

1 Introduction

Australia's productivity growth surged in the 1990s. Growth in both labour productivity and multifactor productivity more than doubled, compared with 1980s rates.

Whilst no single explanation for the productivity surge has emerged, the introduction of microeconomic policy reforms over the past 15 years or so has been identified as a major contributor (see, for example, PC 1999, OECD 2001a). Policy reforms have fostered productivity improvement through enhanced competitive incentives; greater openness to trade, investment and technology transfer; and increased flexibility for businesses to adjust their operations (Parham 2002a). More generally, they have encouraged and facilitated a process of economic restructuring that has invigorated Australia's catch-up toward the productivity levels of 'leader' economies (Parham 2002a).

Information and communications technologies (ICTs) are also considered to have played a role in Australia's surge, but through the use of ICT equipment, rather than the manufacture of ICTs (Parham 2002b). Australia is a small producer of ICT equipment — having the lowest ICT share in manufacturing value added among the countries covered in the OECD's *Science, Technology and Industry Scoreboard* (OECD 2001b). Consequently, MFP gains associated with the production of ICTs, found in other countries, have not been open to Australia. On the other hand, OECD comparisons show that Australia became a relatively high user of ICTs in the 1990s — reaching the third highest ICT share of business sector investment in 1999 on the OECD's *Scoreboard* (OECD 2001b). With low ICT trade barriers, Australian businesses have had the benefit of ready access to international advances in ICTs at competitive (and falling) prices.

In the absence of aggregate productivity gains through ICT manufacture, two other links between ICTs and Australia's productivity growth are possible: increased capital deepening (raising the ratio of capital to labour) as businesses step up investment in ICT; and MFP gains associated with ICT use. Whilst the capital deepening component is commonly recognised in the economics literature (see, for example, Jorgenson 2001), the existence and importance of an MFP component associated with use are more controversial.

There are two lines of argument about the possible effects of ICT use on MFP growth. The first looks upon ICTs as a general purpose technology that enables other productivity-enhancing changes. For example, ICTs could facilitate other actions such as the reorganisation of economic activity between firms and industries or they could provide an indispensable platform upon which further product or process innovations are based (Brynjolfsson and Hitt 2000). (The restructuring effects of ICTs in the Australian economy would then be reinforcing the catch-up restructuring in response to policy reforms.) The second line of argument looks to spillover effects, such as network economies, as sources of MFP gains. For example, an expansion in business via the Internet or 'closed' networks could reduce search and transactions costs for businesses.

This paper presents aspects of past and current research that explore the nature and importance of the links between ICTs and productivity gains in Australia. A broad indication of the importance of ICTs in Australia's improved economic performance can be obtained from output and productivity growth accounting at the aggregate and industry-sector levels. The next chapter provides an update of earlier work of this kind (Parham, Roberts and Sun 2001). However, such exercises provide a statistical accounting or decomposition and are suggestive, rather than

conclusive, on the nature and extent of the links between ICTs and output and productivity growth.

The view of ICTs as general-purpose, enabling technologies suggests that it is not just ICTs alone, but also other complementary factors (reorganisation of production and investments in associated innovations) that jointly determine the performance effects of ICTs. Since the incidence of complementary factors can vary across firms, even within the same industry, micro or firm-based analysis is needed to develop better understanding of the technological, organisational and policy influences — and their interaction — on restructuring and productivity growth.

Chapters 3 and 4 report econometric analysis of the use of ICTs at the firm level. Chapter 3 explores factors that have influenced the adoption of ICTs and chapter 4 explores the effects of ICTs on firm performance and the mechanisms through which these effects have been transmitted. A major objective of the analysis is to test the general-purpose/enabling technology view that ICTs are used jointly with other complementary factors to generate productivity gains.

Concluding remarks from the material presented in this paper are made in chapter 5.

The analysis in chapters 3 and 4 is work in progress from a research project being undertaken jointly by the Productivity Commission, the Australian Bureau of Statistics, the Department of Industry Tourism and Resources and the National Office for the Information Economy. The paper does not present final research outcomes or cover all aspects of the project. The firm-level analysis reported here is based on an existing firm-level dataset that has proved to be well suited to the project's needs. Another firm-level dataset that has been specially constructed for the project is also being analysed, but work on the second dataset is insufficiently advanced at the time of writing for it to be presented extensively in this paper. The project also covers a series of case studies, which have yet to be completed and documented.