



E-commerce beyond 2000



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Foreword

E-commerce continues to bring significant changes to business, consumers and the entire economy—it is a more efficient way of doing business.

E-commerce can be expected to bring significant productivity gains and higher economic growth resulting from the more efficient allocation of resources throughout the economy. Its impact is comparable to other micro-economic reforms and, like these reforms, the industry is taking a lead in implementing change across sectors.

The National Office for the Information Economy (NOIE) in the Department of Communications, Information Technology and the Arts, together with 13 industry partners, has funded a pilot study into the economic impacts of e-commerce. This is a major research initiative—the first of its kind internationally—demonstrating the lead Australia is taking in the analysis of e-commerce.

The results of this study are intended to stimulate discussion about the impacts of e-commerce on our economy. Feedback on the process of analysis is also encouraged, so any further studies can be improved.

This report describes some of the changes expected from the growth and wide-ranging impacts of e-commerce into the next decade—particularly the restructuring of entire industry sectors.

The net benefits to the economy will be substantial and industry sectors that offer products and services amenable to e-commerce will share these benefits.

The Government is pleased to have worked with industry in this ground-breaking research, and looks forward to further cooperation on e-commerce issues.

A summary report of this pilot study was released in November 1999 and, encouraged by its reception, NOIE has commissioned a further study into the impact of electronic commerce on regional and rural Australia. I am pleased that the States and Territories are partners in this further study.



RICHARD ALSTON
Minister for Communications,
Information Technology and the Arts

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Executive summary

E-commerce is stimulating a structural change in the economy.

E-commerce using the Internet is a new way of advertising, buying, selling and, in some cases, delivering goods and services. Open access to the electronic marketplace for households as well as businesses, large and small, has only existed for the last three or four years yet it is growing quickly. It is already clear that e-commerce will bring significant changes to business, consumers, government and the economy. Companies are changing the way that they undertake their business. New industries are emerging and old ones are getting a new lease of life. Others may not fit in this new environment and may decline. What will be the outcome of this complex and extensive structural change?

What difference will greater use of e-commerce make to Australia's economy?

The focus of this pilot study is upon change. In particular it concentrates upon what difference greater use of e-commerce will make to current forecasts of economic outcomes. The study therefore concentrates on activities that are viewed as being likely to experience significant change. This includes impacts brought about by the emerging widespread potential for consumers and businesses to undertake electronic transactions over the Internet. This is a new and rapidly growing activity that is not likely to have been fully factored in to most economic forecasts. Other aspects of e-commerce, including electronic transactions undertaken over less accessible or proprietary networks such as the payments system, the use of EDI, ATMs or EFTPOS are already largely factored in to the economic outlook.

The key finding of this study is that e-commerce will bring substantial net benefits to Australia's economy.

The net benefits will be realised if, as expected, widespread adoption of e-commerce proves to be a more efficient mode of doing business and the benefits exceed the costs. If this is the case, it could produce a growth dividend as a result of freeing resources that can be used in other parts of the economy. Simulation results obtained from the MONASH model indicate that the net impact could be a 2.7 per cent increase in the level of national output, and enhance consumption (a better indicator of material wellbeing) by about \$10 billion within the next decade.

Winning industries are those that make most use of e-commerce.

The main sectors that expand are expected to be those that offer products and services that are amenable to e-commerce. This includes sectors such as media and entertainment, and banking and finance. Some sectors will be larger because of flow on effects as changes ripple through the economy; housing is one example.

Some industries may experience some displacement.

Industry sectors that are essentially 'disintermediated' by the use of e-commerce (such as retail and wholesale trade) may have lower output than otherwise. Industries involved in commodity exports may be sensitive to flow on impacts (particularly higher real wages and a higher real exchange rate).

There should be net growth in employment.

The efficiencies brought about by e-commerce are expected to result in changed employment opportunities. Some sectors will expand and increase job numbers, others will be smaller than otherwise. Overall, employment will expand. Demand is likely to be strongest in occupations that are related to tourism and associated support services.

Competitiveness will be sensitive to changes in e-commerce use.

It is possible that a flow on impact of the productivity gains and growth could be a temporary minor deterioration in the balance of trade. Looking into the medium term, the export enhancing benefits will outweigh other factors and the trade situation will improve.

All states are winners.

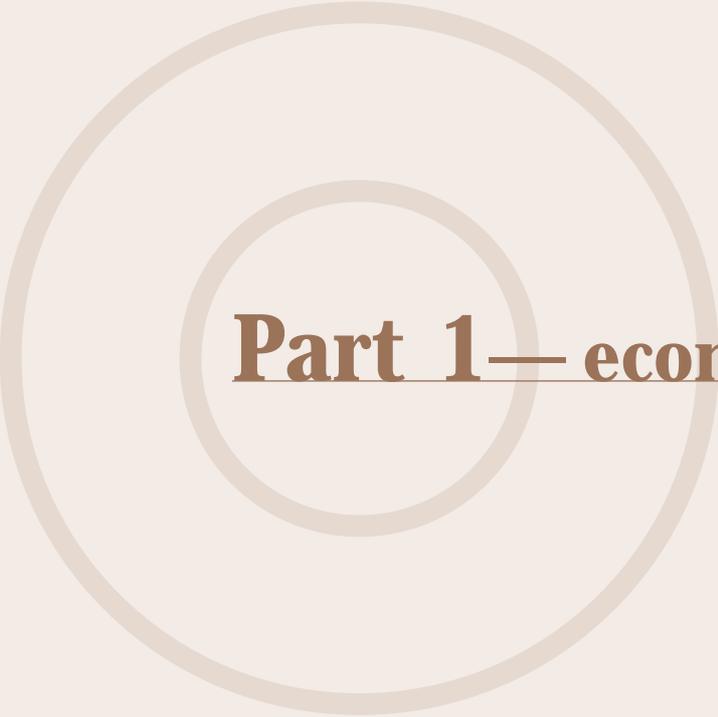
While all states are winners from the efficiency gains likely to be brought by e-commerce, some states are likely to benefit more than others. States that have a high reliance on commodity export activities will have to deal with larger offsetting costs.

Almost every region is better off.

Looking even closer at local impacts almost every one of the 57 Statistical Divisions used by the Australian Bureau of Statistics to examine local impacts is better off as a result of the changes brought by greater use of e-commerce and the benefits are spread evenly around the nation. Over 50 local regions can expect a long run increase in Gross Regional Product of between one and four per cent, while the biggest employment effect is an increase of 1.4 per cent.

Some country regions benefit the most.

The regions that benefit the most include country regions. Most country regions can expect a lift from the effect e-commerce has in compressing distance and making goods and services more accessible. Country areas that rely on tourism and related activities can expect an even larger boost. The regional analysis is obtained by disaggregating results that apply nationally. A different result may occur if regions adopted e-commerce at different rates. This more detailed analysis is the subject of further work to be released by April 2000.



Part 1—economic analysis

Chapter One

Study context, aims and e-commerce trends

This Chapter places the study into context. It sets out the study aims and discusses how these are achieved. The Chapter also aims to establish some dimensions of the remarkable transformation that e-commerce is bringing in Australia and globally.

1.1 The aims of the study

There is compelling evidence that the economy is in the midst of a major structural change.

The challenge that this study addresses is to forecast the structural change that e-commerce may bring. It aims to provide an indication of the likely nature of changes that are in store and their flow on impact through the economy at large using quantitative measures where practical, recognising that information about the nature of the change that is underway is still fragmentary. While taking into account the developments that can be expected abroad, the focus is upon what greater utilisation of e-commerce will mean for Australia.

1.2 Approach to the study

This study has combined the application of economic models based on theoretical frameworks with qualitative input from business leaders to form a rigorous and balanced approach that seeks to minimise the pitfalls inherent in each used in isolation. Industry input was obtained from an Industry Reference Group while the MONASH model was used as the framework for the main quantitative part of the analysis.

The Industry Reference Group

The Industry Reference Group (IRG) comprised of business leaders from selected industry sectors that were invited to join. All of the IRG members have considerable practical expertise and an understanding about the key strategic issues. All hold responsibilities for the use of e-commerce in conducting their business, assessing its impact upon them, or advising about e-commerce issues in general.

While drawing on IRG advice and input, decisions about the direct impacts, the nature of the flow on impacts and other findings remained the responsibility of the consulting team.

A framework for economic analysis

The MONASH model is a computable general equilibrium model of the Australian economy and provides a powerful tool for analysing structural change of this nature. Its use also imposes considerable discipline. It requires analysts to concentrate on impacts that are measurable in much the same way as those impacts are measured in the national accounts. Most importantly, in using the model it is not possible to extrapolate growth beyond the underlying capacity of the economy to deliver it within likely resource constraints, just as the real world economy is subject to similar constraints.

...we cannot get on without making models, and models must be simplified. A map at the scale of 1:1 is of no use to a traveller. The art of setting up models is to cut out all complications inessential to the point at issue, without eliminating the features necessary for some guidance.

Joan Robinson and
John Eatwell, 1973

1.3 Limitations of a pilot study

Economic models are a simplification of reality. They are useful because they make it easier to understand the key drivers in the big picture without being distracted by the confusion of everyday life. Ultimately, not everything can be modelled. When modelling the impact of e-commerce it was important to trim and distil much of the detail to discern the main trends.

Naturally, there will still be a lot left out. A structural change of the sort that is generally expected is likely to permeate the economy and everyday life in many different ways. Many impacts will be unexpected. It is hoped that the techniques learnt in this study will be of use to others examining the issues. It may also be adapted and expanded for use in any subsequent major study that concentrates on an even broader range of probable impacts.

The economy-wide analysis of e-commerce is the first of its kind. Despite an extensive search, the consultants were not able to learn of similar research results or work in progress elsewhere. As a groundbreaking exercise, it is hoped this study will stimulate constructive debate on the impact of e-commerce and how this should be analysed. Future studies will be the richer for this debate.

A note of caution is required about the way in which the results of this study should be analysed and interpreted. This study is very much an initial attempt to analyse the nature and direction of the impacts of e-commerce. The results are therefore more indicative than definitive and should be interpreted accordingly.

1.4 What is e-commerce?

At its broadest, e-commerce is any type of business transaction or interaction in which the participants operate or transact business or conduct their trade electronically. Potentially this could include activities that include use of the telephone or the fax as well as the Internet.¹ A broad definition would encompass activities long recognised under the label Electronic Data Interchange (EDI) as well as more recent developments in electronic transactions.

The general consensus is that at present, most e-commerce activity is at the business-to-business level.

Table 1.1

E-commerce estimated to be business-to-business	
Firm (year)	Percentage
IDC (1997)	61
Negroponte (1998)	70
Forrester Research (1998)	84
Forrester Research (2001)	88
ActivMedia (1996)	72
Lorentz (1997)	80
Price Waterhouse (2002)	78
Piper Jaffray (2001)	90
Average	78

Source: OECD, *The Economic and Social Impacts of E-commerce: Preliminary Findings and Research Agenda*, 1999, p. 36.

¹ See Department of Communications, Information Technology and the Arts (DOCITA), *Australia's e-commerce Report Card*, Canberra, 1999, for a broad definition of electronic commerce.

Within the business-to-business category, revenues are already very substantial.

Table 1.2

Selected individual firm e-commerce revenues by activity US\$ million

Activity	1995–97
E-commerce: business-to-business	
CSX	3 000
GE	1 000
NEC	16 528
Cisco (e-commerce sales)	2 496
Computers: Dell	730
Computers: Gateway	150
Computers: NECX	35
Total business to business	23 943

Source: OECD, based on data from the US Securities and Exchange Commission.

Business-to-consumer e-commerce is still in its formative stages of development. Consumers are still experimenting with the capacity of online purchases.

It is also apparent that business-to-consumer sales face challenges. Survey data consistently reveals that there are some lingering barriers to greater use of online shopping. This includes concerns some consumers have about the security of personal information involved in transactions, uncertainty about vendor integrity, logistical bottlenecks, consumer protection, as well as general issues about access to the Internet (i.e. having the right technology and access to affordable bandwidth). It is likely that these issues will be managed over time largely through increased experience on the part of buyers, sellers and regulators. Addressing these and other issues has been a key thrust of government policy.²

Activity that is widely considered to be e-commerce does not always end in a transaction. E-commerce has significant implications for the whole of business process. Adoption of e-commerce has led many organisations, for example, to reengineer the way that they do business. Others are transforming their approach to business, or their business model, entirely.

1.5 E-commerce trends

Industry data indicate that the speed of adoption of e-commerce is rapid. Many analysts see the fast rate as 'unprecedented'. While portraying a buoyant outlook, industry forecasts have consistently underestimated e-commerce growth.

Starting from practically nothing a few years ago, current estimates are for e-commerce to reach around US\$300 billion in the next year or so and, according to the reckoning of Forrester Research, eclipse the trillion dollar mark by 2003.

If the forecasts of Forrester Research are achieved, OECD-wide e-commerce will be the equivalent of 15 per cent of the total retail sales of seven OECD countries.³

There is massive growth in the small-scale, under-\$100 category of product rather than people wanting to buy, say, \$2 000 stuff regularly. Lower-end purchases are almost necessary in this (early stage) because people are going to put their toe in the water to try it.

Graham Penn, IDC

The real power of technology (such as e-commerce, telecommunications technology services or multimedia) is not that it can make the old processes work better, but that it enables organisations to break old rules and create new ways of thinking—that is, to reengineer.

Hammer, M. and J. Champey, *Reengineering the Corporation: A Manifesto for Business Revolution*

² See DOCITA, *op cit*, 1999.

³ OECD, 1999, p. 27.

It should also be recalled that e-commerce activity is still quite small relative to the economy as a whole. Projections that e-commerce could reach a billion dollars or even many billions of dollars in turnover should be placed in perspective with the fact that economic activity in Australia involves final expenditure of over \$550 billion and total transactions would be many times greater.

Table 1.3

Estimates of e-commerce sales compared to various benchmarks

	E-commerce estimates (US\$ billion)	US catalogue sales (%)	US credit card purchases (%)	Direct marketing (%)	OECD-7 total retail sales (%)
Current (1996/97)	26	37	3	2	0.5
Near-term (2001/02)	330	309	24	18	5
Future (2003/05)	1 000	780	54	42	15

Source: OECD estimates; US catalogue sales (\$78.6 billion) and direct marketing sales (\$1 226.0 billion) data and growth rates (6.3 and 8.7 respectively) are from Direct Marketing Association (1998), *Economic Impact: US Direct Marketing*, April; credit card is based on VISA and MasterCard US charges in 1997 (\$870 billion) and the 1996 to 1997 growth rate of ten per cent; OECD-7 retail sales (\$5 328 billion) are for Canada (1997), France (1996), Finland (1997), Germany (1995), Japan (1994), UK (1994) and the US (1997).

It is perhaps more useful to look at e-commerce in comparison to other transaction types. In the US, where e-commerce has been adopted more rapidly, the activity currently compares to direct marketing sales, as shown in Table 1.3. Based on recent growth, however, online sales are expected to overtake those of direct marketing and amount to about half of credit card transactions within the medium term.

While there is a great deal of popular interest in the growth of e-commerce reflected in many media reports, it is difficult to obtain reliable data about this activity in Australia at present. This in part reflects the recent arrival of the activity and because companies' e-commerce plans are viewed as being strategic and therefore confidential.

The data that is available points to rapid growth in the use of e-commerce here as elsewhere:

- At the end of 1998, there were 1.7 million Australians accessing the Internet at least once a week (regular users). This is projected to grow to 5.7 million by 2003. Adding email-only Internet users and casual users lifts the 2003 total to 10.9 million.⁴
- Internet based commerce in Australia is predicted to grow from \$61 million in 1997 to \$1.3 billion in 2001.⁵
- The number of business websites in Australia doubled between 1996 and 1998.⁶
- There has been a doubling or better in annual revenues in recent years for several Australian companies that supply Internet systems or knowhow.⁷

Growth in e-commerce infrastructure and support

Looking at the components of e-commerce activities there is general confidence that e-commerce support activities are growing rapidly. Some comments about major aspects are summarised in the table below.

4 *Business Review Weekly* Vol. 21, No. 29.

5 Department of State and Regional Development, NSW, Sydney—*First for Information Technology and Telecommunications*, 1999.

6 *Op cit.*

7 ASX Investor Select.

Table 1.4

Projected growth in economic commerce infrastructure market segments

Network service providers	Providers of Internet services (ISPs) currently generate about US\$125 million in revenues. During 1996–97, the OECD average for 20 hours of Internet access has fallen from US\$68 to US\$20. But with expectations that in the near future 50 million people will pay an annual fee of US\$240 for access, generating US\$12 billion in revenues, it makes providing Internet access 'the largest revenue stream directly predictable for the Internet.'
Hardware	This segment has the largest sales, estimated to range from US\$10 billion to US\$30 billion. Future estimates of hardware sales range from US\$43 billion to US\$72 billion. In most cases, though, estimates of hardware expenditures are for all Internet related hardware, not just that portion of Internet use dedicated to e-commerce.
Software	This is a smaller but not insignificant part of the market. Estimates range from US\$300 million to US\$900 million in 1996, to possibly US\$4 billion to US\$5 billion in the year 2000. On top of this is e-commerce specific software, such as 'turn-key' packages that allow merchants to set up online shop fronts. It has been estimated that this segment earned revenues of about US\$20 million in 1996, and should grow significantly to US\$3.2 billion by the year 2000.
Enabling services	To date, this segment has been dominated by advertising, which remains the primary business model for the Internet. It has been estimated that Web-based advertising revenue in 1996 was US\$310 million. By the year 2000, it is expected that this shall grow to US\$4.8 billion.

Source: OECD 1997b, *Measuring E-commerce*, Committee for Information, Computer and Communications Policy, Paris, OCDE/GD(97)185, p. 10.

Business use

Businesses are also rapidly taking up e-commerce in Australia, as highlighted recently in the *Australian Financial Review*:

The number of Australian companies active in e-commerce is set to explode in the next 15 months with a five-fold increase in active Internet trading sites to take the total to 40 000 by mid-2000.

That's the latest prediction from research group www.consult, which estimates there are 8 000 companies that can now boast a secure, web-based ordering system that enables electronic commercial activity. Only 1 000 companies boasted such facilities a year ago, but 30 000 companies with access to Internet technology are still to make the leap into e-commerce, according to www.consult's principal, Mr Ramin Marzbani.

Australian Financial Review, 1 April 99

Household use of e-commerce

Households appear to be continuing to increase their use of both the Internet and e-commerce. Over 12 months from August 1998 to August 1999, the proportion of households accessing the Internet rose by 27 per cent to nearly 1.6 million households, or 23 per cent of all Australian households.⁸ Meanwhile household numbers using the Internet as a means for paying bills and transferring funds are rising at a rapid rate. Many financial institutions are making investment in this area on the basis of this growth. In addition, purchases of both tangible and intangible products is increasing as individuals become more familiar with and trusting of security and authentication measures for conducting e-commerce over the Internet safely.

8 Australian Bureau of Statistics, *Use of the Internet by Households*, 8147.0, August 1999, p. 11.

E-commerce is to the Information Revolution what the railroad was to the Industrial Revolution—a totally new, totally unprecedented, totally unexpected development. And like the railroad 170 years ago, e-commerce is creating a new and distinct boom, rapidly changing the economy, society, and politics.

