mainly by 'normalisation' of growth in the ICT sector, but productivity growth also slowed in industry excluding electronics. Labour productivity growth was very weak outside the electronics industry. At the same time, productivity continued to grow strongly in the United States,

where the service sector (excl. ICT) and industry (excl. ICT) actually boosted overall labour productivity growth. It is evident that the strong emphasis placed on the use of ICT in the US has been of significance. In EU countries, on the other hand, labour productivity growth has on average been weaker than in Finland in all sectors in the 2000s. It is surprising that productivity in the service sector has hardly grown at all in EU countries in this period. The greatest difference vs the United States is due to the slow productivity growth in the service production, although, according to Van Ark and Inklaar (2005), EU countries are falling behind the US also in terms of ICT productivity growth.

According to the Bank of Finland forecast, labour productivity growth will remain at the relatively low level seen in the first few years of the 2000s. Hence the productivity growth gap between the US and Finland will remain. On the other hand, Finland seems to be able to preserve its head start over the other EU15 countries.

Sources:

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