ICT and productivity growth in the United Kingdom

Working Paper No. 140

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This paper seeks to measure the contribution of information and communications technology (ICT) to the growth of output and productivity. It follows recent work for the United States in taking a growth accounting approach. Four types of ICT are examined: computers, software, telecommunications equipment and semiconductors (chips).

Method
Using the growth accounting approach, the contribution of any particular type of output, such as computers, to GDP growth is:

> Share of final output of computers in GDP *times* growth rate of final output of computers

Computers also contribute to aggregate *input* since they are a form of capital. The contribution of computers to aggregate input is:

> Profit attributable to computers as a proportion of GDP *times* growth rate of the services of the stock of computers

Semiconductors are an intermediate product and in a closed economy their contribution would not be separately distinguishable using this methodology. But in an open economy like the United Kingdom they do make a contribution to output via net trade (exports net of imports).

In this paper, US price indices (adjusted for exchange rate changes) are used as deflators for ICT. US prices have been falling much more rapidly than their UK counterparts. The paper also argues that UK software investment in current prices is at least three times the official figure. The higher level of software investment argued for here raises both the level and the growth rate of GDP. These two adjustments taken together have a large effect on the results reported below.

The paper also uses capital services rather than the capital stock (a wealth measure) to quantify the contribution of capital. This too has a significant effect on the results. The reason is that the capital services measure gives a higher weight to assets with short lives and high depreciation rates, and this sort of asset, particularly computers and software, has been growing more rapidly. Wealth measures of capital have their place but theory suggests that capital services are the appropriate measure for the analysis of productivity.

Results
On the basis of these new estimates of ICT output and investment, there has been a substantial and growing understatement of GDP growth in the United Kingdom. From 1994 to 1998, accepting the new estimates would add between 0.25 and 0.33 percentage points per annum to the growth rate.

The share of ICT output in GDP has been rising fairly steadily but still only reached 3% by 1998. Despite this, the growth of ICT output has contributed about a fifth of GDP growth from 1989 to 1998.

On the input side, since 1989, 55% of capital deepening—the growth of aggregate capital services per hour worked—has been contributed by ICT capital. From 1994 to 1998, ICT capital accounted for a remarkable 90% of capital deepening.

ICT capital deepening accounted for 25% of the growth of output per hour in 1989–98 and 48% in 1994–98.

The UK performance in the second half of the 1990s resembles that of the United States in some respects. Both countries saw an acceleration in the rate of growth of output accompanied by an increase in the contribution of ICT capital deepening. But, despite the ICT adjustments, the UK growth rate of labour productivity weakens after 1994. Part of this is due to a fall in the contribution of non-ICT capital but part to a slowdown in total factor productivity (TFP) growth. By contrast, the US labour productivity acceleration has been accompanied by a rise in TFP growth (in both the ICT and non-ICT sectors of the economy). Overall, TFP growth has increased in the United States by about one half a percentage point, whereas it has fallen in the United Kingdom by about three quarters of a percentage point.

Finally, since the ICT share in GDP in the United Kingdom, though rising, is still only two thirds that in the United States, we may expect the contribution of ICT capital to economic growth in the United Kingdom to continue to increase.