Peter Drucker, 1999. 'Beyond the Information Revolution,' Atlantic Monthly (October).

1.6 Focus on change

The quantitative work undertaken in the study has concentrated on aspects of e-commerce that are likely to see significant changes in the future. Through the course of the study and in interaction with the IRG it was apparent that a great deal of progress has already been made in achieving widespread use of proprietary networks. Many firms and industries where EDI was likely to improve business outcomes have already implemented such systems. Australians have been quick to adopt use of ATMs and EFTPOS. It is probable that a considerable portion of the efficiency and growth improvements stemming from these forms of e-commerce have been largely absorbed into the economy already, or where impacts are yet to be fully realised, the broad influence has already been factored into the economic outlook.

The task of this study was to focus on the impact e-commerce that has not yet been factored into community expectations about the future. As a result, it has concentrated upon aspects of e-commerce that involved transactions (financial or otherwise) that are conducted over open non-proprietary networks, such as the Internet. This is a fairly new activity with explosive growth. The use of open access networks for commerce opens up new network efficiencies that should have major economic dimensions.

Within this approach the study has concentrated on aspects of business to business commerce and business to consumer transactions. Even then the study is seeking to pick up new impacts. That is, it avoids counting outcomes from changes that have already been made.

Chapter Two

Economic issues

What difference will greater reliance on e-commerce make? Why is it not just an information technology issue? This Chapter identifies some of the key economic issues at stake. This sets the groundwork for the work to follow in examining actual impacts.

Huge estimates of the rapid growth in e-commerce sales generally do not impress economists. If US Internet retailers have boosted their sales to US\$38 billion, so what?⁹ Economists will assume that this is offset by a US\$38 billion loss by other retailers. Where is the net gain?

Major economic issues include the following:

- Will e-commerce change productivity?
- Will it lead to new products and ways of doing things?
- Are there implications for employment?
- Will prices or the rate of inflation change?
- Is there a risk of industry dislocation?
- Will some regions be impacted more than others?
- What are the implications for international competitiveness?
- How will it change the way that business is done?

2.1 Productivity gains

It is becoming clear that e-commerce is likely to have a profound impact on the economy at large. Even mainstream economic policy makers in other economies now recognise that the gains, characterised as productivity gains by macroeconomic analysts, are already having a substantial impact. As noted by Alan Greenspan, Chairman of the Federal Reserve:

... Our nation has been experiencing a higher growth rate of productivity—output per hour worked—in recent years. The dramatic improvements in computing power and communications and information technology appear to have been a major force behind this beneficial trend.

'Monetary Policy Testimony and Report to the Congress.' Testimony of Alan Greenspan, Chairman, Federal Reserve Board. February 24, 1998
<http://www.bog.frb.fed.us/boarddocs/HH/>

There are good reasons to expect that e-commerce can raise productivity. Firms can 'reengineer' to make maximal use of the capabilities of the new technology. With a streamlined interface between production and sales, for example, firms could extend 'just in time' processes to almost every activity, reducing inventories and other input costs. They may also be able to streamline their own purchasing and orders processing systems and reduce the cost of finding and processing sales. E-commerce introduces potential distribution cost savings for many firms, particularly those that can digitise their products. It may also be easier to reduce the cost of after sales service.

⁹ As forecast recently by the Centre for Research in Electronic Commerce, University of Texas.

Box 2.1

Can information technology improve productivity?

The productivity gains from investment in information oriented infrastructure has been a controversial issue amongst economists for some time. It has been pointed out, for example, that the rapid adoption of information and communications technology from the mid-1970s onwards was accompanied by a slowdown in labour and capital productivity growth in most developed countries. This led the Nobel-prize winning economist, Robert Solow, to observe in 1987 that 'you can see the computer age everywhere but in the productivity statistics'. The reasons for this may include the substitution of investment in information and communications technology for other types of capital and learning effects. These may mean that it takes time for business to realise the full benefit of new technologies.

While academic economists are still pondering the issues, practitioners are taking a more pragmatic approach. Alan Greenspan, the Chairman of the Federal Reserve Bank in the US, for example, finds arguments that IT related productivity gains are ephemeral hard to believe. He gives every indication that he is taking the productivity enhancing e-commerce factor into account when forecasting economic outcomes and setting monetary policy. This was clear when he recently said that

The Internet offers an admixture of potential new goods and services and potential lower costs of production. A major part of our current GDP reflects distribution cost, and it is evident that much of that is subject to potential competitive reduction through Internet marketing. I do not perceive the end of the shopping mall, if for no other reason than I have been strongly advised that shopping is not solely an economic phenomenon. But the relationship between businesses and consumers already is being changed by the expanding opportunities for e-commerce. The forces unleashed by the Internet may be even more potent within and among businesses, where uncertainties are being reduced by improving the quantity, the reliability, and the timeliness of information.'

Sources: UK Cabinet Office, *e-commerce@its.best.uk*, September 1999, p. 105.

Remarks by Chairman Alan Greenspan, *Information, productivity, and capital investment*, Before the Business Council, Florida, October 28, 1999.

The value-added chain

Following on from the potential for e-commerce to reduce the cost structure of firms, it will also change firms' relationships with their suppliers, or with their customers. This can change the structure of the complex interrelationships represented in value-added chains which make up the economy.

Disintermediation

A concept that underpins much of the economics of this study is the process of disintermediation.

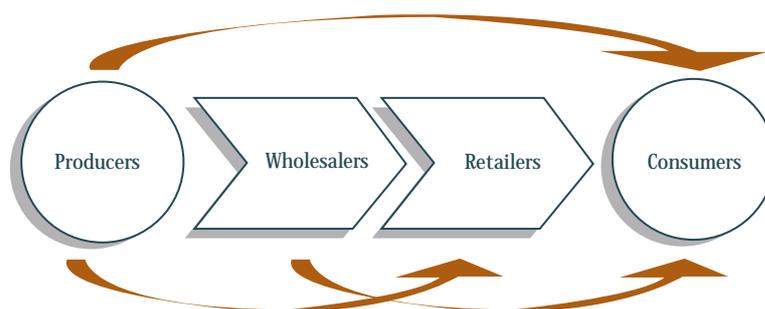
In the chain of activity between the producer and the final consumer, intermediaries perform many services including transportation, wholesaling and retailing—these activities are known as margins because their costs form a margin between buyers and sellers. In most OECD countries, margins typically add about 33 per cent to the final price of goods.¹⁰

The exhibit below illustrates some disintermediation opportunities in a very simple value-added chain.

10 OECD 1999, p. 64.

Exhibit 2.1

Disintermediation effects of e-commerce



Source: The Allen Consulting Group

Reintermediation

The use of e-commerce may also involve reintermediation. Making electronic purchases may involve inputs from new sources. This could include services provided by network services providers that both the buyer and the seller use to find each other. Other new intermediaries may include electronic payment systems and services for authentication and certification of transactions. E-commerce may also involve some additional traditional inputs. Someone, for example, still has to deliver many of the physical products that are purchased. Generally, such services are far less labour intensive than the previous intermediaries, but nevertheless there is a cost.

Frictionless trade or trade with less friction?

Initially it was supposed that e-commerce could lead to a 'frictionless' economy. This would be close to economists' text book world in which transaction costs essentially disappear, barriers to entry fall, geography becomes irrelevant and markets clear instantly.

Much of this earlier enthusiasm is likely to prove unfounded. Nevertheless, evidence is emerging that e-commerce does reduce costs and prices.¹¹

¹¹ This evidence is discussed in greater detail in the main report and includes studies conducted by MIT, Ernst & Young and Forrester Research.

Box 2.2

Frictionless commerce?

There have been many claims that the Internet represents a new 'frictionless market'. These claims have until now been largely based in theory, with little or no empirical evidence to substantiate the claims.

However, research released in August 1999 by Erik Brynjolfsson and Michael Smith at the MIT Sloan School of Management has produced evidence suggesting that prices for goods sold via the Internet are lower than at conventional outlets.

The MIT study compiled a data set of over 8 500 price observations collected over a period of 15 months, comparing pricing behaviour at 41 Internet and conventional retail outlets. It found that prices for books and CDs sold on the Internet average 9–16 per cent less than identical items sold through conventional channels.

The conclusions of the MIT study have had a major bearing on the modelling exercise conducted in this pilot study. While all Industry Reference Group members agreed that the reduced friction of Internet commerce would indeed reduce prices, identifying the extent to which it would reduce prices proved problematic.

The results of the MIT study were therefore used as a benchmark against the observations of the Industry Reference Group to ensure that the direct impacts introduced to the model were in line with the most up-to-date analysis in this area.

Source: The Allen Consulting Group.

Evaluation of the economic implications of greater use of e-commerce requires understanding about developments within and between industries. A review of key industry impacts is conducted in following chapters.

When discussing productivity and commerce with less friction, the tendency is to focus upon business efficiencies. Closer inspection reveals that there is another party—the consumer—in every transaction that is also concerned about ease, convenience and efficiency. Reducing consumers' transaction costs leads to efficiencies that free up resources (i.e. time) that can be used elsewhere.

2.2 Changes in competitiveness

With the Internet, businesses have greater scope to advertise and sell their products into a global market at lower cost. This is an opportunity that even small and medium sized businesses are taking advantage of already. Of course, Australia also becomes a market that is more accessible to foreign businesses.

2.3 New products and ways of doing things

It is likely that the impact of e-commerce will be magnified many times over when changes in capacity are reflected in completely new products and services. The impact of new products is particularly difficult to assess.

It is possible that the future development of innovations based around greater use of e-commerce will follow the 'reverse product cycle' of innovation in services. In the initial phase, incremental process innovations increase efficiency. In the second phase, more radical innovations lead to substantial improvements in quality. In the third, product rather than process innovations become important. It takes until this third stage for new industries and products to become dominant. While all three phases may become operational in the time frame under analysis in this study, the most significant new products are to be expected only in the more distant future. The main focus of the quantitative modelling to be introduced later will be upon the efficiency gains characteristic of the first phase.

Table 2.1**E-commerce impact on various distribution costs, US\$ per transaction**

	Airline tickets	Banking	Bill payment	Term life insurance policy	Software distribution
Traditional system	\$8.00	\$1.08	\$2.22 to \$3.32	\$400 to \$700	\$15.00
Telephone-based		\$0.54			\$5.00
Internet-based	\$1.00	\$0.13	\$0.65 to \$1.10	\$200 to \$350	\$0.20 to \$0.50
Savings (%)	87%	89%	71% to 67%	50%	97% to 99%

Source: OECD 1999, *The Economic and Social Impacts of E-commerce: Preliminary Findings and Research Agenda*, p. 63.

2.4 Changes in prices and inflation

The combination of reduced production costs and increased competition over the Internet will have a significant downward pressure on prices and inflation.

[The Internet] is severely curtailing retailers' pricing power by giving consumers the means to compare different offerings with the click of a mouse.

'E-commerce could help reduce inflation', *Sydney Morning Herald*, 9 September 1999, p. 30

This phenomenon is not limited to firms who compete for business online. Competitive pressures affect competitors who remain off-line.

Traditional off-line suppliers were forced to improve efficiency as they sought cost-effective ways to match the value propositions offered by their online competitors.

'E-commerce could help reduce inflation', *Sydney Morning Herald*, 9 September 1999, p. 30

The translation to lower prices is not automatic with a number of quantitative studies finding that the evidence is mixed¹².

The 'sticker price' of a good or service being sold using two different 'channels' (i.e. in a shop and on the Internet) may not give the full picture. Even where the price is the same, the cost of obtaining a product from the Internet is likely to be lower because it involves more convenience and less cost for the consumer. Studies that do not take this into account may be misleading. Certainly when looking at evaluations of the economic impacts of e-commerce, the full cost comparison should be factored in.

2.5 Employment

Many of the productivity improvements that greater use of e-commerce may bring also pose a threat to employment. Disintermediating layers of economic activity between buyers and sellers results in bypassing jobs. An offsetting factor would be that the lower prices for goods and services would stimulate demand in other areas and increase the demand for labour. Identifying the net impact requires an economy-wide framework.

Not all labour is homogeneous. Increased demand for skilled IT workers is unlikely to be met quickly by large numbers of recently retrenched shop assistants. Examination of the labour market outcomes would be enhanced through looking at changes in the economy's demand for people with different skills and occupations.

There appears to be another misunderstanding on e-commerce, and that is cost. A banking transaction, share purchase or travel booking will be easier and cheaper on the Internet. But not all shopping falls into this category. It depends on the cost of what is known as 'fulfilment' which is delivering your order.

Australian Financial Review,
15 December 1999

12 OECD 1999, *The Economic and Social Impacts of Electronic Commerce: Preliminary Findings and Research Agenda*, p. 73.

2.6 Regional dimensions

If greater use of e-commerce has an uneven effect on industries, affecting some more than others, reflecting differing geographic distribution of industries, regions are also going to enjoy differing benefits and costs. This also requires an economy-wide perspective to evaluate.

2.7 Changing business models

E-commerce may change the way that business is conducted and organisations are structured.

E-commerce is likely to have an impact on transaction costs throughout the economy. Many transaction costs result at their core from limitations in information or in moving goods and services to where they are useful, among many other factors. Greater use of e-commerce appears to make it easier for buyers and sellers to learn more about products and prices, or to transport some items (particularly goods that are easily digitised) reducing transaction costs.

Transactions costs are one of the key factors that define the boundaries between what activity is undertaken within a firm or a business, and what is essentially outsourced through purchases in a market. Thus firms rarely outsource strategic management, or key production functions. Many firms are prepared, however, to outsource a sales function or logistical facilities by essentially selling their output to retailers or other intermediaries. If there is a major change in transaction costs, the boundaries between firms, industries and markets are likely to change in turn.

It will be important when looking at specific industries to try to identify ways in which business models are changing.

2.8 Key points

In general, e-commerce seems to offer the prospect of moving economic activity closer to some of the ideals of perfect competition: low transaction costs, low barriers to entry, and improved access to information for the consumer. It may significantly lower prices while improving quality. In doing so, e-commerce may significantly improve the efficiency of economies, enhance their competitiveness, improve the allocation of resources and increase long-term growth.

... over the next ten to 15 years, all businesses will be at risk. Whether you are in the manufacturing of hard goods or in the soft area of the information business, you will be affected.

Daniel Petre, Australia's Future Online, 1996 RJ White Services Lecture, ACIS.

Chapter Three

Changes ahead—industry impacts

This Chapter takes a pragmatic look at the changes that e-commerce can be expected to bring in key industry areas. It summarises detailed insights and case studies reported in Part 2 of the report. These observations are then distilled into expected changes that are amenable for inclusion into the MONASH model with simulation results to be reported in the next Chapter.

3.1 Opportunities for industry

The Industry Reference Group (IRG) provided strategic input to help define the parameters to be used in the MONASH Model and provided comments throughout the process. This was important in giving the model a more realistic perspective.

IRG members were requested to consider the most probable impacts of e-commerce on their industry sector, as well as ways in which value would be added to, subtracted from or transferred between sectors as a result of e-commerce.

The expected sectoral impacts spanned an extensive range of impacts that make up some considerable bulk in Part 2 of this report. Some major implications for industry are summarised in the sections below.

Information Technology (IT)

A key enabler of e-commerce, demand for IT is expected by industry representatives to grow commensurately with the rapid rates expected in e-commerce.

Exponential growth in computing power will unlock further applications of e-commerce. Widespread access to computers has been both a prerequisite for broadbased e-commerce activity and a driver of change. Access to e-commerce is increasingly less dependent upon owning a sophisticated, full function desktop computer.

IT products, such as software and hardware, are increasingly being sold via means that bypass traditional intermediaries.

This sector can be expected to continue to receive a shift in consumer preferences towards purchase of its products.

Communications

Communications is a major input sector to e-commerce. Access to affordable bandwidth is unlikely to be a major constraint in future to all but a minority. New demands will alter inputs required and allow intermediaries to be bypassed. New technologies, such as Wireless Access Protocol (WAP) will have a large impact on the future conduct of e-commerce.

Similar to IT, communications industry representatives see this sector as enjoying a greater share of final and intermediate demand as a result of greater use of e-commerce.

Banking and finance

An information-intensive industry with an established IT infrastructure, this sector will be able to extract greater efficiencies and bypass

traditional cost structures, such as the branch structure. Banks are looking at ways to expand their value proposition by linking new services to their existing customer base.

Greater use of e-commerce in these activities could reduce bricks and mortar costs, especially for banks in terms of less need for expensive branch networks, and for labour and other inputs.

Business services

This sector is comprised of a range of professional 'knowledge' services that will benefit from greater efficiencies in dealing with suppliers and clients through electronic service delivery. Some traditional cost structures will be altered. New products and services will be created, such as legal authorisation of electronic documents or data registry services.

Media and entertainment

A high profile industry, online forms of media and entertainment will compete with traditional forms for audiences, customers and advertising revenue. New distribution and recording technologies, such as MP3, will challenge traditional systems.

It has been very difficult to ascribe specific sector changes to this sector in the context of this pilot study.

Manufacturing

A beneficiary of major productivity gains from previous forms of e-commerce such as EDI, manufacturing may extract further efficiencies made possible through open networks. Companies can build stronger relationships directly with customers including by selling products directly online.

It is expected that many manufactured products will benefit from reduced retail and wholesale margins as a portion of these costs are disintermediated.

Retail

Traditional retail faces increased competition from online competitors with more effective product ranges and cost structures. It risks being bypassed to varying degrees by consumers making online purchases directly from producers or new infomediaries, especially in digital products and commodities such as CDs.

Transport

Improvements in supply chains will generate efficiencies and possible disintermediation in the transport sector. Transport stands to secure significant productivity gains from e-commerce. Greater productivity may also lead to decreased demand for labour. Additional value can be built into customer relationships, such as Qantas' frequent flier points website, or the 70 per cent of tickets sales that are e-tickets.

Transport activities are conservatively expected to be able to save up to five per cent of their existing staff requirements over the next decade through more efficient administrative processes (e.g. in ticket sales and marketing).

Health

Significant efficiencies stand to be made in pharmaceutical supply chains. New service modes and channels to the consumer will be developed, as will expanding electronic modes of operation, such as telemedicine. Considerable potential gains in terms of reduced 'avoidable incidents' were also identified although still difficult to quantify at this stage.

No direct impacts are identified at this time in this sector in the interests of producing a conservative estimate of the impact of e-commerce.

Education

E-commerce will provide greater opportunities for distance education and improved efficiencies through online processes to bypass traditional administrative functions. Greater reliance on e-commerce is an increasingly unavoidable requirement when seeking to conduct educational services over multiple campuses, through distance learning, and to attract foreign students.

No direct impacts are factored in to this pilot study, although it is clear that this will result in an understatement of the benefits.

Agriculture

A high reliance on accurate information and large distances between producers and customers makes this sector conducive to the benefits of e-commerce. E-commerce provides additional opportunities to generate operational efficiencies such as obtaining better weather and stock information or bypassing intermediaries and locating cheaper inputs. It also allows agribusinesses to market products more effectively to wider audiences.

It seems likely that much of the savings to be experienced by the agriculture sector will be due to efficiencies in other sectors from which it buys its inputs.

Mining

Despite conducting a large proportion of transactions in the industry electronically, it is not clear that there will be as profound a change in this sector as there will be in others. Nonetheless, general opportunities for disintermediation (cost saving) and re-intermediation (new costs) are still expected to occur as use of e-commerce expands throughout the economy.

