National Accounts
Jukka Jalava
e-mail: jukka.jalava@stat.fi

The new economy in Finland: impacts on growth and productivity

The new economy is by definition an economy where businesses have learnt to take advantage of both the ICT revolution and the globalization of business activities in ways that enhance growth and improve productivity. There has also been a shift to low inflation. The new economy can influence the economy in various ways. First, we can speak of a new economy if the production of goods and services in the ICT (information and communication technology) industries expands rapidly. Secondly, the new economy may be evident as the increased contribution of ICT capital to economic growth. Thirdly, ICT can have spill-over effects.

Although investment in ICT has literally exploded since the mid-1970s, it wasn't until the late 1990s that a step-up in the growth rate of US GDP took place. According to Oliner and Sichel (2000), this faster economic growth is due to a rebound in the growth rate of labour productivity. In fact, there was an increase of two percentage points in the real output of the non-farm business sector and a one percentage point increase in labour productivity. Oliner and Sichel attribute two-thirds of this step-up in labour productivity to the joint influence of the production and use of ICT, with use being the dominant factor.

Other advanced countries lack such evidence of the impact of the new economy. No increase in the growth rate of labour productivity is discernible in Finland, reflecting the negative impact of non-ICT capital. Indeed, labour productivity growth slowed in the latter half of the 1990s compared with earlier periods. Nevertheless, nearly half of the 6% average annual growth of value added in Finnish non-residential market production[1] in 1995--99 can be traced to the production and use of ICT (Jalava and Pohjola, 2001).

Production of ICT goods and services

According to the OECD, the average share of ICT industries in value added in OECD countries was 6.8% in 1998. As can be seen in Table 1, this share has long since been surpassed in Finland. Here the ICT industries are defined as encompassing manufacture of electrical and optical equipment (ISIC 30, 31, 32 and 33), telecommunications (ISIC 642) and computer and related activities (ISIC 72). Growth has been quite remarkable in the ICT industries. Whereas average growth in market production resulted in a sixfold increase in gross value added between 1975 and 1999, there was a twenty-one-fold increase in the ICT industries.

Table 1. Share of ICT industries in the value added of market production, %.

	1975	1980	1985	1990	1995	1999*
	3.7	4.2	5.3	5.8	8.0	13.0

* Preliminary estimate.

[1] Market production is the production of goods and services sold at economically significant prices. This is in contrast to non-market production, which is performed by general government and non-profit institutions serving households and mostly financed through taxes or income transfers.

Source: Statistics Finland.

This rapid growth has led to a quite significant increase in the contribution of ICT industries to the growth of value added in market production, as can be seen from Table 2. Most of the change has taken place quite recently, since in 1997 the contribution was still 1.6 percentage points but in 1999 already 2.8 percentage points. Electronic and optical equipment has been the top performer, with volume growth of 30 % in 1999 compared with 25 % for the ICT industries on average.

Table 2. Output contribution of ICT production in market production.

	1975--90	1990--95	1995--99*
Output growth	3.2	-0.7	6.0
Contribution of ICT industries	0.3	0.5	2.0

* Preliminary estimate.

Source: Statistics Finland.

Use of ICT

The impact of the use of ICT capital on economic growth can be ascertained using standard neoclassical growth accounting, that is, by decomposing output growth into the contributions of labour, capital and multi-factor productivity. To be able to discern the specific growth contribution of ICT capital, the capital input is divided into ICT capital services and other capital services. Ten types of assets are distinguished, including the three ICT assets (hardware, software and communications equipment)[2]. As a measure of labour services, hours worked adjusted for labour quality (measured by the level of education) is used. Multi-factor productivity is the residual growth rate of output that is not explained by the growth rate of the inputs. Therefore multi-factor productivity is sometimes referred to as the measure of our ignorance.

Following Finland's severe economic recession in the early 1990s, there has been a structural shift in non-ICT capital from extensive to intensive growth. Extensive growth means growth achieved through investment in capital equipment, whereas intensive growth means that growth is achieved through productivity. Only ICT capital's growth contribution has increased, being 0.7 percentage point in 1995--99, despite the fact that ICT capital accounted for only 9% of the non-residential productive capital stock in 1999. The growth contribution of labour improved too. The positive growth contribution of non-ICT capital vanished in the late 1990s, making growth even more intensive than before. This reflects the fact that capital was used rather inefficiently in Finland in the past decades and that a considerable improvement in capital productivity has taken place since the recession. On the other hand, multi-factor productivity was the main engine of economic growth in Finland over the whole observation period, as can be seen in Table 3, and it almost doubled in the period 1995--99.

It is also possible that ICT investments have led to spill-overs from industries with rapid productivity growth to less productive industries.[3] A rough estimate can be obtained of the ICT industries' impact on total multi-factor productivity by using their output shares as weights. Thus almost one percentage

[2] Since Finnish national accounts data are not available for gross fixed capital formation in hardware and telecommunications, the analysis is based on the ICT expenditure data published by the World Information Technology and Services Alliance and the International Data Corporation.

[3] In order to address this question properly, the KLEMS growth accounting framework would have to be utilized (see Aulin-Ahmavaara and Jalava, 1999). The KLEMS (the letters stand for capital, labour, energy, materials and services) framework takes into account the intermediate consumption of industries, and output instead of value added is used as a measure of output. Productivity measurement based on value added is justifiable only if the industry's production function is neutral with respect to intermediate consumption. How labour and capital are actually combined often also depends on the intermediate goods used.

point of the average annual growth of 4.2% in multi-factor productivity in 1995--99 derives directly from the ICT industries, although this still leaves more than three percentage points unaccounted for.

Table 3. Contributions to real output in market production 1975--99[4].

