

# Uptake and impacts of ICTs in the Australian economy:

Evidence from aggregate, sectoral  
and firm levels

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This paper presents part of the work in progress on a joint research project of the Productivity Commission, the Australian Bureau of Statistics, the Department of Industry, Tourism and Resources, and the National Office for the Information Economy. The joint project was set up to provide an Australian contribution to the set of country studies on ICT and Business Performance that is being facilitated and co-ordinated by the OECD.

The paper and the views expressed should be attributed to the authors and not to the participating agencies. On the other hand, it is stressed that the paper draws on the contributions of all members of the study team from the participating agencies and the guidance and scrutiny of Dr Trevor Breusch from the Australian National University.

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## Key points

- The aggregate, sectoral and firm level evidence examined in this paper presents a picture of strong uptake of information and communication technologies (ICTs) in Australia in the 1990s which, in concert with restructuring of firms and production, has brought performance gains.
- The use of ICT equipment (hardware and software) has contributed to Australia's output and productivity performance through a modest increase in the rate of multifactor productivity (MFP) growth.
- The paper supports the general purpose technology view of ICTs — that is, that ICTs generate productivity gains by enabling restructuring, new products and new methods of production and operation.

### *ICT uptake*

- Strong growth in ICT investment continued in Australia in the 1990s. Computer investment grew in real terms from around 3 per cent of total market sector investment in 1989-90 to around 19 per cent in 2000-01.
- Services industries featured very prominently in the uptake of computers, absorbing at least three-quarters of total market sector investment (about 10 percentage points more than their share of market sector output). The Finance & insurance sector stands out as the main area of uptake, with a 25 per cent share of investment. Manufacturing has also been a major user.
- Time-related developments — which could include the falling prices of equipment, lower adjustment costs and network effects — have had a significant influence on the uptake of ICTs and the Internet. Positive relationships with firm size and skill are also found. The earliest and most intensive users of ICTs and the Internet tended to be large firms with skilled managers and workers.
- The characterisation of the ICT uptake as a post-1995 phenomenon has been overstated. The uplift in ICT use began in some sectors before the 1990s. And there were also some cyclical and one-off factors in the 1990s trends. Nevertheless, there were some genuine post-1995 developments, including more rapid technological advances and price declines.

### *Performance effects*

- In growth accounting terms, growth in ICT use accounted for a quarter of 1990s output growth of 3.4 per cent a year and, by raising the rate of ICT use per hour worked, accounted for a third of labour productivity growth of 3.0 per cent a year.
- However, increased ICT use has not affected the overall contribution of capital inputs to output and productivity growth. Rather, its increased use has been offset by slower growth in use of other forms of capital. This also means that the rate of substitution of capital for labour has remained unchanged.
- The net effect of ICTs on output and productivity performance depends on whether, and to what extent, they influence MFP growth. With little equipment production in Australia, there are no MFP gains of national significance from this source.
- Two approaches adopted in this paper suggest that the contribution from ICT use to Australia's aggregate MFP growth has been of importance, but not major — one or two

tenths of a percentage point of annual average growth. (Australia's underlying annual average MFP growth reached 1.8 per cent in the 1990s.)

- Sectoral evidence suggests that the performance effects have been concentrated in certain industries. The association between computer use and productivity growth is clearest in Finance & insurance. A somewhat weaker association appears in Wholesale trade.
- The firm-level analysis finds positive links between ICT use and productivity growth in all industry sectors examined. Significant interactions between ICT use and complementary organisational variables (eg skill and business restructuring) are also found in nearly all sectors. However, the strength of the links to ICTs, and the importance of complementary factors, varies across industries.
- The micro analysis has also highlighted dynamics and the importance of lags. Productivity growth effects taper over time, meaning that the ultimate productivity effect is a step up in levels, rather than a permanent increase in the rate of growth.
- Amongst other things, the paper points to the importance of management and employee skills in not only identifying the opportunities that ICTs present but also in transforming what businesses do and how they do it.