When looking at the modelling of these impacts it seems reasonable to factor in modest savings in retail and wholesale margins in the sector (i.e. reduced costs through some disintermediation) in the purchase of inputs.

3.2 Some overarching points

Drawing the above impacts and other points made in various sections in Part 2, it is possible to discern some broadly applicable impacts on business. Many of these relate to challenges that individual business are increasingly going to have to come to terms with. They do not generally impact on the overall level of activity or industry costs, and so will not be factored in to the modelling process that follows, but they should nevertheless be factors of increasing importance in the strategic thinking in business for some time to come.

The first of such findings is that industry representatives see that e-commerce is altering business models and, in particular, spheres of competition. Businesses are being forced to reassess who their competitors are in an online world as often they differ from their traditional competitors. There may be large new markets for some, but increasing competition is also a feature of the new environment.

Secondly, e-commerce is forcing business to rethink customer relationships. Industry representatives have broadly identified that e-commerce is making it possible for businesses to approach customers directly, whether for direct sales or product information and feedback, rather than going through intermediaries (e.g. retailers, distributors, etc.). Customisation can occur much more readily.

Order and delivery of products is being improved by e-commerce. Customers can be served from their home or business rather than having to go to a point of purchase. When products or services are digital or 'virtual', the entire process can be conducted electronically. While real goods still require eventual delivery, the process of gathering information, browsing, comparing and ordering can still be more convenient than by traditional means.

A key theme that industry representatives reported was that e-commerce is being used to improve supply chain management. E-commerce continues the process of substituting information for inventories and reducing substantially the investment in warehouses. It continues to cut back the need for paper-based documentation and improves the speed of communication. (The modelling work to follow picks up on many aspects of this change).

Some industry representatives have commented on the capacity for e-commerce to improve customer power by expanding their information base, particularly with respect to price differentials. As the Internet overcomes problems associated with buying products from a distance, alternative lower-cost suppliers can be found across a larger geographic range, widening the effective market and intensifying competitive pressures. This is another dimension of the increasing competition point made above.

Finally, e-commerce is expected to allow competitors in other industries and other countries to enter markets as it bypasses the need for investment in local facilities. This has been seen in financial services, with the entrance of new dot.com players. Import competition is patchy with some sectors facing more competition than others. (Some aspects of this will be analysed in the modelling to follow).

Chapter Four

Economy-wide assessment

What are the economy wide implications of the changes foreshadowed in the previous Chapter? This Chapter reports on MONASH model simulations about the impact of greater use of e-commerce in the Australian economy. It compares outcomes for a range of economic indicators against a base case forecast which represents outcomes with less use of e-commerce.

4.1 The base case

The simulation results that follow compare the expected outcomes with greater use of e-commerce against those that would have been obtained anyway, if use of e-commerce stayed largely static (the base case). The base case simulation is detailed in Appendix C to this report. The key inputs of the base case are:

- The economy will grow and exhibit changes in prices and industry composition in line with standard economic forecasts (incorporating forecasts from Access Economics).
- Trends in world commodity prices (largely drawing on Australian Bureau of Agricultural and Resource Economics forecasts).
- Trends in technology particularly as reflected in changes in input-output ratios for differing industries.
- Known policy changes of significance including issues such as the introduction of the GST and related reforms are included.¹³ The Ralph reforms have not been included because they were announced after this analysis had been done.
- Immigration and population growth forecasts from the ABS.
- Pre-existing trends in the use of e-commerce as they applied up to the end of 1996–97 (the base year for the current MONASH model). This is projected to be supported by a reasonable level of access to the Internet infrastructure through adequate bandwidth at reasonable prices.
- The economic impacts of greater use of some forms of e-commerce such as EDI and ATMs and EFTPOS are included in this study. It is viewed that these developments continue well established trends, further developments are likely to happen anyway and they have been factored in to the forecasts about expected economic outcomes.

Against these settings, the results which are discussed below can therefore be viewed as the sensitivity of each economic indicator (i.e. output, employment, etc.) to greater use of e-commerce.

4.2 Change scenario

To evaluate the economy-wide implications of e-commerce, the analysis draws on 14 sets of direct changes to the Australian economy. These changes are often referred to as 'shocks' because they change the balance

¹³ See Peter B. Dixon and Maureen T. Rimmer, 'Changes in Indirect Taxes in Australia: A Dynamic General Equilibrium Analysis', *Australian Economic Review*, December 1999 (forthcoming).

that would have resulted without change. They cover four broad categories:

- retail and wholesale trade changes;
- selected sectoral changes;
- international trade related changes; and
- reintermediation costs.

These are discussed in detail in Appendix A.

Summary of direct economic impacts

For each shock, an estimate of the full-strength direct GDP effect is provided in the table below. For example, if a shock saves ten per cent of an industry's labour and the industry's labour represents five per cent of GDP, then the direct GDP effect is 0.5 per cent. This recognizes that the shock releases resources that can be used to generate a 0.5 per cent increase in GDP. The direct effect on public and private consumption is also noted for each set of shocks. This can be considered an indicator of the welfare effect of the shocks.

Table 4.1

Summary of shocks used in the MONASH change scenario

	Description	GDP	Effect on (%)	
			Consumption	Welfare
s1	Savings of margins by consumers	0.14	0.18	0.36
s2	Saving of time of consumers	0.14	0.18	0.36
s3	Purchase of e-commerce equipment and services by consumers	0.00	0.00	-0.15
s4	Saving of margins by industries	0.37	0.46	0.46
s5	Saving of labour by industries in buying inputs	0.19	0.23	0.23
s6	Purchase of e-commerce equipment by industries	-0.09	-0.12	-0.12
s7	Direct labour saving technical progress in transport and banking	0.28	0.35	0.35
s8	Time saving by industries dealing with the transport and banking sectors	0.06	0.08	0.08
s9	Time saving by households dealing with the transport and banking sectors	0.01	0.02	0.04
s10	Additional margins savings by the communications industry	0.05	0.06	0.06
s11	Saving of particular inputs	0.01	0.02	0.02
s12	Twist in favour of imports	0.00	0.00	0.00
s13	Increase in foreign awareness of Australian products	0.00	0.60	0.60
s14	Reductions of foreign currency c.i.f. prices of imports	0.00	0.19	0.19
	Aggregate effects	1.62	2.83	2.88

Source: Centre of Policy Studies.

Direct changes and flow on impacts

The identified changes have implications for prices and resources use. The total value of the direct changes after ten years of operation is an increase in GDP by about 1.6 per cent (out of the total 2.7 per cent rise in GDP, to be discussed in more detail in Section 4.3 below. Direct changes will also raise consumption by 2.8 per cent and increase community welfare (measured in dollar terms) by 2.9 per cent. These are factored into the MONASH model to identify the full flow on impact after all adjustments have been made throughout the economy. These changes are often referred to as 'shocks'.

4.3 Simulation results

Macro economic outcomes

The trajectory of the difference greater use of e-commerce makes for major macro economic impacts are plotted and explained in Exhibit 4.1 with a brief additional commentary about each variable. The major points are as follows.

Output or GDP

The overall level of economic output, or GDP, may be higher by around 2.7 per cent by the year 2007 if Australia adopts greater use of e-commerce than if it does not. Using the current size of the economy as an indicator, that increase is equivalent to more than \$14 billion per annum.

The increase in activity (real GDP) obtained by 2007 is equivalent to achieving 11 years of economic growth in ten.

Composition and pattern of growth

Real GDP increases as there are progressive increases in the extent of adoption of e-commerce in the economy at large. Three broad factors shape the composition of growth.

Firstly, the economy makes better use of existing capital and labour. In economic terms there is an increase in total factor productivity. This technological change accounts for the majority of the increase in growth.

Secondly, more capital is invested in the economy raising the availability of this factor of production. The capital stock increases because the productivity gains brought about by greater use of e-commerce increase wage rates relative to capital rental rates. This occurs with a lag as investors react cautiously to changes in rates of return and the change is gradual. In the long run it is expected that rates of return will return to levels that would prevail without an e-commerce impact (as market forces bring rates back into balance).

Although additional capital inflows and investment are associated with productivity gains, and are largest when those gains are being enjoyed, the expansion in the economy also leads to a sustained increase in investment. It is assumed the additional capital is sourced from abroad through foreign savings and investment (i.e. it is not assumed that e-commerce changes Australians' savings patterns). These factors have implications for changes in the exchange rate (explained in Exhibit 4.2).

Thirdly, there is an increase in the supply of labour, another factor of production. This stems from time savings for producers and consumers.

Higher activity is sustained even after the full effect of the modelled e-commerce changes have taken place after a decade. In fact real GDP continues to rise slightly. This reflects dynamic benefits. E-commerce will be used intensively in the fastest growing parts of the economy (including services such as banking). This means that the technological improvements become progressively more important.

Aggregate employment and wages

Greater use of e-commerce is expected to generate increases in real wages and employment. Initially, real wages are fixed and employment adjusts to changes introduced by e-commerce. As more use is made of e-commerce, activity in the economy and employment will rise over time. Real wages eventually also rise. In the longer term, the increase in employment declines somewhat because of higher real wages, but it remains above the base case forecast reflecting the increased supply of labour associated with the technological change. While job numbers may rise or fall in specific industries (discussed in more detail below), the net effect is an increase in employment.

The increase in real wages is a benefit of the expected structural change. It is part of the means by which employees obtain a share of the productivity gains. The increase in real wages could be brought about in one of two ways. One way would be through reductions in prices below their forecast path. This would involve wages staying on their forecast path and producers passing on the efficiency gains as reductions in their prices. It seems more realistic, however, to expect that the Reserve Bank will preserve its medium term objective of keeping underlying inflation to within 2–3 per cent and allow real wages to rise than expect it to permit prices to fall below its target band.

Implications for national welfare

But what is the implication for the economic welfare or material wellbeing of Australians? To assess the welfare significance of the change, the increase in activity is translated into an increase in real consumption that it allows. Real consumption is a primary purpose of economic activity and is a better measure of welfare or material wellbeing than GDP. While there are many factors which shape welfare outcomes, including environmental factors and others that are not always reflected comprehensively in the national accounts, all else being equal, most people would consider themselves better off with an increase in their ability to consume.¹⁴

One step in the conversion of the results from changes in activity to consumption is to note that income is influenced by changes in the terms of trade.¹⁵ As part of the economic expansion generated by the greater use of e-commerce, export volumes expand. Despite this, it is likely that e-commerce will increase the prices of exports relative to imports. This is because e-commerce will increase foreign awareness of Australian products. The resulting improvement in export prices relative to import prices (i.e. the improvement in the terms of trade) will increase

14 It is also notable that it does not seem likely that greater use of e-commerce would contribute significantly or disproportionately to greater environmental degradation or higher crime rates or other negative factors that would reduce welfare gains from increased consumption.

15 In order to produce conservative results it is assumed (fairly realistically) that e-commerce does not alter the overall fiscal balance and therefore change the aggregate consumption rate. That is, governments do not raise or lower tax rates, although the level of spending rises and falls with changes in the overall level of activity.

consumption relative to economic activity. Offsetting this to some extent, owners of foreign capital remit their after tax return on investment, generating a leakage to the domestic economy and reducing its consumption potential.

The net change in the consumption potential of the economy is projected in Exhibit 4.1(a). This shows that increase in consumption can be expected to be higher than the percentage deviation in activity (i.e. real GDP). Australians are richer because the economy will be using its resources better. The economy will essentially be getting more out of the capital and labour endowment and there are more jobs (see Exhibit 4.1(d)).

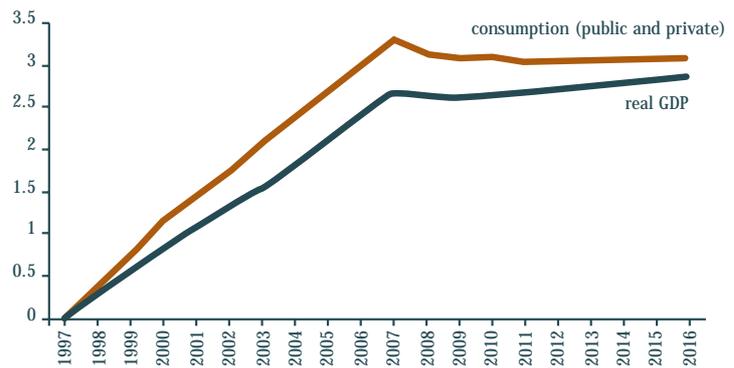
Exhibit 4.1

Major macro economic impacts (% deviation from base case forecasts)

(a) Real GDP and consumption

Output (real GDP) is projected to be higher if Australia makes greater use of the potential of e-commerce. Real GDP will rise to a level 2.7 per cent higher than the base case by 2007.

Real consumption (private and public) is also expected to be higher, peaking at about 3.2 per cent above the base case forecast by 2007. Consumption rises as a result of an overall increase in income.

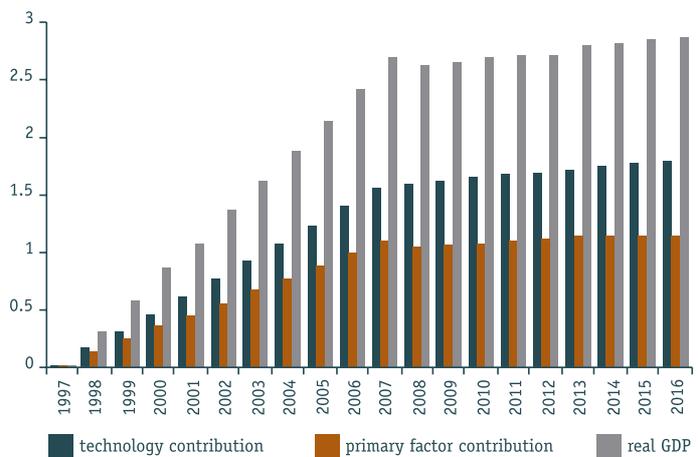


(b) Contribution to real GDP

The source of the additional output can be divided into two components.

The technology contribution stems from the combined savings including disintermediation benefits.

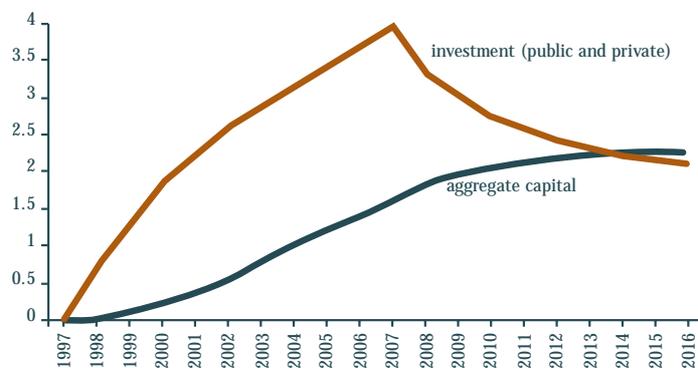
The primary factor contribution is the contribution to output growth from the capital and labour that is freed through greater use of e-commerce.



(c) Real investment and aggregate investment

Real investment rises as a consequence of the additional capital that is made available to the economy. This peaks in 2007 when the direct changes are expected to be complete. While investment then falls towards base case levels it remains slightly higher because the capital stock is now expanded and more maintenance investment will be required.

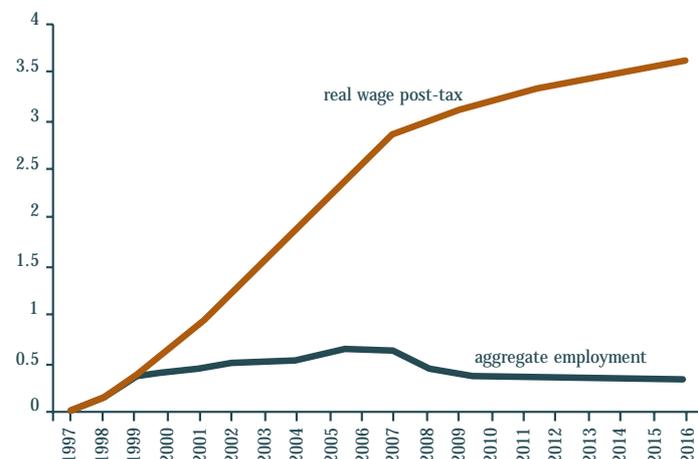
Aggregate capital increases reflecting the change in investment. The increase in Australia's capital requirements is financed by foreigners. Payments for this capital reduces the portion of the benefits that can be consumed in Australia.



(d) Real wage rate and aggregate employment

The simulation indicates that real wages will rise. The productivity improvements boost the value of extra labour.

Increases in real wages restrain the increase in aggregate employment that can be achieved over time.



Source: MONASH model results.

External competitiveness

Greater use of e-commerce can be expected to lead to significant changes in external competitiveness. Details about the impact upon the trade outcomes and external factors in general are provided in Exhibit 4.2.

A key factor is that the real exchange rate is driven by changes in investment. The capital inflow that stems from the opportunities created by greater use of e-commerce pushes the value of the Australian dollar up.

In the longer term, when the investment pressure slackens (i.e. after 2007) the exchange rate moves closer to the base line projections. It does not fall back to the base case because e-commerce has a favourable long term impact on the terms of trade. The terms of trade improve because Australia will earn higher unit prices on a slightly smaller volume of exports. Additionally, the prices of imported items will fall relative to exports.

The appreciation of the real exchange rate is expected to have a significant impact on aggregate export and import volumes.¹⁶ The overall result is a deterioration in the balance of trade at first. This is gradually unwound as exports recover strongly when the exchange rate moves towards base case levels.

The impact of these changes is not felt evenly through the economy. Tourism and related services exports enjoy a significant boost as a result of these factors. Commodity exports face offsetting disadvantages.

¹⁶ Changes in import and export volumes are measured by making a weighted average of the percentage change in the quantities of each individual commodity (e.g. wool, wheat). These weights are value shares.

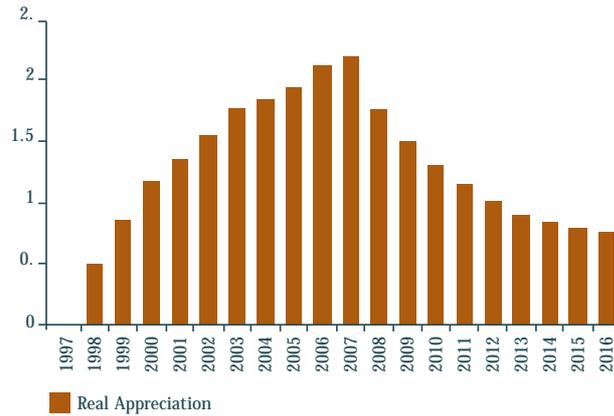
Exhibit 4.2

External competitiveness (% deviation from base case forecasts)

(a) Real exchange rate

The real exchange rate is sensitive to the expected impacts of e-commerce. It is expected to be higher than it would otherwise be by about two per cent by the year 2007 as a corollary of the expected increase in investment and capital inflows.

The increase is sustained after 2007 because of the increased capital requirements in the economy at large.