		1975--90	1990--95	1995--99*
Output growth		3.2	-0.7	6.0
Contributions	ICT capital	0.2	0.3	0.7
	Hardware	0.1	0.2	0.4
	Software	0.1	0.1	0.1
	Communications equip.	0.0	0.1	0.1
	Other capital	0.8	-0.7	-0.4
	Hours worked	-0.4	-2.9	1.3
	Labour quality (education)	0.2	0.2	0.3
	Multi-factor productivity	2.2	2.3	4.2
Income shares	ICT capital	1.7	5.0	5.6
	Hardware	0.5	1.5	1.7
	Software	0.6	2.4	2.4
	Communications equip.	0.5	1.1	1.5
	Other capital	33.9	33.8	38.8
	Labour	64.4	61.3	55.6
Growth rates	ICT capital	16.5	7.2	12.4
	Hardware	29.7	15.1	28.1
	Software	12.9	2.7	5.6
	Communications equip.	9.9	9.1	10.2
	Other capital	2.8	-2.1	-1.1
	Hours worked	-0.7	-4.5	2.3

* Preliminary estimate.

Source: Jalava and Pohjola (2001).

Recently, the OECD (2001) has compiled a survey of the growth contributions of ICT in selected advanced countries. Most countries show signs of an increase in the contribution of ICT capital -- at least in relative if not absolute terms – to output growth in the late 1990s. In the United States the share of ICT capital in total capital services is now already more than 50%. In both Australia and France it is over 40% while in Germany, Italy and Japan it is 30% or more. The results are very interesting, since Australia, which is not a major producer of ICT, has reaped huge benefits from successful deployment of ICT whereas Japan, which is a leading producer of hardware, has not experienced an absolute increase in ICT's growth contribution. From this comparison it must be concluded that successful use of ICT in production is of paramount importance.

Slowdown in labour productivity

Labour productivity is the ratio of output to hours worked, ie a measure of how productively labour is used to produce output/value added. There are four sources of labour productivity growth. The first source is ICT capital deepening, ie an increase in ICT capital services per hour worked, and the second

[4] Figures may not add up to the totals because of averages and rounding.

other capital deepening. The third component is an improvement in labour quality (measured by the level of education), which is defined as the difference between the growth rates of labour services and hours worked. The fourth source is a general increase in multi-factor productivity.

Unlike the United States, Finland did not experience an increase in labour productivity growth in the latter part of the 1990s. Table 4 shows labour productivity in Finland decomposed into the contributions of capital deepening, labour quality and multi-factor productivity. The results are somewhat surprising, since labour productivity experienced a slowdown after the recession despite rapid growth in the productive stock of ICT capital. This is due to the negative influence of other capital deepening. The contribution of ICT capital deepening is still positive and nearly twice as large as it was in the period 1975--90. In 1990--95 labour productivity grew exceptionally rapidly, which is explained by the economy moving out of recession and the momentary peak that this caused, something which micro-level studies have found to include evidence of 'creative destruction'.

Table 4. Contributions to labour productivity in market production 1975--99[5]

	1975--90	1990--95	1995--99*
Labour productivity	3.7	3.9	3.5
Contributions			
ICT capital	0.3	0.6	0.5
Hardware	0.1	0.3	0.4
Software	0.1	0.2	0.1
Communications equip.	0.0	0.1	0.1
Other capital	1.0	0.7	-1.3
Labour quality (education)	0.2	0.2	0.3
Multi-factor productivity	2.2	2.3	4.2

* Preliminary estimate.

Source: Jalava and Pohjola (2001).

Concluding remarks

The new economy isn't tangible in Finland in the same way it is in the United States, where there was a step-up in labour productivity growth in the latter part of the 1990s. In Finland the exceptionally fast increase in multi-factor productivity growth has been the main engine behind growth of both total output and labour productivity. Although the use of ICT already contributes significantly to the growth of the Finnish economy, the focus is still on the production of ICT, where the productivity gains have been enormous but confined to a narrow sector. Perhaps Finland should try to use ICT even more efficiently so that the benefits would spread more widely. Furthermore, in order to obtain a better understanding of Finland's economic success in the 1990s, we need to find out the reasons underlying the doubling in multi-factor productivity.

The rapid increase in productivity in the second half of the 1990s, combined with moderate increases in average earnings, have resulted in a decrease in labour's income share. As in many other industrial countries, the new technology has resulted in a shift in the functional income distribution in favour of capital. Together with sparing use of capital spending, the productivity increase has improved the profitability of Finnish companies to levels seldom seen before. The improvement in profitability is a reflection of the structural change that has occurred in the economy and is therefore probably here to stay.

[5] Figures may not add up to the totals because of averages and rounding.

Key words: new economy, ICT, economic growth, growth accounting, productivity

Discussion points

How to measure spill-over effects related to ICT?

Aspects related to outsourcing should be better understood. Are statistical institutes ready for input-output analysis? Are there any other means for better measurement?

References

Aulin-Ahmavaara, P and Jalava, J (1999), 'Kansantalouden toimialoittaisten tuottavuusmittarien kehittäminen (The development of productivity measures by industry)', *Tuottavuuskatsaus 1999, SVT Kansantalous 1999: 24*, Statistics Finland (in Finnish).

Jalava, J and Pohjola, M (2001), 'Economic growth in the new economy: evidence from advanced economies', *UNU/WIDER, Discussion Paper No. 2001/5*.

OECD (2001): *The impact of information and communications technologies on output growth: issues and preliminary findings*, Paris, unpublished manuscript.

Oliner, S D and Sichel, D E (2000), 'The resurgence of growth in the late 1990s: is information technology the story?', *Journal of Economic Perspectives 14:3-22*.