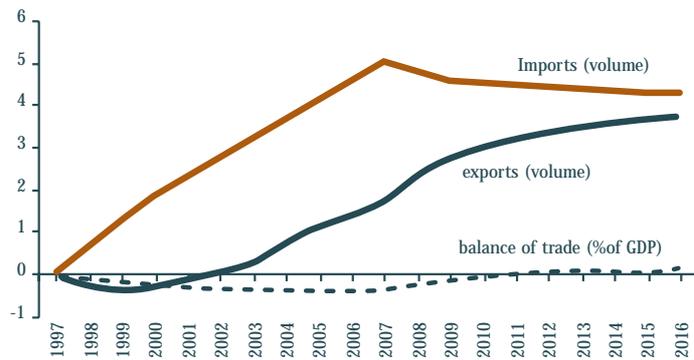


(b) Aggregate export and import volumes

Imports rise strongly at first strongly associated with the real appreciation of the currency.

Exports decline at first reflecting the appreciation of the exchange rate. They eventually rise as well despite the appreciation through the expected export enhancing benefits of e-commerce.

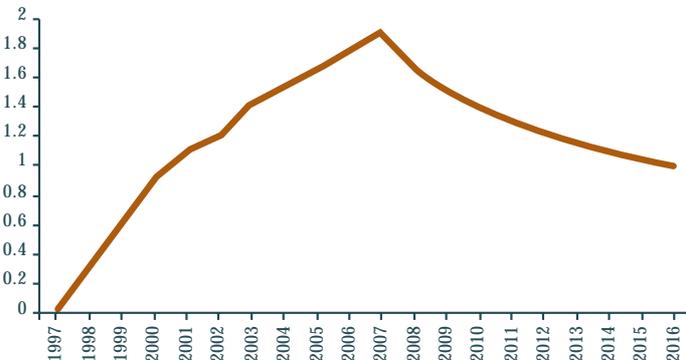
Australia will run a balance of trade deficit that corresponds to the increase in investment in the initial years. The deviation in the balance of trade will eventually turn around and swing towards surplus. This is despite the fact that the deviation on imports stays above exports.



(c) Terms of trade

Changes in the terms of trade shadow the projection for changes in the real exchange rate.

The terms of trade changes reflects the expected direct impacts. After the initial shocks the terms of trade position still reflects an improvement from the base because Australia will earn higher unit prices on a smaller volume of exports into the long run.

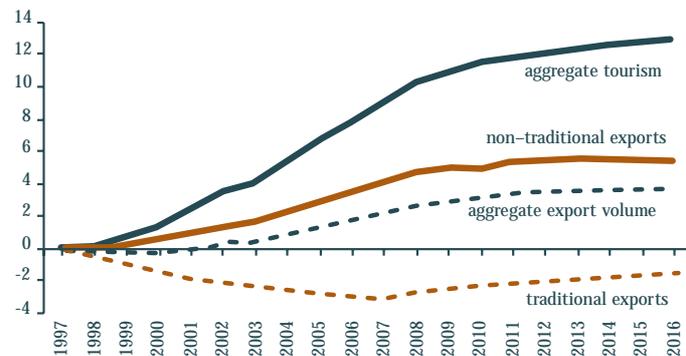


(d) Changes in exports

This chart highlights that the driver of additional exports is earnings from tourism.

At the other extreme, Australia's commodity exporters are slightly displaced from e-commerce. This is because these sectors receive little direct benefit while the appreciation of the real exchange and higher real wages harms their competitiveness.

The remainder are somewhere in between. These exports benefit more from the direct market than the offsetting disadvantages due to the real appreciation.



Source: MONASH model results.

Industry outcomes

Greater use of e-commerce results in structural change of the economy. It is expected to stimulate activity and employment in industries that benefit from increased awareness of their products or services, meet the growing e-commerce needs of other institutions or just grow through the productivity enhanced expansion of activity at large. The majority of industries are expected to expand for one or more of the above reasons.

The flip side of structural change is that some industries will experience some displacement. Naturally those industries that provide services that can be disintermediated by greater use of e-commerce face particular challenges. They are likely to see less activity than otherwise, although they may still grow in absolute terms. Other sectors may be disadvantaged by the macro economic impacts identified earlier. Export oriented activities that are sensitive to changes in the appreciations in the exchange rate are particularly at risk.

The MONASH model calculates the output deviation paths for 113 industry sectors. To present the findings in a more coherent way, industry results are aggregated and presented graphically in two clusters.

- The first deals with the sectors that are the main focus in this pilot study. These include sectors that experience direct impacts in the model.
- The second cluster contains industry sectors that mainly experience flow on impacts of change.

A brief commentary about the industry impacts is provided in the following sections.

Cluster one

Entertainment and hospitality

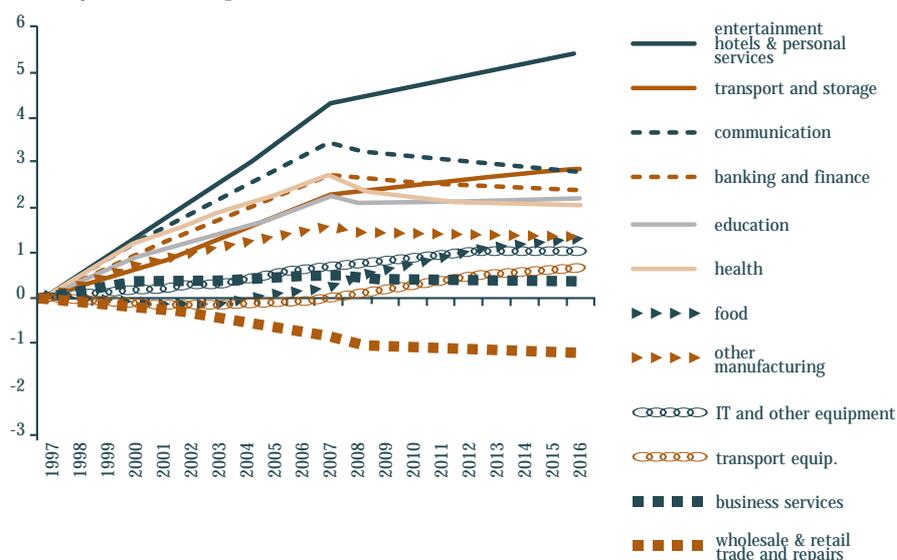
Activity in the entertainment and hospitality sector will be some 4.3 per cent larger by 2007. This sector benefits primarily from growth in tourism exports and through the general expansion in consumption in Australia at large. Tourism exports grow strongly relative to other exports. This sector enjoys the largest expansion from the forecast changes.

Communications

The communications sector will grow by 3.4 per cent by 2007. Cost reductions are achieved in this industry via e-commerce. Demand rises for industry outputs used to facilitate e-commerce activity as investment in e-commerce infrastructure is required. The increase in activity in this sector tapers off after 2007 when the direct changes are assumed to be completed. Activity is still above the base case because of overall growth in the economy.

Exhibit 4.3

Industry/sectoral impacts: cluster one (% deviation from base case)



Source: MONASH model results.

Banking and Finance

Activity in the banking and finance sector will be larger than the base case forecast by 2.7 per cent by 2007. Major cost reductions are achieved in the sector due to e-commerce enhancing its competitiveness. However, expansion of the sector is limited by low price-sensitivities of demand.

Health

The health sector will rise by 2.7 per cent by 2007. Health expenditure increases are facilitated by higher government revenue flow on implications of higher levels in activity. The sector therefore broadly tracks changes in GDP at large.

Education

Education will rise by 2.2 per cent by 2007. As with health, education increases are largely related to increases in government revenue and spending that flows from growth in other sectors and the economy at large.

Transport

Activity in the transport sector will be some 2.2 per cent larger than the base case by 2007. This sector owes its strong positive result to air transport, which benefits from increases in tourism demand. The increase in activity in this sector is sustained well after the initial changes have been absorbed, reflecting the compounding benefits of encouraging growth in an activity that is already forecast to grow strongly in the base case.

Other manufacturing

Other manufacturing is anticipated to be larger than the base case forecast by 1.6 per cent by the year 2007. The output paths for most of these industries are closely related to that of investment. Industries highly exposed to import competition are adversely affected by real dollar appreciation especially in the early years of the simulation period. Industries such as this one with considerable export potential will perform well.

Food products

The food products sector is adversely affected to a modest extent in the early part of the simulation period by the forecast real appreciation. Later, the sector's exports recover as the appreciation in the real exchange rate weakens. Eventually output will have a positive deviation reflecting growth in consumption in the economy at large and will increase by 1.4 per cent by 2016.

IT and other equipment

IT and other equipment is expected to be larger than the base case forecast by 0.7 per cent by 2007. Industries in this sector are influenced by a variety of factors. Export-oriented subsets of this industry (such as agricultural and construction machinery) benefit from e-commerce via increased foreign awareness of their products. The other industries in the sector benefit from stronger investment and consumption but are harmed by increased competition from imports arising from a stronger real exchange rate. There is a positive overall effect in the first decade of the simulation through e-commerce related IT acquisitions.

Transport equipment

This sector is dominated by the motor vehicle industry. Output from the Australian motor vehicle industry is highly sensitive to the real exchange rate. In the early part of the simulation period the industry suffers from import competition brought about by a high real exchange rate. Consequently, the sector registers no change by 2007 despite increased activity and consumption. Later when the real exchange rate falls, the industry rises by 0.7 per cent by 2016 associated with increased activity in the economy.

Business services

The business services sector is expected to see an increase in activity by 0.5 per cent to the year 2007 compared with the base case. While the sector achieves major cost reductions via e-commerce, expansion of the sector is limited by the strong link between business services and wholesale and retail trade. That is, a large number of business services act as intermediaries, which are bypassed to some extent by e-commerce supported activity.

Wholesale and retail trade

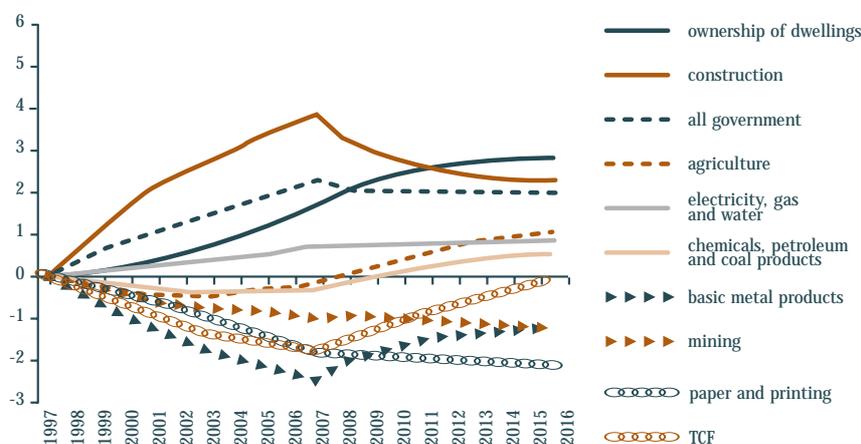
Wholesale and retail trade is expected to decline relative to the base case by 0.8 per cent by 2007. The fall in this sector is dominated by the negative result for retail trade. Retail trade contracts as e-commerce permits traditional retailing to be bypassed.

Other Sectors—cluster two

The industries in the second cluster are not directly impacted by e-commerce in the modelling exercise, but are affected nonetheless by the flow on effects that reverberate through the economy.

Exhibit 4.4

Industry/sectoral impacts: cluster two (% deviation from base case)



Source: MONASH model results.

Flow on effects positively impact some sectors. Increases in productivity and real wages have dual effects of freeing up additional investment and improving consumer confidence, both of which positively impact, for example, upon construction and ownership of dwellings. Additional economic activity generates greater government revenue and the public sector expends in line with activity at large.

Many of the industries in cluster two, however, are not affected positively. Real appreciation of the exchange rate negatively impacts upon many commodity sectors, such as mining, metal products as well as import competing sectors such as TCF. Commodity exports become relatively more expensive abroad and others face greater competition domestically from relatively cheaper imported goods. The exchange rate appreciation is caused by real wage increases that arise from e-commerce related productivity gains in the rest of the economy.

Many of the export commodity sectors recover as the real exchange rate eventually returns towards the base case trajectory. This is the case for basic metal products and chemicals. The exception is mining. This largely reflects a sustained decline for black coal. Relative to other major mining activities black coal spends very little on intermediate inputs and therefore obtains no benefit from e-commerce while other sectors do. Black coal accounts for an increasing proportion of mining activity at large in the base case forecast and so the sector at large sustains a contraction.

In the agriculture sector, industries producing export commodities (e.g. wool, grain and meat) perform poorly relative to industries producing food for the domestic market or inputs (e.g. grapes) used in emerging export products. This is because, as explained above, exports are harmed by real appreciation. Agriculture recovers strongly following abatement in the appreciation of the exchange rate.

The impact on occupations

The structural change in the composition of Australia's industry brought about by greater use of e-commerce will also change the demand for

people with differing occupational skills and experience. One person's labour is not a perfect substitute for another's in areas where skills matter. Retraining the workforce to better match the skill profile required by industry is a key requirement of smooth structural change.

The MONASH model includes a module that allows analysis of changes in demand for differing occupations.¹⁷ It is important to note that this focuses on changes in demand. Labour is assumed to be able to move freely between occupations in the core MONASH model. The results cannot be read as indicating that educational systems will be able to meet the demand or indicate where bottlenecks may be experienced.

Results for 340 occupations are available. Exhibit 4.5 shows the modelling results for two dozen occupations that reflect the overall changes and flow on effects.

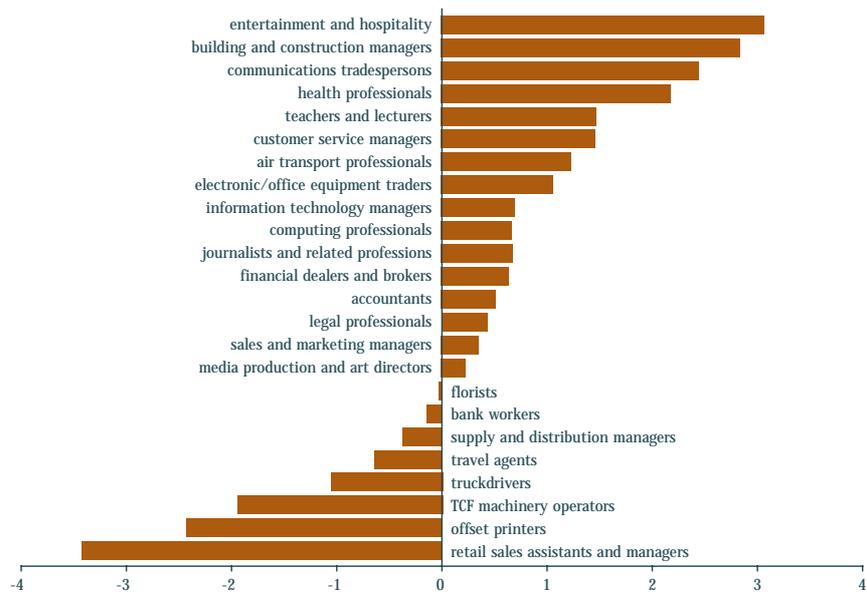
Changes stem from a mixture of direct effects and flow on impacts in industries that at first glance would seem to be quite removed from e-commerce. In contrast perhaps to a view that e-commerce is an IT issue leading largely to increased demand for computing professionals, the occupations expected to see large increases in demand are spread broadly. The occupations with the highest increases are associated with hotels, restaurants, entertainment and air travel. These are the industries that will benefit from an e-commerce related expansion of tourism.

In addition, there is a varying degree of increased demand for professionals in health, education, business, finance, accounting and law. These benefit from e-commerce efficiencies.

It is true that the greater use of e-commerce in the industry will lead to an increase in demand for computing professionals above those already factored in to the base case. This is by no means the largest area of occupational demand.

Exhibit 4.5

Change in occupations (% deviation from base case)



Source: MONASH model results.

17 See Philip D. Adams and G. A. Meagher 'The output for employment by occupation', *Australian Bulletin of Labour*, Vol 23, No. 4 December 1997, pp. 231-254.

Occupations that experience a decline in demand for their services are in areas such as printing, retailing, TCF, ground transport and banking staff. Printing and retailing were identified as losing industries reflecting e-commerce related savings in paper used (i.e. reduced use of hard copy) and savings of retail margins (that is, this stems from model assumptions). Employment in transport is reduced by e-commerce related labour-saving technical change. The TCF sector is harmed by the real appreciation associated with e-commerce related increases in real wage rates. It is expected that greater use of e-commerce for banking purposes will reduce the demand for teller staff.

Regional impacts

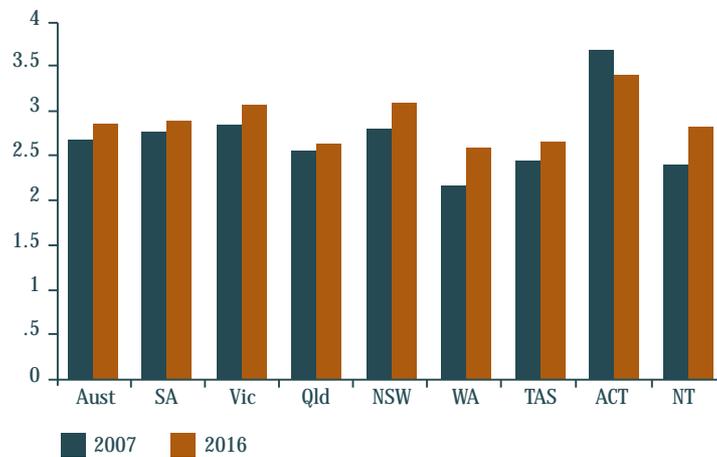
Given the expected industry impacts, because the location of industry in Australia is known, it is practicable to assess the geographical spread of the economic change in Australia.

Impacts on State and Territory economies

Exhibit 4.6 shows the deviation in gross state product (GSP) in Australia’s six States and two Territories. The results show that every State and Territory of Australia will obtain net benefits. This does not mean that sustained *growth* is projected over the timeframe to 2007 and beyond. That depends on trends that are forecast in the base case. What it does suggest is that all States and Territories will have a larger economy than they would otherwise have in the absence of e-commerce. Some, however, do better than others.

Exhibit 4.6

Impact on the States



Source: MONASH model results.

The State which is least stimulated is Western Australia. As noted earlier, some macro economic flow ons from the greater use of e-commerce disadvantages mining. The benefits expected to be obtained in Western Australia are offset somewhat by the reduction in mining in Western Australia.

Queensland has a heavy concentration of mining and also agriculture. This explains its relatively low ranking in Exhibit 4.6. An offset for Queensland, which means that it performs better than Western Australia, is its well developed tourism industry.

Tasmania and the Northern Territory, like Queensland, have strong representations in their economies of commodity exports and of tourism. As a result these regions will obtain growth with greater use of e-commerce similar to that of Queensland.

The industrial composition of the New South Wales economy is broadly in line with that of Australia at large. Thus the forecast deviation path for GSP in New South Wales is close to that for Australia's GDP.

Victoria and South Australia have above average prospects with greater use of e-commerce. Neither of these regional economies has a heavy reliance on commodity exporting.

The Australian Capital Territory is the State/Territory with least reliance on commodity exports. It therefore obtains most of the benefits without significant costs. This gives it the top ranking in Exhibit 4.6.

Statistical divisions

The MONASH model also permits detailed disaggregation of simulation results into more detailed local impacts based on the Statistical Divisions used by the ABS. These divide Australia into 57 areas selected to reflect 'identifiable social and economic links between inhabitants and between the economic units within the region, under the unifying influence of one or more major towns or cities'.¹⁸ (See Appendix B about technical aspects of the MONASH model).

The long run deviations from the base case forecasts for Statistical Divisions are shown in Table 4.2 below. This reveals that almost every region in Australia is better off as a result of the changes brought by greater use of e-commerce. Over 50 regions can expect a long run increase in the Gross Regional Product (GRP) of between one and four per cent. This is despite the fact that output in some sectors is expected to be lower as a result of the expected changes, particularly in retail, mining and agriculture.

The biggest employment effect is an increase of 1.4 per cent and the smallest is a loss of 0.2 per cent.

The main cause of variations in the results for Statistical Divisions is differences in dependence on tourism and dependence on commodity exporting. The top three Statistical Divisions shown in Table 4.2, Far North (QLD), Morton (QLD) and Kimberley (WA), all have heavy reliance on tourism. At the other end, we find Mackay (QLD), South East (SA), Barwon (VIC), Peel (WA), Far West (NSW), South West (WA), Fitzroy (QLD), North West (QLD) and Goldfields-Esperance (WA). All of these areas of Australia rely heavily on either export-oriented agriculture or export-oriented mining, activities that (in this simulation) are likely to obtain only modest additional direct gains from e-commerce. Further work to identify and analyse more of the direct gains that could be realised in mining and agriculture may find that the outcomes for these regions would be a net boost.

Only one Statistical Division sees a decline in GRP and employment. This decline is small and little different from a zero change (i.e. the result is not larger than the rounding error involved in the shocks and model calculations).

18 ABS, *Australian Standard Geographical Classification*, Cat no. 1216.0, AGPS, Canberra, 1995, p. 18.

It is notable that the small decline in employment in five regions is associated with a productivity boost brought about by e-commerce (i.e. an increase in GRP per worker). The largest forecast decrease in employment relative to the base case equates to net losses of 46 jobs. This is after more than a decade of change, giving industries, communities and governments considerable time to adjust and respond as necessary. While structural adjustment is not always comfortable, especially for those involved, this would seem to be an area where the transition costs could be easily managed.

Table 4.2**Regional growth and employment (% deviation from base case)**

Statistical Division	Employment	Gross Regional Product (GRP)	GRP per worker
New South Wales	0.41	2.28	1.87
Sydney	0.41	3.30	2.89
Hunter	0.18	1.48	1.30
Illawarra	0.26	2.22	1.96
Richmond-Tweed	0.63	3.20	2.57
Mid-North Coast	0.53	3.13	2.60
Northern	0.46	2.41	1.95
North Western	0.40	1.72	1.32
Central West	0.32	1.95	1.63
South Eastern	0.68	3.01	2.33
Murrumbidgee	0.45	2.57	2.12
Murray	0.61	2.51	1.90
Far West	-0.02	-0.11	-0.09
Australian Capital Territory	0.93	3.12	2.19
Victoria	0.37	2.81	2.45
Melbourne	0.14	3.07	2.93
Barwon	0.09	2.71	2.63
Western District	0.22	2.32	2.10
Central Highlands	0.39	2.98	2.59
Wimmera	0.23	2.24	2.01
Mallee	0.58	2.93	2.35
Loddon-Campaspe	0.34	2.93	2.59
Goulburn	0.38	2.84	2.46
Ovens-Murray	0.54	2.92	2.38
East Gippsland	0.79	3.43	2.63
Gippsland	0.35	2.59	2.24
Queensland	0.38	1.89	1.51
Brisbane	0.15	3.08	2.93
Moreton	1.18	4.06	2.88
Wide Bay—Burnett	0.19	2.48	2.29
Darling Downs	0.17	2.42	2.24
South West	0.20	0.86	0.66
Fitzroy	-0.05	0.82	0.88
Central West	0.41	0.43	0.02
Mackay	0.13	0.44	0.31
Northern	0.55	2.28	1.73
Far North	1.38	3.82	2.44
North West	-0.11	0.09	0.21
Adelaide	0.24	3.16	2.92
South Australia	0.32	2.50	2.18
Outer Adelaide	0.54	3.09	2.55
Yorke and Lower North	0.33	2.16	1.82
Murray Lands	0.55	2.82	2.26
South East	0.12	2.32	2.20
Eyre	0.24	1.95	1.71

Table 4.2 continued

Statistical Division	Employment	Gross Regional Product (GRP)	GRP per worker
Northern	0.24	1.97	1.73
Northern Territory	0.30	2.52	2.22
Western Australia	0.32	2.05	1.73
Perth	0.19	2.94	2.75
Peel	0.07	2.05	1.98
South West	-0.05	1.30	1.35
Great Southern	0.17	2.07	1.89
Wheatbelt	0.38	1.57	1.19
Goldfields-Esperance	-0.16	0.03	0.19
Mid West	0.30	1.67	1.37
Gascoyne	0.69	2.15	1.46
Pilbara	0.65	2.49	1.84
Kimberley	0.95	4.26	3.31
Tasmania	0.36	2.55	2.19
Greater Hobart	0.45	3.05	2.60
Southern	0.57	2.57	2.00
Northern	0.29	2.62	2.33
Mersey-Lyell	0.14	1.98	1.84

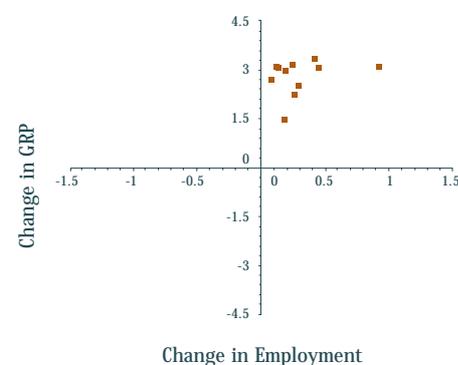
Source: MONASH model results.

The benefits of greater use of e-commerce are spread evenly around the nation. This is not a case where it is only the cities that benefit. The following Exhibit compares employment and output deviations for metropolitan and non-metropolitan (or country) regions based on the results in the table above. This exhibit makes it clear that almost every region is in the optimal situation where output and employment would increase.

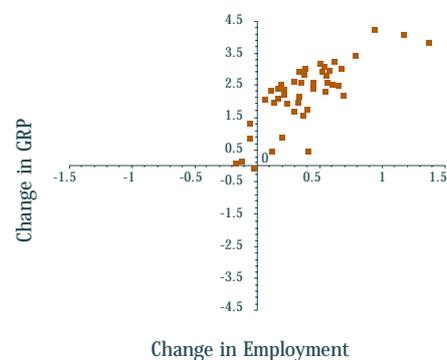
Exhibit 4.6

Regional impacts: gross regional product and employment (Long run % change from base case)

(a) Metropolitan regions



(b) Non-metropolitan regions



Source: MONASH model results.

The data for country regions (Exhibit 4.6(b)) are more spread out, but that is to be expected with a larger sample. Interestingly, metropolitan regions (Exhibit 4.6(a)) are estimated to achieve smaller increases in output than the majority of country regions. The regions which obtain the largest benefits are country regions (which is related to tourism impacts discussed above).

The above results are based on impacts that apply nationally. Things may change if some regions adopted e-commerce more rapidly than others, reflecting policy or other impediments.

Chapter Five

Sensitivity analysis

How robust are the simulation results to changes in the assumptions? This Chapter reviews sensitivity of the findings to changes in key assumptions.

The flow on impacts (i.e. the deviations from base case) that are forecast to result if the economy makes greater use of e-commerce in the way modelled should be viewed as being fairly robust. They should apply whatever cyclical changes the economy will in fact experience in the years ahead. If growth slows down, or accelerates, and is different from outcomes foreshadowed in the base case in this analysis, the forecast deviations could still be anticipated. Activity would still be higher than would be the case if Australia did not adopt e-commerce.

5.1 Different direct impacts

How would the outlook differ if the actual direct changes (or model shocks) were different?

Experimentation with the model using different settings indicates that the findings are fairly robust to changes in most of the assumed direct impacts (or shocks) introduced into the model. The broad picture about the nature and composition of expected economy-wide impacts do not change with adjustments in the initial shocks. The main difference is that the magnitude of the forecast outcomes differs. While the MONASH model is not a linear model, for reasonably small changes in initial shocks, the results are generally altered proportionately to the magnitude of changes in the initial shock.

Readers can anticipate the impact of alterations in starting shocks if they wish. Chapter Four contains an indication of the importance to GDP and economic welfare of each of the 14 sets of shocks used in the e-commerce change scenario simulation. These indicators can be used for sensitivity analysis about the flow on impacts. For example, if it is thought that the initial estimate of the saving of margins by consumers (shock s1) was too low and that it should be raised by 50 per cent, then it is expected that a MONASH simulation would generate an extra long-run increase in consumption of 0.09 per cent and in GDP of 0.07 per cent.

It is notable that the analysis has made assumptions about major parameters such as the availability of bandwidth at affordable prices. At this stage it appears likely that this will be obtained. If not, the forecast impacts will be reduced commensurately with shortfalls in the rate and extent of widespread adoption of e-commerce.¹⁹

Additionally, some readers may view that the analysts have been too conservative in anticipating a ten year delay until the full effect of identified changes are felt when it could be achieved in say five years. In this case, outcomes forecast for 2007 could be achieved as early as 2002.

5.2 Leading and lagging the rest of the world

Even if other countries are quicker in taking up e-commerce than Australia, Australia would still obtain most of the benefits forecast because it would still obtain an absolute productivity gain (given that the direct

¹⁹ There may be major changes, however, if there are in fact substantial differences in bandwidth and other support infrastructure in different regions. This is identified as an area to be covered in further work.

impacts are a reasonable representation of the changes to be actually realised).

This is not to say that the flow on effects from the trade dimension, are insignificant. Slow or fast adoption of e-commerce in Australia relative to the rate of adoption in the rest of the world can be expected to result in different outcomes.

A danger for Australia if it lags behind the rest of the world in the adoption of e-commerce methods is that it will lose market share in tourism and elaborately transformed manufactures to competitor countries. In terms of the sets of shocks listed in Appendix A, Australia will fail to acquire all or part of the benefits of shock 13, in other words Australia will miss the opportunity to increase foreign awareness of its products. On the other hand, if it was a leader in some areas, particularly say in relation to some other economies in the Asia-Pacific, it could obtain a first mover advantage.

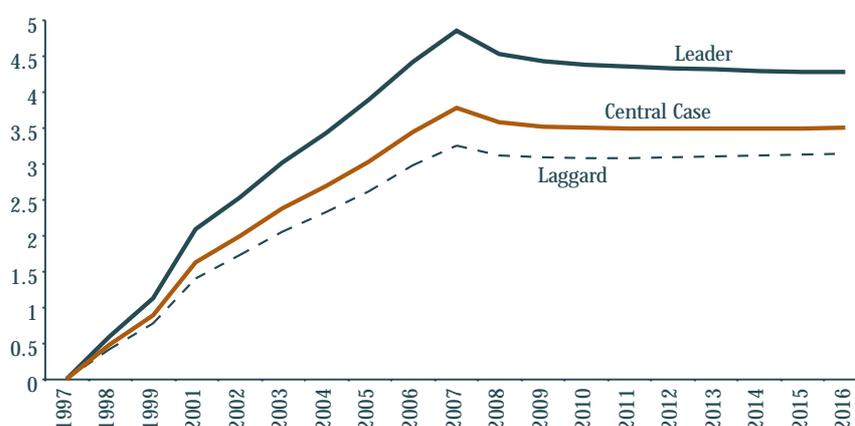
Exhibit 5.1 below shows the paths of consumption (a legitimate measure of economic welfare in the MONASH simulations reported in this study) in three MONASH simulations:

- the *central case* simulation of the effects of e-commerce already discussed in the previous sections;
- a simulation in which Australia *lags* other countries in adopting e-commerce; and
- a simulation in which Australia *leads* other countries.

In the lag simulation, it is assumed that Australia increases foreign awareness of its products (shock 13) at half the rate assumed in the standard simulation, and in the lead simulation it is assumed that Australia increases foreign awareness of its products at twice the rate assumed in the standard simulation. In the lag simulation it is assumed that the loss of market share relative to the standard simulation is permanent. That is, after the assumed ten-year adoption period, the e-commerce induced increase in foreign demand for Australian products is permanently left at half the value it had in the standard simulation. Similarly, in the lead simulation it is assumed that the e-commerce induced gain in foreign demand for Australian products is permanently left at twice the value it had in the standard simulation.

Exhibit 5.1

Consumption in central, lead and lag simulations (% deviation from base case)



Source: MONASH model results.

As could be expected, if Australia lags the rest of the world it will obtain less benefit. The simulation results indicate a long-run deviation in consumption in the lag simulation is about 0.3 percentage points below that in the central case simulation. Looking at what would happen if Australia were among the leaders, the long-run deviation in consumption is about 0.6 percentage points above that in the standard simulation.

The value of gaining extra market share by leading is about 13.9 per cent of a year's consumption. On the other hand, the consumption cost of lagging is about 6.6 per cent of a year's consumption.

Clearly there are compelling economic reasons to seek to ensure that Australia does not lag other economies in the implementation of e-commerce. The benefits of shifting into a leading position are relatively large and would be worth investing considerable resources in seeking to obtain that outcome in as many e-commerce fields as practicable.

5.3 Some unanswered questions

A question that has not been addressed in this analysis includes what would happen if there was a differential rate of adoption of e-commerce in the rest of the world. Would Australia's prospects as a leader or laggard change if there was greater information about the relative performance of the US, Europe, Japan and other economies in the Asia-Pacific region?

Chapter Six

Policy implications and next steps

What are the key points that can be drawn from this pilot study? This Chapter outlines some observations about the magnitude of the change envisaged, implications for policy and further analysis of this important issue.

Additional output in the order of 2.7 per cent of GDP as a consequence of greater use of e-commerce should not come as a large surprise. The fact that market participants are embracing the new technology at a pace that is astonishing indicates that there is already widespread agreement that the opportunities are extensive.

It is important to place the magnitude of the forecast impact into context. The result should be viewed as the net gains from the transformation to a more efficient business mode. It may seem a small number relative to most other values that are bandied about regarding e-commerce, but then most efficiency gains are about seemingly small changes at the margin. It is hard to find assessments of changes in the way that business is done which have simulated growth dividends as big as that found for e-commerce. The only example that comes to mind in the consulting team is the Industry Commission's simulation of the Hilmer reforms. By adopting a very broad view of the savings which could be attributed to the successful implementation of Hilmer, the Commission found a consumption gain of about three per cent compared to the 3.2 per cent increase in consumption due to e-commerce as modelled in this study.²⁰ Other microeconomic reforms such as tariff cuts generate relatively negligible gains. For example, in their final report on the Motor Vehicle Inquiry of 1997, the Commission showed a sustainable consumption gain from the proposed reduction in tariffs of 0.3 per cent.²¹

It is important to note that the MONASH model generally assumes the efficient functioning of markets in the long run. Obtaining the estimated net benefits depends, therefore, in part upon continued success in the government's pursuit of other crucial microeconomic reforms. This would ensure that businesses pass on cost savings that stem from e-commerce and that the market is able to adjust smoothly to the substantial transition that is to come. This in turn requires ongoing commitment to maintaining competitive product markets, increasing the flexibility of labour markets and continuing to enhance the efficiency of capital markets.

High expectations notwithstanding, the outlook for greater use of e-commerce should not be taken for granted. The technology is still at an early stage. While it appears to be entrenched for business purposes, the popular appeal may fade. Retailers may find that e-commerce is merely another marketing channel. Policy decisions taken by government may make or break the appropriate environment for the use of e-commerce to expand.

This finding reinforces the current thrust of the Commonwealth Government's approach to policy. The benefits are of such an order of magnitude that the government should continue to seek to ensure rapid adoption of e-commerce. It should continue its thrust of seeking to remove or alleviate the impact of market impediments.

²⁰ Industry Commission.

²¹ Productivity Commission, *The Automotive Industry, Volume II: Appendices*, Report No. 58, 26 May 1997.

There are a number of additional steps to learn more about the issues that are opened up or highlighted by this study.

A follow up to this pilot study should incorporate more comprehensive data about impacts including a wider range of industries. This could be obtained from a detailed and extensive survey to derive hard facts including costs, savings and other impacts rather than perceptions and investor sentiment.

More detailed application of the modelling technology could be used to better assess the international impact of e-commerce developments. This could include scenarios about Australia leading or lagging the rest of the world, with the world separated into regions with differing rates of advancement in the use of e-commerce.

This pilot study has assumed a fairly even application of e-commerce across the nation. What would happen if there is a differential rate of adoption in e-commerce. Would the pilot study's conclusion that almost all regions in Australia benefit still hold? Is it just a matter of sharing the same sized cake, or would the cake in terms of benefits shrink with differential regional adoption rates? Would policies applied at the State level make a difference or is a national approach optimal? Such a regional analysis is currently being addressed in a study which will be released by the end of April 2000.

An overarching observation in conducting this study was that there is a pressing need to collect better statistics about trends in e-commerce utilisation, its costs and benefits. As a general rule, the current national accounts framework is better suited to measurement of inputs and outputs in tangible or manufactured products. Meanwhile, e-commerce is likely to accelerate the economic contribution that services make, yet there are still challenges to be addressed in how these activities are measured.

Appendix A

Study methodology, shocks and data

A.1 Study methodology

A common approach when looking at e-commerce has been to conduct a survey of business leaders' views. Drawing on practical experience in this way can provide some useful data, and indeed, this study has used the results of some surveys of this nature. Because of the lack of an underpinning framework, however, a risk with the survey approach is that it serves to reinforce the conventional wisdom rather than tease out new insights.

Valuable additional insights can be found from the application of models based on theoretical frameworks that have been proven to be useful when looking at similar issues. The problem with this is that many of the analytical techniques used by economists and public policy practitioners (including statistical analysis tools and macro economic modelling) are hamstrung by the absence of reliable data about the issue at hand.

As noted in Chapter 1, the study combined these two techniques—relying on the Industry Reference Group (IRG) for expert opinion and to provide a reality check on the study's conclusions and using the MONASH model for the rigorous economic framework.

The IRG's role was to give the study strategic direction, to provide as much information as possible about the nature of the impacts of e-commerce and, as indicated above, to provide a reality check for the inputs to the model and sectoral reports. The IRG provided strategic input at the earliest stages of the project to help define the parameters to be used in the MONASH Model and provided comments at a number of progress meetings throughout the study process. This was important in giving the model a more realistic perspective.

The IRG also completed an industry survey, to collect information germane to both the modelling process and as a primary source of input for the sectoral reports contained in Part 2.

Through a series of meetings and interviews, IRG members shared their experience with the study team and assisted in ensuring that the direction the study took reflected their views about the outlook. IRG members were also involved in a survey used to assess the implications of e-commerce for key industry sectors.

A detailed review of alternative economic evaluation techniques conducted in an earlier scoping study identified that the MONASH model was the best means of assessing the structural change from e-commerce. This was because use of the model allowed for straightforward incorporation of disintermediation and other electronic impacts in a way that was realistic. It would also allow analysis of detailed sectoral impacts as well as the flow on effects through the economy at large. It was also recommended because the modellers that own and operate the model, the Centre of Policy Studies, have considerable experience with analysis of these kinds of issues. They operate with a framework that is open and transparent with the framework having been subject to worldwide peer assessment through publications in major economic journals.

The key structural assumptions and techniques used in the MONASH model are detailed in Appendix B.

... to my mind, a model is useless if it is just a black box where nobody knows what is in it except its author. Full documentation is an absolute necessity.

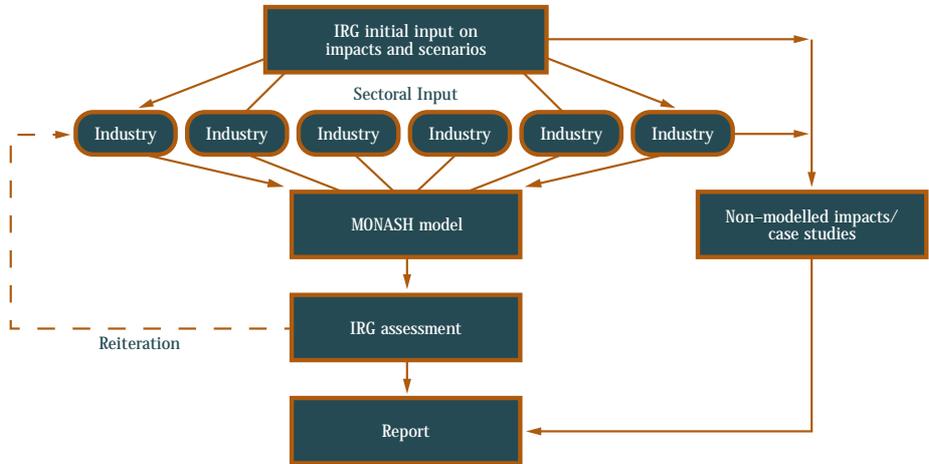
Hargraves, C., 'A comparison of the macroeconomic results of the economy wide models of Australia in response to a rise in labour productivity, in EPAC' (1994)

Study Process

The involvement of the IRG and the MONASH model was undertaken in an iterative process mapped out in the exhibit below.

Exhibit A.1

Conducting the MONASH Modelling

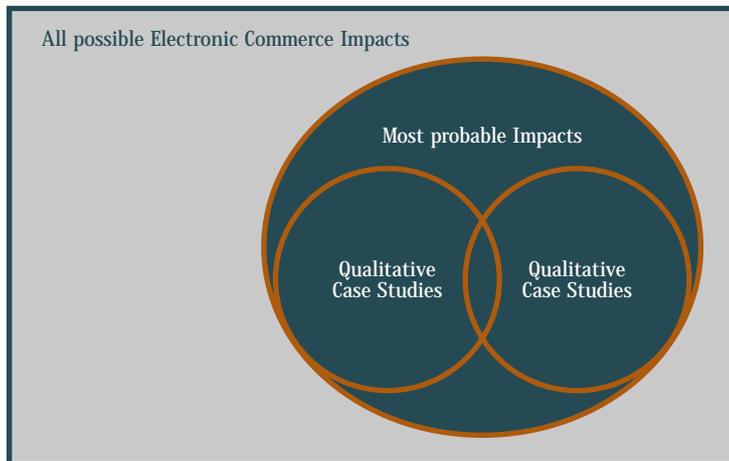


Source: The Allen Consulting Group.

The overall strategy in evaluating the economic impacts of e-commerce can be set out with the assistance of a Venn diagram, as shown in Exhibit A.2. This is discussed below.

Exhibit A.2

Impacts of E-commerce



Source: The Allen Consulting Group.

Universal impact. The box represents the totality of what e-commerce could bring in the future. There is already a vast literature discussing the future trends of e-commerce. It is confusing and often contradictory.

Most probable impacts. Even today it is possible to discern a number of major directions in the data with some confidence if only because of the ability of humans to recognise patterns. There is also a degree of self-fulfilling prophecy in this area. Researchers and businesses will focus their efforts on areas that are generally seen as being most prospective and rewarding today. Concentrating on the major impacts will narrow the scope to a much smaller portion of the potential impact of e-commerce.

Quantifiable forecasts. This narrows the forecast about expected outcomes to those that can be predicted with a reasonable degree of

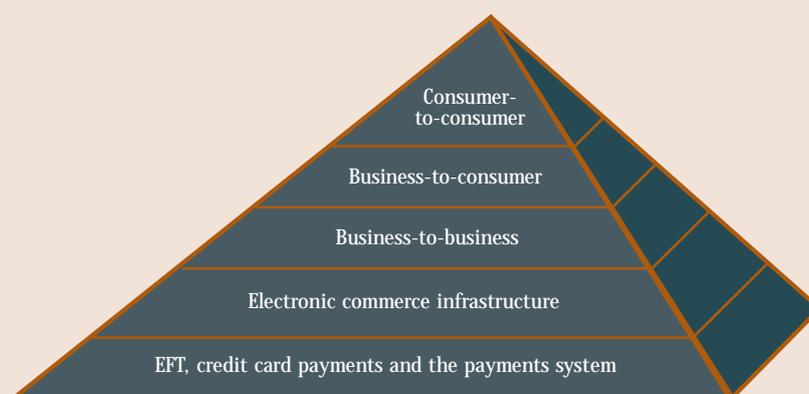
confidence. This is at the expense of breadth and detail. A good many of the expected impacts, mostly those of a qualitative nature are not included in the modelling in exchange for increased confidence in our results.

Non-quantifiable impacts. The study will reinject some of the detail and technical insight about the impact of e-commerce by using a case study approach in a limited number of key activities. This will work to maintain a balance between confidence and detail. These are included in the sectoral reports in Part 2.

Within the broad definition e-commerce can also be viewed as being formed of a number of differing layers of activity. The layers that are most often discussed in the industry and their relative significance is set out in the exhibit below.

Box A.1

Layers of e-commerce activity



EFT and Other Payments Systems is the transactional foundation upon which a great deal of e-commerce is based or follows. There are already a great number of transactions in the economy that occur at this level. Key activities at this level include use of Automatic Teller Machines (ATMs), the huge raft of transactions that occur daily between banks in the payments system, as well as credit card payments, electronic payrolls and many more.

E-commerce infrastructure includes network service providers, hardware, software and enabling services.

Business-to-business represents the major proportion of e-commerce activity. The focus of business-to-business e-commerce has been on the inter-corporate or inter-organisational supply chain, although non-supply chain interactions are also significant.

Business-to-consumer e-commerce can involve electronic transactions in marketing, ordering and paying, after sales service and, in the case of intangible or virtual goods and services, even delivery.

Consumer-to-consumer e-commerce consists primarily of websites where consumers deal directly with one another, such as online communities, free personal classifieds pages, auction houses such as eBay, and swap sites.

Source: Based on OECD 1997b, *Measuring E-commerce*, Committee for Information, Computer and Communications Policy, Paris, OCDE/GD(97)185, p. 19.

A.2 Shocks

To evaluate the economy wide implications of e-commerce the analysis draws on 14 sets of direct changes to the Australian economy. These changes are often referred to as 'shocks' because they change the balance that would have resulted without change. They cover four broad categories:

- retail and wholesale trade changes;
- selected sectoral changes;
- international trade related changes; and
- reintermediation costs.

All of these shocks are hypothetical values that seek to represent the broad nature of changes that are expected. They are informed by the limited data that currently is available. The study approach is basically the same as the MONASH model uses to estimate a change in policy such as taxes or tariffs, or the impact of a major piece of new infrastructure. It has proven to be useful in conveying the broad pattern of structural change in the economy. An overarching challenge in this area is that reliable data is not available to provide even more concrete values for these shocks.

These are discussed in detail below.

Timing

To simplify the analysis, the financial year ending June 1998 was selected as the base year for the study. All prices are in 1997–98 prices (constant dollars, unless indicated otherwise). It is assumed that the direct impacts are phased in over ten years, that is each operates in year 1 (1998) at a tenth of its eventual strength, in year 2 (1999) at two-tenths of its eventual strength and in years ten (2007) and beyond at its full strength.

(s1) Saving of margins by consumers

The main thrust of these changes is that greater use of e-commerce leads to a reduction in retail margins in those goods/industries that are identified as being amenable to sale via e-commerce. This is largely driven by disintermediation through business to consumer e-commerce. The reduction in retail margins ranges between 0 and 20 per cent over ten years. Books are viewed as being particularly susceptible to this impact and so margins in that industry fall by 30 per cent after ten years. For other goods, reductions in retail margins are forecast to be between 0 and 20 per cent (see Table A.1). Overall, the average reduction in retail margins is 12.8 per cent. This is a saving to consumers of about \$4.7 billion in 1996–97 prices, equivalent to about 1.6 per cent of consumer spending or 0.95 per cent of GDP.

Shifting sales activity away from retailers is not costless. Firms that fulfil e-commerce orders still require resources to do so. It is assumed that reductions in retail margins require increases in wholesale margins. That is, rather than dealing with retailers, consumers deal more directly with businesses that fulfil a wholesalers role (i.e. logistics, storage, etc.). It is assumed that the savings of retail margins are lost to consumers via increases in wholesale margins. This is a loss to consumers of about \$2.35 billion in 1996–97 prices.

Taken together these changes in retail and wholesale margins generate a direct gain in GDP of about \$2.35 billion, that is 0.47 per cent of GDP.

All of the GDP gain generated by changes in margins is available for extra private and public consumption. Because public and private consumption are about 80 per cent of GDP, a gain in GDP of 0.47 per cent translates into a consumption gain of 0.60 per cent.

(s2) Saving of time by consumers

A major finding of the study is that e-commerce saves households' shopping time. While it is difficult to discern the precise magnitude of such savings, it is likely to be associated with the extent of margins saved through disintermediation. That is, it is likely that consumers will save time in the areas where there are efficiency gains through disintermediation because these are the areas that are most amenable to the use of e-commerce. Using the margin savings as a benchmark and in order to be conservative, in the MONASH simulation it is assumed that the time saved could generate labour income equal to half the net savings generated by the reduction in consumer margins (i.e. half of s1). That is, it is assumed there is a potential increase in labour supply worth \$1.17 billion in 1996–97 prices.

Of the potential increase in labour supply it is assumed that half (\$0.59 billion) is translated into extra leisure and half into extra labour supply. This represents an increase in the economy's labour supply of about 0.20 per cent, generating an increase in GDP of about 0.14 per cent and a corresponding increase in consumption of 0.18 per cent.

In calculating welfare, the increase in leisure is also taken into account. Thus the welfare effect is equivalent to an increase in consumption of 0.36 per cent.

(s3) Purchase of e-commerce capacity by consumers

Obtaining access to e-commerce is not costless, although it is generally only a small part of costs paid for other things (e.g. to have access to a computer or email). At the risk of overstating the costs it is assumed that consumers purchase e-commerce equipment and services worth 25 per cent of consumer-margin cost savings. That is, consumers in year 10 purchase equipment and services worth \$0.59 billion. This is simulated as a change in consumer preferences requiring extra expenditures on: (a) electronic equipment of \$0.059 billion; (b) communications of \$0.059 billion; (c) Banking of \$0.247 billion; (d) non-bank finance of \$0.165 billion; and (e) business services of \$0.059 billion.

Changes in consumer preferences have no direct effect on GDP (because increases on expenditure for one product result in less spending on others within an income constraint). For welfare analysis, however, purchase of e-commerce equipment and services is recognised as an expense to consumers not a benefit.

(s4) Saving of margins by industries

There will also be a reduction in margins in transactions between goods/ industries. This reflects disintermediation between producers and retailers (i.e. business-to-business e-commerce). For most inputs to industry it is assumed that e-commerce will reduce Wholesale and Retail margins by five per cent over ten years. For consumer goods used as inputs to industries it is assumed that margins savings will be at the same rate as for consumers (discussed under s1).

Under these assumptions the overall reduction in margins on inputs to industries is about \$1.85 billion, approximately five per cent of wholesale and retail margins on inputs to current production and capital creation. This saving of margins in business is a GDP gain of about 0.37 per cent.

(s5) Saving of labour by industries in buying inputs

E-commerce will reduce shopping time not only for consumers but also for firms. This is simulated as a labour-saving technical change worth half the savings of margins by industries, that is half of shock (s4).

(s6) Purchases of e-commerce equipment by industries

As with consumers, it is assumed that industries must buy e-commerce equipment and services worth 25 per cent of their margins savings. By the tenth year this is an annual cost to the economy of about 0.093 per cent of GDP.

(s7) Direct labour saving technical progress in transport and banking

Some sectors were viewed as having additional productivity gain potential from greater use of e-commerce. Reflecting this view it is assumed that over the next ten years e-commerce will reduce labour costs by five per cent in the Transport and Banking sectors (comprised of MONASH industries 93, 96, 97, 99 and 100). These cost savings will arise from reductions in staff required to provide services to the public (e.g. selling airline tickets).

(s8) Time saving by industries dealing with the transport and banking sectors

The technical progress gains quantified in (s7) can also be expected to stimulate cost reductions for banking and transport customers. This is calculated in proportion to the use made of those sectors' inputs. Where j is any industry except Ownership of dwellings (MONASH industry 104), then if industry j uses ten per cent of the services sold by the Banking sector (MONASH industries 99 and 100) then it is assumed that industry j makes labour savings worth half of ten per cent of the savings made by Banking. A similar treatment is adopted with respect to industry purchases of services from the Transport sector (industries 93, 96 and 97).

(s9) Time saving by households dealing with transport and banking

If households use ten per cent of the services sold by industry q ($q = 93, 96, 97, 99$ and 100) then it is assumed that households save time worth half of ten per cent of the direct savings made by industry q . It is also assumed that if Ownership of dwellings uses ten per cent of the services sold by industry q ($q = 93, 96, 97, 99$ and 100) then households receive a time saving worth half of ten per cent of the savings made by industry q .

It is assumed that half of the timesaving made by households is devoted to labour and half is devoted to leisure.

(s10) Additional margins savings by communications industry

As well as the margin savings outlined in (s4), it is assumed that the Communication industry will save an additional 20 per cent of the wholesale margins on all its purchases. Industry representatives indicated that they consider that e-commerce will be important in enabling the industry to buy more directly from producers.

(s11) Saving of particular inputs

It is expected that some sectors will be able to save inputs through reengineering using e-commerce techniques and other factors.

- The Banking sector (industries 99 and 100) is expected to be able to save 5 per cent of its inputs of paper products (commodities 49 and 50).
- Business services (industry 103) will save 5 per cent of its inputs of paper (commodities 49 and 50), machinery and equipment (commodities 74 to 80) and financial and business services (commodities 101 to 105).
- Because e-commerce will reduce the need for constructing branch offices, it is assumed that the Banking industry (99) will save three per cent of the costs of construction inputs to capital creation.

(s12) Twist in favour of imports

E-commerce will increase awareness by Australian households and industries of foreign products. This is represented by a twist in preferences which at given prices increases the ratio of imports to purchases of domestic products by five per cent.

(s13) Increase in foreign awareness of Australian products

E-commerce will increase foreign awareness of many of Australia's manufactured commodities and of tourism opportunities in Australia. This is represented as follows:

- for MONASH commodities 25 to 48, 53 to 57, 59 to 85 and 101 to 105, a vertical upward movement in foreign demand curves of five per cent is assumed;
- for commodities 49 and 50 (publishing and printing), an upward movement of ten per cent is assumed;
- for tourism, an upward movement of five per cent is assumed. It is also assumed that e-commerce will not increase foreign awareness of Australia's agricultural, mineral and standard processed food products.

These shifts in export demand curves have an impact on the terms of trade of 2.4 per cent. With exports representing about 20 per cent of GDP, this terms of trade improvement is equivalent to a gift to consumers worth about 0.60 per cent of consumption.

(s14) Reductions in foreign-currency c.i.f. prices of imports

Wider use of e-commerce in Australia will help Australian consumers shop around and get a better deal on imported products. This is recognised in the simulation by assuming for most commodities that Australian consumers will be able to save foreign margins worth 50 per cent of the margins that they save in Australia. For example, if it is assumed that saving of Australian margins reduces the price of clothing in Australia by one per cent, then it follows that shopping around using e-commerce reduces c.i.f. prices of imported clothes by 0.5 per cent.

It is viewed that some goods are particularly susceptible to such shopping around including books and commercial printing (commodities 49 and 50). For these it is assumed that the percentage reductions in foreign prices equal the percentage reductions in Australian prices caused by saving of Australian margins.

After ten years, the assumed reduction in average import prices caused by Australia's adoption of e-commerce is 0.76 per cent. With imports being about 20 per cent of GDP, or 25 per cent of public and private consumption, the reduction in import prices of 0.76 per cent has an impact effect on consumption of 0.19 per cent.

A.3 Data

The following table contains detailed assumptions of reduction in retail margins used to generate the shocks discussed in the section above.

Table A.1

Assumed reductions in retail margins

Commodity	Per cent	Commodity	Per cent
<i>Agriculture, forestry & fishing</i>			
C1 Wool	10	C34 Cotton Yarns	10
C2 Sheep	10	C35 Wool Yarns	10
C3 Wheat	10	C36 Textile Finishing	10
C4 Barley	10	C37 Carpets	10
C5 Other Grains	10	C38 Canvas	10
C6 Meat Cattle	10	C39 Knitting	10
C7 Milk Cattle	10	C40 Clothing	10
C8 Sugarcane, Fruit & Nuts	10	C41 Footwear	10
C9 Vegetables, Cotton & Tobacco	10	<i>Wood & paper products</i>	
C10 Poultry	10	C42 Sawmill	10
C11 Agricultural Services	10	C43 Panels	10
C12 Forestry	10	C44 Fittings	10
C13 Fishing	10	C45 Furniture	10
<i>Mining</i>			
C14 Iron Ore	10	C46 Pulp and Paper	10
C15 Non-Ferrous Ores	10	C47 Bags and Boxes	10
C16 Black Coal	10	C48 Sanitary Products	10
C17 Oil and Gas	10	C49 Newspapers and Books	30
C18 Other Minerals	10	C50 Commercial Printing	20
C19 Mining Services	10	<i>Chemical products</i>	
<i>Food, drink & tobacco</i>			
C20 Meat	5	C51 Fertiliser	10
C21 Dairy	5	C52 Basic Chemicals	10
C22 Fruit and Vegetables	5	C53 Paints	10
C23 Oils and Fats	5	C54 Pharmacy	20
C24 Flour	5	C55 Soaps	20
C25 Bakery	5	C56 Cosmetics	20
C26 Confectionery	5	C57 Explosive	0
C27 Seafood and Sugar	5	C58 Petrol	0
C28 Soft Drinks	5	<i>Building materials</i>	
C29 Beer	20	C59 Glass	20
C30 Other Alcoholic Drinks	20	C60 Clay Products	20
C31 Tobacco	20	C61 Cement	10
<i>Textiles, clothing & footwear</i>			
C32 Cotton Ginning	10	C62 Readymix Concrete	10
C33 Synthetic Yarns	10	C63 Pipes	10
		C64 Plaster	10
		C65 Iron and Steel	10
		C66 Non-Ferrous Metals	10
		C67 Structural Metal Products	10

Table A.1 continued

Commodity	Per cent	Commodity	Per cent
C68 Sheet Metal	10	<i>Wholesale & retail trade</i>	
C69 Wire	10	C91 Wholesale Trade	0
<i>Transport equipment</i>		C92 Retail Trade	0
C70 Motor Vehicles	10	C93 Mechanical Repairs	0
C71 Ships	10	C94 Other Repairs	0
C72 Trains	10	<i>Transport & communications</i>	
C73 Aircraft	10	C95 Road Transport	0
<i>Machinery & appliances</i>		C96 Rail Transport	0
C74 Scientific Equipment	20	C97 Water Transport	0
C75 Electronic Equipment	20	C98 Air Transport	0
C76 Household Appliances	20	C99 Transport Services	0
C77 Electrical Equipment	20	C100 Communication	0
C78 Agricultural Machinery	20	<i>Banking & finance</i>	
C79 Construction Machinery	20	C101 Banking	0
C80 Manufacturing Machinery	20	C102 Non-Bank Finance	0
<i>Other manufactured products</i>		C103 Investment	0
C81 Leather Products	20	C104 Insurance	0
C82 Rubber Products	20	C105 Other Financial Services	0
C83 Plastic Products	20	<i>Rental services of houses</i>	
C84 Signs	20	C106 Ownership of Dwellings	0
C85 Sports Equipment	20	<i>Public administration & services</i>	
<i>Electricity, gas & water</i>		C107 Public Administration	0
C86 Electricity	0	C108 Defence	0
C87 Gas	0	C109 Health	0
C88 Water	0	C110 Education	0
<i>Construction</i>		C111 Welfare	0
C89 Residential Building	0	<i>Entertainment</i>	
C90 Other Building	0	C112 Entertainment	20
		C113 Hotels	0
		C114 Personal Services	0

Source: Centre of Policy Studies.

The following table indicates the percentage change in occupation levels for the 340 occupations included in the MONASH model.

Table A.2

Change in Occupation Levels by 2007

Occupation	% Change	Occupation	% Change
Aboriginal Hlth Wkrs	2.4	Clay, C'crete Proc Mach Ops	1.7
Accountants	0.6	Cleaners	1.3
Accounting Clerks	0.6	Clothing Tradespersons	-2.0
Actors, Dancers etc	2.9	Club Managers (Lic Premises)	2.3
Advanced Legal Clerks etc	0.6	Commissioned Officers	1.9
Air Transport Professionals	1.5	Communications Tradespersons	2.5
Aircraft Maint. Engineers	1.8	Company Secretaries	0.5
Ambulance Officers/Paramedic	2.4	Computing Professionals	0.7
Animal Trainers	2.7	Computing Support Technician	0.8
Aquaculture Farmers	-0.7	Concreters	3.9
Architects & L'scape Arch.	0.7	Const'n/Plumber Assistants	3.3
Auditors	0.7	Cooks	3.9
Authors etc	1.7	Corporate Treasurers	0.5
Automobile Drivers	-3.1	Counsellors	2.0
Automotive Electricians	-4.2	Court & Hansard Reporters	1.0
Bakers & Pastrycooks	-1.4	Crane, Hoist & Lift Ops	0.4
Bank Workers	-0.1	Credit & Loans Officers	0.8
Bar Attendants	4.8	Crop Farmers	-0.5
Betting Clerks	1.2	Customer Service Managers	1.5
Binders & Finishers	-2.7	Defence Force Members NEI	0.0
Blasting Workers	-0.7	Delivery Drivers	-1.0
Bldg, Arch & S'vey Assoc Prof	1.9	Dental Assistants	2.4
Bookkeepers	0.6	Dental Assoc. Professionals	0.4
Bricklayers	4.6	Dental Practitioners	2.5
Brnch Acc'ts & M'gers:FinInst	-0.4	Designers & Illustrators	0.7
Building & Cnstrctn Managers	2.8	Desktop Publishing Operators	1.3
Bus & Tram Drivers	-2.8	Dietitians	2.3
Business Analysts	0.7	Domestic Housekeepers	3.3
C'van Park/Camp'g Ground Mgr	5.1	Drillers	-0.4
Cabinetmakers	1.8	Earthmoving Labourers	3.1
Caretakers	2.2	Economists	1.3
Carpentry & Joinery Trades	4.3	Education Aides	2.1
Cartographers & Surveyors	0.5	Education Managers	2.2
Checkout Operators	-3.6	Education Officers	1.5
Chefs	3.9	Elect/Telecom Trades Assist	1.0
Chem, Petroleum, Gas Plant Ops	-1.8	Electrical Distrib. Trades	0.7
Chemical Prod. Machine Ops	-1.5	Electrical Eng Assoc. Profs	1.2
Chemists	0.1	Electrical/Electrnics Eng'rs	0.6
Child Care Co-ordinators	2.0	Electricians	2.5
Children's Care Workers	2.0	Electronic Eng Assoc. Profs	1.2
Chiropractors & Osteopaths	2.5	Electronic Instrument Trades	0.2
Civil Engineering Assoc Prof	0.8	Electronic/Office Equip Trds	1.1
Civil Engineers	1.2	Eng Prod. Process Workers	0.0

Table A.2 continued

Engine & Boiler Operators	-0.3	Human Resource Managers	0.8
Engineering Managers	1.2	Human Resource Professionals	1.0
Engineering Technologists	-1.4	Import/Exporters & Wholesals	2.8
Engineerng Prod'n Systems Wkr	-0.5	Information Tech.y Managers	0.7
Enrolled Nurses	2.5	Inquiry & Admissions Clerks	1.3
Env'mntal & Ag Science Profs	1.3	Insul'n & HomeImprov Install	2.7
ESL Teachers	2.2	Insur Survey/Adjustors	0.9
Extra-Systemic Teachers	2.1	Insurance Agents	0.9
Farm Hands	0.0	Insurance Clerks	0.9
Farm Overseers	-0.1	Intermed Inspectors/Examiner	1.3
Fast Food Cooks	-1.6	Jewellers & Rel Trades	-1.7
Fibrous Plasterers	4.3	Journalists & Related Profs	0.7
Film, TV, Radio, Stage Directrs	2.7	Keyboard Operators	0.7
Finance Managers	0.5	Kitchenhands	0.2
Financial Dealers & Brokers	0.7	Laundry Workers	2.4
Financial Investment Adviser	0.7	Leather/Canvas/Sail Mkrs	1.5
Fire Fighters	1.8	Legal Professionals	0.5
Fitness Instructors etc	2.3	Legislators & Gov Officials	1.6
Floor Finishers	3.0	Librarians	2.0
Florists	0.0	Library Assistants	1.6
Food Trades Assistants	1.0	Library Technicians	1.0
Footwear Tradespersons	-4.3	Life Scientists	1.6
Forestry & Logging Workers	0.9	Livestock Farmers	-0.5
Forging Tradespersons	0.8	Mail Sorting Clerks	2.1
Forklift Drivers	0.1	Manufacturers	2.8
Freight & Furniture Handlers	-1.2	Marine Construction Trades	0.2
Gaming Workers	1.7	Marketing/Advertising Profs	1.0
Garbage Collectors	1.8	Massage Therapists	1.9
Gardeners	2.1	Math'ns, Stat'ns & Actuaries	1.4
General Clerks	1.0	Meat & Fish Process Workers	-0.1
General Managers	0.9	Meat Tradespersons	-4.1
General Mechanical Eng Trdes	-0.3	Mech.l Prod'n & Plant Eng'rs	0.1
Geologists & Geophysicists	-0.1	Mechanical Eng Assoc. Profs	0.4
Glass Production Machine Ops	0.4	Media Presenters	2.9
Glass Tradespersons	2.4	Media Prods & Art Directors	0.3
Gnral Fabrication Eng Trades	0.6	Medical Imaging Pffessionals	2.3
GPs	2.5	Medical Scientists	2.2
Graphic Pre-Press Trades	-2.3	Medical Technical Officers	2.2
Greenkeepers	3.7	Messengers	1.8
Guards & Security Officers	0.6	Metal Casting Tradespersons	-1.2
Hairdressers	3.0	Metal Finishing Tradesperson	-0.9
Hand Packers	-0.5	Metal Fitters & Machinists	-0.5
Handypersons	1.4	Mine Sup Wkrs, Driller Assist	0.2
Health Services Managers	2.3	Miners	-0.9
Hospitality Trainees	5.2	Mining & Materials Engineers	-0.7
Hotel & Motel Managers	5.1	Ministers of Religion	1.9
Hotel Service Supervisors	3.8	Mixed Crop/Livestock Farmers	-0.6

Table A.2 continued

Mobile Cnstruction Plant Ops	1.9	Paper Prods Machine Operator	-1.8
Money Market & Stats Clerks	1.1	Paving & Surfacing Labourers	2.1
Motor Mechanics	-3.5	Payroll Clerks	0.6
Motor Veh & Related Sales	-3.5	Performing Arts Support Wrks	2.1
Motor Veh Parts Fitters	-4.0	Personal Care Consultants	1.9
Musicians & Related Profs	2.8	Personal Care/Nursing Assist	2.5
Natural Therapy Prfessionals	2.3	Personnel Clerks	1.3
Nurse Educators & Researcher	2.0	Pharmacists	-3.8
Nurse Managers	2.5	Photo Developers & Printers	-0.6
Nursery & Garden Labourers	1.4	Photographers	1.8
Nurserypersons	-0.5	Physiotherapists	2.5
Occ & Env'mental Health Prof	1.3	Plastics Prod. Machine Ops	-0.6
Occupational Therapists	2.4	Plumbers	3.8
Office Managers	0.6	Podiatrists	2.5
Office Trainees	0.8	Police Officers	1.8
Optometrists	2.5	Policy & Planning Managers	1.7
Oth Ag/Horticultural Labour	0.5	Power Generation Plant Ops	-0.2
Oth Blding & Eng Assoc Profs	-1.1	Pre-Primary School Teachers	2.2
Oth Blding & Enginring Profs	-0.4	Precision Metal Trades	-1.1
Oth Bus/Information Profs	1.2	Primary Products Inspectors	1.0
Oth Man'g Supervis:Sales/Svc	0.7	Primary School Teachers	2.2
Oth Mine, Const'n Labour etc	3.6	Printing Hands	0.0
Oth Misc Adv Cleric & Serv	-1.7	PrintMach & SmlOffset Printers	-2.4
Oth Misc Tradespersons etc	-2.4	Prison Officers	1.9
Oth Natural & Phys Sci Profs	0.9	Product Assemblers	-0.2
Other Elementary Clerks	1.3	Product Quality Controllers	-0.1
Other Elementary Sales Wrks	-0.1	Production Managers	1.8
Other Elementary Srvc Workr	1.3	Production Recording Clerks	0.1
Other Food Factory Hands	0.0	Project & Program Admin	1.4
Other Food Tradespersons	0.4	Property Professionals	0.4
Other Health Professionals	2.3	Psychologists	2.1
Other Hospalty/Accom M'gers	3.1	Pulp & Paper Mill Operators	0.7
Other Intermed Machine Ops	0.8	Quantity Surveyors	1.4
Other Intermediate Clerical	1.0	Railway Labourers	0.2
Other Intermediate Srvc Wkrs	1.4	Real Estate Associate Profs	1.0
Other Misc Associate Profs	0.3	Receptionists	1.5
Other Misc Labourers	0.2	Refrigeration/AirCon Mchnics	1.4
Other Mobile Plant Operators	1.7	Reg Disability Nurses	2.4
Other Process Workers	-0.1	Registered Midwives	2.4
Other Professionals	1.7	Registered Nurses	2.5
Other Social Professionals	1.3	Registry & Filing Clerks	1.4
Other Specialist Managers	2.4	Restaurant/Catering Managers	3.1
Other Stationary Plant Ops	0.0	Retail & Checkout Supervisor	-3.3
Other Wood Tradespersons	1.6	Retail Buyers	0.1
Packagers & Container Filler	0.2	Rgstrd Mental Health Nurses	2.4
Painters & Decorators	3.3	Roof Slaters & Tilers	4.3
Panel Beaters	-5.1	Rubber Prod. Machine Ops	-1.0

Table A.2 continued

Safety Inspectors	1.0	Supply & Distrib. Managers	-0.4
Sales & Marketing Managers	0.4	Survey Hands	0.8
Sales & Service Trainees	-2.1	Switchboard Operators	1.3
Sales Assistants	-3.4	TCF Prod. Mach Ops	-1.9
Sales Demonstrators & Models	-2.8	Technical Sales Reps	0.8
Sales Representatives	0.8	Telemarketers	-1.9
Science Technical Officers	0.8	Ticket Salespersons	0.8
Screen Printers	-2.5	Tilers & Stonemasons	3.7
Sea Transport Professionals	-1.1	Toolmakers	-0.9
Seafarers & Fishing Hands	-1.1	Train Drivers & Assistants	-0.8
Secondary School Teachers	2.2	Transport Company Managers	0.4
Secretaries & Personal Assist	0.9	Transport/Despatching Clerks	-0.4
Senior Fire Fighters	1.6	Travel & Tourism Agents	-0.6
Service Station Attendants	-2.7	Travel Attendants	1.1
Sewing Machinists	-0.7	Truck Drivers	-1.0
Shearers	-0.2	Uni Lecturers & Tutors	2.2
Sheetmetal Tradespersons	2.0	Upholsterers & Bedding Trades	0.9
Shop Managers	-3.7	Urban & Regional Planners	1.2
Signwriters	3.1	Ushers, Porters etc	2.6
Snr Non-Commis Military	0.0	Vehicle Body Makers	-1.7
Social Workers	2.1	Vehicle Painters	-4.1
Solid Plasterers	4.3	Vehicle Trimmers	-3.6
Special Care Workers	2.0	Veterinarians	2.4
Special Education Teachers	2.2	Veterinary Nurses	1.5
Specialist Medical	2.5	Visual Arts & Crafts Profs	0.3
Speech Pathologists	2.3	Vocational Educ. Teachers	2.2
Sport & Recreation Managers	2.0	Waiters	4.6
Sportspsns,Coaches etc	1.9	Welfare & Community Workers	2.0
Stock & Purchasing Clerks	0.3	Welfare Associate Profess.	1.9
Storepersons	-0.4	Wood Machinists & Turners	2.0
Street Vendors etc	-1.5	Wood Processing Machine Ops	1.7
Struc Steel & Welding Trades	0.8	Wood Products Factory Hands	-0.1
Struc Steel Const'n Workers	2.7	Wool, Hide & Skin Classers	0.9

Source: Centre of Policy Studies

The following table shows the modelled output deviations for each of the 112 sectors included in the MONASH model.

Table A.3
Output deviations for MONASH industries caused by e-commerce (percentage deviation from base case)

Industries	2007	2016	Industries	2007	2016
1 Pastoral zone	-3.55	-1.83	43 Furniture	1.56	0.51
2 Wheat/sheep zone	-0.94	0.15	44 Pulp and Paper	-2.97	-2.97
3 High rainfall Zone	-1.78	-0.54	45 Bags and Boxes	0.29	0.65
4 Northern Beef	0.02	1.14	46 Sanitary Products	0.25	-0.09
5 Milk Cattle	0.45	1.75	47 Newspapers and Books	-0.72	-0.31
6 Sugarcane, Fruit & Nuts	0.70	2.99	48 Commercial Printing	-2.41	-2.86
7 Vegetables, Cotton & Tobacco	0.60	2.03	49 Fertiliser	-2.59	-0.90
8 Poultry	-0.57	0.31	50 Basic Chemicals	-1.16	0.20
9 Agricultural Services	0.96	2.04	51 Paints	2.11	2.18
10 Forestry	0.99	1.24	52 Pharmacy	0.17	0.47
11 Fishing	0.65	1.97	53 Soaps	1.37	2.64
12 Iron Ore	-1.96	-0.54	54 Cosmetics	-0.39	1.10
13 Non-Ferrous Ores	-2.55	-0.77	55 Explosive	-1.37	-0.80
14 Black Coal	-2.27	-2.32	56 Petrol	1.08	1.44
15 Oil and Gas	0.77	2.11	57 Glass	0.40	0.78
16 Other Minerals	2.68	4.14	58 Clay Products	2.97	1.26
17 Mining Services	-0.95	0.72	59 Cement	3.28	1.62
18 Meat	-0.98	0.15	60 Readymix Concrete	4.43	2.45
19 Dairy	1.13	2.51	61 Pipes	4.01	2.39
20 Fruit and Vegetables	0.85	0.86	62 Plaster	2.74	1.17
21 Oils and Fats	2.29	5.67	63 Iron and Steel	-0.69	0.01
22 Flour	1.85	3.93	64 Non-Ferrous Metals	-3.15	-1.45
23 Bakery	0.77	1.30	65 Structural Metal Products	2.56	1.95
24 Confectionery	0.90	2.57	66 Sheet Metal	2.83	4.58
25 Seafood and Sugar	-1.92	-1.07	67 Wire	-0.85	-0.40
26 Soft Drinks	1.48	1.18	68 Motor Vehicles	-0.77	-0.37
27 Beer	2.70	2.25	69 Ships	0.95	2.45
28 Other Alcoholic Drinks	2.38	4.12	70 Trains	0.46	1.80
29 Tobacco	0.42	0.76	71 Aircraft	3.71	5.66
30 Cotton Ginning	-2.70	-0.59	72 Scientific Equipment	1.49	1.82
31 Synthetic Yarns	-4.09	-2.16	73 Electronic Equipment	0.24	0.68
32 Cotton Yarns	-2.72	-0.21	74 Household Appliances	1.88	0.73
33 Wool Yarns	-0.90	1.28	75 Electrical Equipment	0.06	1.36
34 Textile Finishing	-0.15	0.95	76 Agricultural Machinery	0.83	3.69
35 Carpets	2.58	2.70	77 Construction Machinery	3.35	5.83
36 Canvas	0.25	1.69	78 Manufacturing Machinery	-0.26	0.76
37 Knitting	-0.91	1.68	79 Leather Products	3.74	6.11
38 Clothing	-1.02	0.39	80 Rubber Products	-2.05	-1.46
39 Footwear	-4.35	-0.55	81 Plastic Products	-1.01	-0.36
40 Sawmill	1.75	1.19	82 Signs	-1.52	-0.89
41 Panels	1.65	1.31	83 Sports Equipment	1.45	4.86
42 Fittings	3.87	1.92	84 Electricity	0.45	0.77

Table A.3 continued

Industries	2007	2016	Industries	2007	2016
85 Gas	0.48	0.14	99 Banking	3.36	2.95
86 Water	1.42	1.78	100 Non-Bank Finance	2.62	2.41
87 Residential Building	6.96	3.46	101 Investment	1.51	1.32
88 Other Building	2.46	1.81	102 Insurance	2.09	1.32
89 Wholesale Trade	3.58	3.43	103 Other Financial Services	0.49	0.34
90 Retail Trade	-5.89	-6.19	104 Ownership of Dwellings	1.74	2.86
91 Mechanical Repairs	2.34	1.74	105 Public Administration	1.82	1.65
92 Other Repairs	-0.29	-0.61	106 Defence	2.00	2.03
93 Road Transport	1.52	1.76	107 Health	2.66	2.01
94 Rail Transport	0.25	0.55	108 Education	2.21	2.13
95 Water Transport	-2.78	-1.49	109 Welfare	2.03	1.72
96 Air Transport	5.50	7.36	110 Entertainment	3.63	3.14
97 Transport Services	2.91	3.52	111 Hotels	5.01	7.47
98 Communication	3.39	2.80	112 Personal Services	3.28	3.42

Source: Centre of Policy Studies.

Technical guide to the MONASH model

B.1 Overview

Since 1993, the Centre of Policy Studies (CoPS) has developed MONASH, a dynamic computable general equilibrium (CGE) model of the Australian economy designed for forecasting and policy analysis. Like its predecessor, ORANI, MONASH has a high level of microeconomic detail. Unlike ORANI, it has a strong forecasting capability. This is due to:

- a more detailed specification of intertemporal (i.e. dynamic) relationships;
- greater use of up-to-date data; and
- enhancements that allow the model to take on information from specialist forecasting organisations and from recent historic trends.

The key to generating believable forecasts is to use detailed information available from expert groups specialising in the analysis of different aspects of the economy. MONASH forecasts incorporate a wide variety of information including:

- macro forecasts from the Treasury and Access Economics;
- export forecasts from ABARE and the Tourism Forecasting Council; and
- forecasts of changes in technology and consumer tastes derived from trends calculated at CoPS.

Using this information the model generates projections for 113 industries and 115 commodities. These can be transformed into projections for 860 sub-commodities, 341 labour occupations, 56 regions and many types of households.

The initial applications of MONASH were made for State and Commonwealth Government departments requiring detailed employment forecasts. The model continues to be used for this purpose. However in the last three years the main enhancements to the model have been directed at dynamic policy analysis.²² In dynamic policy simulations, we are concerned with the effects on the economy of changes in tax rates, technology, consumer tastes, etc. These effects are calculated as deviations from two alternative projections for the economy, one generated without the shock in question, the other with the shock in place. Deviations are produced for all of the common macro economic indicators such as GDP, employment, consumption and the CPI, as well as for structural variables such as industry output, exports and imports. The two alternative projections can also be used to analyse issues like labour market dislocation or adjustment costs that other CGE models, which do not have a year-to-year capability, are unable to address.

²² This has led to papers on a wide range of issues such as: the effects of changes in tariffs on motor vehicles and on textiles, clothing and footwear; the effects of reforms in the coal industry; the implications of a more open airline policy; the implications of financing a major project such as the undergrounding of electricity and communication cables, by different types of taxes; and the impacts of the government's planned goods and services tax.

B.2 The structure of MONASH

The core equations of MONASH are based on the equation system of ORANI. ORANI is transformed into MONASH via the addition of: (1) dynamic equations relating capital to past investment and investment to expected rates of return; and (2) mechanisms that facilitate dynamic policy simulations such as allowing for a sticky real-wage response to an employment-damaging/enhancing policy shock.

The basic theoretical assumptions made in the MONASH model are as follows.

The nature of markets

Markets are assumed to be perfectly competitive. Competition guarantees that a level of output is produced in each industry at a point where the producer's price equals marginal costs and where zero pure profits are earned. Demand is assumed to equal supply in all markets except in the market for labour where oversupply is allowed. The government intervenes in a market by imposing sales taxes on commodities. This puts a wedge between the price paid by the purchaser and price received by the producer. The model also recognises nine margin commodities (wholesale trade, retail trade, road transport, rail transport, water transport, air transport, transport services, insurance and restaurants) which are required for each transaction involving a commodity or service. The costs of the margins are included in the price paid by the purchaser.

Input demand for industry production

Two broad categories of inputs to the production process are recognised, intermediate inputs and primary factors (labour of various occupations, capital, agricultural land and working capital). Intermediate inputs are distinguished by commodity type and by source (domestically-produced and imported). Firms in each industry are assumed to choose a mix of inputs that minimises the costs of production for given input and output prices and for a given level of output. They are constrained in their choice of inputs by a production technology that combines intermediate and primary inputs to produce output.

Household demands

The household determines the composition of consumption by choosing commodities (distinguished by source) to maximise a utility function subject to an expenditure constraint. A consumption function determines overall household expenditure as a function of household disposable income.

Input demand for investment

Given a level of investment expenditure, an industry chooses inputs (distinguished by type and by source) to minimise the costs of capital creation. The input-demand functions to capital creation are analogous to the input-demand functions for current production, with the exception that there are no primary factor inputs to capital creation.

Government demands for current production

There is no explicit theory determining governments' consumption expenditures. These can be determined in one of three ways: (1) endogenously, by a rule such as moving government expenditures with household consumption expenditure or with overall domestic absorption;

(2) endogenously, as a policy instrument which varies in order to accommodate an exogenously determined policy target such as a required outcome for the government's budget deficit; or (3) exogenously.

Foreign demand (international exports)

MONASH is a single country model, and hence cannot explicitly model all of the determinants of foreign demand for Australian products. It handles export demand by imposing for each exported commodity a foreign demand schedule. These schedules, which relate the volume of exports to the foreign currency price of Australian products, are downward sloping. Hence, export volumes and foreign-currency prices can respond to changes in Australian supply conditions.

Capital stocks, investment and rates of return

MONASH allows for two broad treatments of capital and investment. The first, involving explicit assumptions about movements in rates of return and investment/capital ratios, is suitable for comparative-static simulations. In such simulations, we are concerned with the effects of a policy or other shock after considerable time, say seven years. In these circumstances, MONASH allows the user to assume that the shock under examination does not affect rates of return. Thus, industries favoured by the shock attract capital until their rates of return are driven down to their initial levels and that industries for which the shock is unfavourable lose capital until their rates of return increase to their initial levels. Having, in this way, tied down the long-run effect of the shock on capital stocks, the effect on investment by industry can then be determined by assuming no change in investment/capital ratios.

The second broad treatment of capital and investment in MONASH involves explicit capital supply functions, and is used in year-to-year simulations, i.e., simulations tracing out the paths of variables for years t , $t+1$, $t+2$, etc. While the assumption of no change in rates of return may be suitable for long-run analysis, it is unrealistic to assume that movements in an industry's rate of return are eliminated by year-to-year movements in the industry's capital stock. In each year of year-to-year simulations, industries' capital growth rates (and thus investment) are determined according to functions which specify that investors are willing to supply increased funds to industry j in response to increases in j 's expected rate of return. However, investors are assumed to be cautious. In any year, the capital supply functions in MONASH limit the growth in industry j 's capital stock so that disturbances in j 's rate of return are eliminated only gradually.

Equations for facilitating dynamic policy simulations

There are a number of mechanisms in MONASH introduced to facilitate dynamic policy simulations. Probably the most important mechanisms relate to wage and employment adjustment in the labour market. In comparative static analysis, one of the following two assumptions is made about the operations of the labour market: (1) real wages adjust so that any policy shock has no effect on employment; or (2) real wages are unaffected by the shock and employment adjusts.

MONASH, however, allows an intermediate position for year-to-year policy simulations. In MONASH, real wages can be sticky in the short run but flexible in the long run and employment can be flexible in the short-run but sticky in the long run. More specifically, for year-to-year policy

simulations it is assumed that the deviation in the real wage increases in proportion to the deviation in employment from its base case-forecast level. The coefficient of adjustment is chosen so that the employment effects of a shock are largely eliminated after eight to ten years. This labour market is consistent with macroeconomic modelling in which the non-accelerating inflation rate of unemployment (NAIRU) is exogenous.

B.3 Evaluation of regional impacts

The MONASH model adopts a 'tops down' approach to regional analysis. Under this approach, national results are generated for each industry. These results are then subdivided into State effects based on the industry mix of each state's activity, and then further subdivided to give impacts at the statistical division level, again based on the industry mix of each statistical division's activity. The model allows for the modification of regional results to reflect particular features of a region, with a consequent rebalancing of effects across all other regions, although this is often limited in practice due to information shortfalls.

The MONASH model identifies 57 separate statistical divisions. These divisions are shown in the Table below with a link to the related ABS statistical division.

The tops down methodology is well suited to showing the regional effects of national reforms, but less well suited to tracing the regional effects of reforms or policies that are region specific. Where significant policies differ between regions it would be better to use a region specific or 'bottoms up' modelling approach, such as the MONASH Multi-Regional Forecast (MMRF) model.

Table B.1**MONASH Regions**

MONASH region	ABS SD	Main centre	Other selected urban centres
Sydney	105	Sydney	Campbelltown, Gosford, Katoomba, Parramatta, Sutherland
Hunter	110	Newcastle	Cessnock, Maitland, Muswellbrook, Port Stephens, Singleton
Illawarra	115	Wollongong	Kiama, Mittagong, Moss Vale, Shellharbour, Shoalhaven
Richmond-Tweed	120	Lismore	Ballina, Byron Bay, Casino, Tweed Heads
Mid-North Coast	125	Coffs Harbour	Grafton, Kempsey, Port Macquarie, Taree
Northern	130	Tamworth	Armidale, Glen Innes, Gunnedah, Inverell, Moree, Tenterfield
North Western	135	Dubbo	Bourke, Cobar, Coonabarabran, Gilgandra, Mudgee, Walgett
Central West	140	Orange	Bathurst, Blayney, Cowra, Forbes, Lithgow, Oberon, Parkes
South Eastern	145	Queanbeyan	Bega, Bombala, Cooma, Crookwell, Goulburn, Yass, Young
Murrumbidgee	150	Wagga Wagga	Cootamundra, Griffith, Gundagai, Hay, Narrandera, Tumut
Murray	155	Albury	Balranald, Deniliquin, Holbrook, Tumbarumba, Wentworth
Far West	160	Broken Hill	Tibooburra, Wilcannia
Melbourne	205	Melbourne	Altona, Dandenong, Lilydale, Mornington Peninsula, Sunbury
Barwon	210	Geelong	Apollo Bay, Colac, Lorne, Queenscliffe
Western District	215	Warrnambool	Camperdown, Hamilton, Portland
Central Highlands	220	Ballarat	Ararat, Bacchus Marsh, Daylesford
Wimmera	225	Horsham	Dimboola, St Arnaud, Stawell
Mallee	230	Swan Hill	Kerang, Mildura, Ouyen
Loddon	235	Bendigo	Castlemaine, Maryborough
Goulburn	240	Shepparton	Benalla, Echuca, Kyabram, Rochester
Ovens-Murray	245	Wodonga	Beechworth, Bright, Mount Beauty, Rutherglen, Wangaratta
East Gippsland	250	Sale	Bairnsdale, Omeo, Orbost
Gippsland	255	Traralgon	Moe, Morwell, Wonthaggi

Source: MONASH data base, ABS cat no 1216.0.

Table B.1 (Continued)

MONASH-RR Regions^a			
MONASH region	ABS SD	Main centre	Other selected urban centres
Brisbane	305	Brisbane	Beenleigh, Logan, Mount Gravatt, Redcliffe
Moreton	310	Coolangatta	Burleigh Heads, Caloundra, Ipswich, Noosa, Surfers Paradise
Wide Bay-Burnett	315	Maryborough	Bundaberg, Gympie, Hervey Bay, Mundubbera
Darling Downs	320	Toowoomba	Dalby, Goondiwindi, Stanthorpe, Warwick
South West	325	Charleville	Quilpie, Roma, St George
Fitzroy	330	Rockhampton	Emerald, Gladstone
Central West	335	Longreach	Barcardine, Blackhall, Winton
Mackay	340	Mackay	Clermont, Proserpine
Northern	345	Townsville	Ayr, Bowen, Charters Towers, Ingham
Far North	350	Cairns	Atherton, Cooktown, Innisfail, Mareeba, Mosman, Weipa
North West	355	Mount Isa	Cloncurry, Hughenden, Normanton
Adelaide	405	Adelaide	Glenelg, Henley, Hindmarsh, Marion, Salisbury
Outer Adelaide	410	Mount Barker	Barossa Valley, Kangaroo Island, Onkaparinga
Yorke & Lower North	415	Yorke town	Bute, Riverton, Wallaroo
Murray Lands	420	Renmark	Murray Bridge, Pinnaroo
South East	425	Mount Gambier	Bordertown, Kingston, Naracoorte
Eyre	430	Port Lincoln	Ceduna
Northern	435	Whyalla	Cooper Pedy, Port Augusta, Port Pirie, Woomera
Perth	505	Perth	Armadale, Fremantle, Joondalup, Stirling, Wanneroo
Peel	510(p)	Rockingham	Kwinana, Mandurah
South West	510(p)	Bunbury	Busselton, Collie, Manjimup, Margaret River, Pemberton
Great Southern	515	Albany	Denmark, Katanning
Wheatbelt	520/525	Northam	Merridin, Moora, Narrogin
Goldfields-Esperance	530	Kalgoorlie	Boulder, Coolgardie, Esperance
Mid West	535(p)	Geraldton	Meekatharra, Mount Magnet
Gascoyne	535(p)	Carnarvon	Exmouth
Pilbara	540	Port Hedland	Karratha, Newman, Tom Price
Kimberley	545	Broome	Derby, Kununurra, Wyndham
Greater Hobart	605	Hobart	Clarence, Glenorchy, Sorell
Southern	610	Geeveston	Bicheno, Huonville, Triabunna
Northern	615	Launceston	Deloraine, Georgetown, St Helens
Mersey-Lyell	620	Burnie	Devonport, Queenstown, Smithton, Ulverstone, Zeehan
Northern Territory	7	Darwin	Alice Springs
Australian Capital Territory	8	Canberra	

MRES: Monash regional economic system; ABS SD: Australian Bureau of Statistics statistical division.

^a Metropolitan regions are shaded.

Source: Monash-RR data base; ABS 1995 (*Australian Standard Geographic Classification*, Cat. No. 1216.0) and Productivity Commission (1999, p. 297).

Appendix C

MONASH base case forecasts

This Appendix explains the detailed assumptions that underpin the base case forecasts. That is, the view of the economy as it would be without greater use of e-commerce.

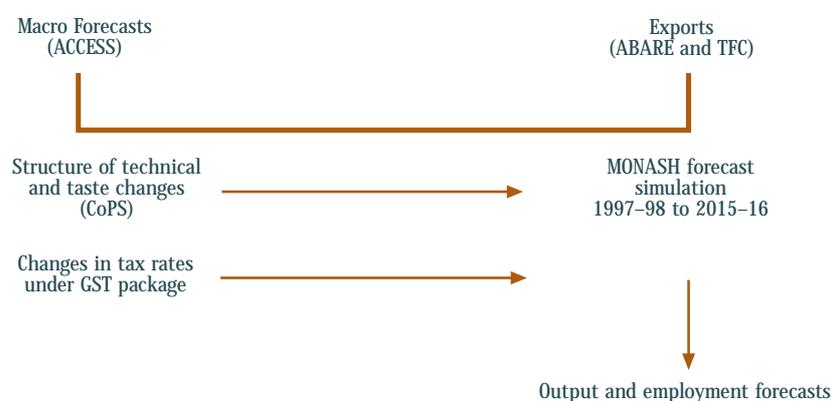
C.1 MONASH methodology

As indicated in Exhibit C.1, the model incorporates the views of specialist organisations into the base case simulation. For this study the modellers have used:

- Macroeconomic forecasts from the Treasury and Access Economics.²³
- Forecasts for the quantities and prices of agricultural and mineral exports from the Australian Bureau of Agricultural and Resource Economics (ABARE),²⁴ and forecasts of inbound tourism numbers from the Tourism Forecasting Council (TFC).²⁵
- Forecasts of changes in industry production technologies (i.e., in input-output coefficients) and in household preferences from the Centre of Policy Studies (CoPS).
- Results from Dixon and Rimmer (1999)²⁶ on the effects of the GST.

Exhibit C.1

The MONASH forecasting system



The following portion of this Appendix is divided into two sections. Section C.2 describes forecasts for macroeconomic variables and for the volumes of traditional exports. It also describes assumptions for changes in industry production technologies and in household tastes. The forecasts for industry output and employment are discussed in Section C.3.

23 The Treasury forecasts come from Treasury (1999), *Budget Statements, 1999-2000: Budget Paper No. 1*. AGPS, Canberra. These cover the years 1998-99 (estimates) and 1999-2000. For variables not covered by the Treasury forecasts and for all variables between 1999-2000 and 2005-06, forecasts from Access Economics (1999), *Five year Business Outlook, March Quarter* were used. Long-term trends are used for the years 2005-06 to 2009-10.

24 Forecasts to 2003-04 come from ABARE (1999), *Australian Commodities*, March quarter. For the remaining years of the forecast period we use long-term trends.

25 See Tourism Forecasting Council (1998), *Forecast*, Vol. 4, No. 2.

26 Dixon, P.B. and Rimmer, M.T. (1999), 'The Government's Tax Package: Further Analysis Based on the MONASH Model', *Report prepared for the Senate Select Committee on a Next Tax System*, mimeo, January 25. The *Central Estimates* from that report were used.

C.2 Forecasts for macroeconomic variables, the structure of exports, industry technologies and household tastes

C.2.1 Macroeconomic Forecasts (Table C.1)

Table C.1 shows average annual growth rates for selected macroeconomic variables. The numbers in column (I) are historical growth rates for the period 1993–94 to 1997–98. The numbers in columns (II) are forecast growth rates.

Table C.1

	(I)	(II)
	History	Forecast
	1993–94 to 1997–98	1997–98 to 2015–16
Real GDP and its components		
1. Private consumption	4.01	3.55
2. Public consumption	2.97	2.10
3. Investment	7.42	2.82
4. Exports	7.27	5.27
5. Imports	9.82	5.33
6. GDP	4.22	3.04
Other macroeconomic variables		
7. Employment	2.21	1.45
8. Real wage rate	-2.10	-0.33

The base case forecast is that real GDP will grow at an average annual rate of 3.04 per cent (row 6) between 1997–98 and 2015–16. This is in line with the long-term growth potential for the economy of around three per cent per annum, though it is below the average growth rate of the last four years. Australia has experienced unusually strong growth over recent years.

Real private consumption (row 1) and real public consumption (row 2) are expected to have slower average growth rates in the forecast period than in the historical period. Part of the weakening in private consumption growth can be attributed to the forecast of slower growth in real GDP and hence slower growth in real income available for consumption. Another factor that Access has identified is demographic factors associated with increasing numbers of baby boomers moving from their ‘spending years’ (30 to 40) into ‘saving years’ (40 to 50). The slowdown in growth in public consumption (mainly the real wages of government employees) is consistent with the expectation of further public-service cutbacks.

Growth in real private investment (row 3) is forecast to be lower than in recent history, reflecting different initial conditions. 1993–94 was a weak year for investment. 1997–98 was a strong year. Lower investment growth in the forecast period reflects a return to longer-term average levels of investment/capital ratios from their cyclically high levels in 1997–98.

Between the mid 1980s and 1997–98, aggregate real exports (row 4) and imports (row 5) grew rapidly relative to real GDP (row 6). This was the result of several factors: declining transport costs; improvements in communications; reductions in protection in Australia and in our major trading partners; and technological changes favouring the use of import-

intensive goods such as computers and communication equipment. All these factors are expected to continue through the forecast period, leading to further increases in trade volumes relative to GDP. However, these increases will be comparatively moderate due, in part, to the negative impacts of the Asian crisis on Australia's trade in the first two years of the forecast period.

The base case forecasts that employment will grow at an average annual rate of 1.45 per cent (row 7), implying growth in labour productivity of 1.6 per cent per annum. This compares with average productivity growth in the historical period of 2.0 per cent.

C.2.2 Structure of exports (Table C.2)

Our forecasts for the structure of exports are summarised in column (II) of Table C.2. Rows 1 to 16 show forecasts for average annual growth in exports of products classified as traditional export commodities. Rows 17 and 18 show forecasts for tourism exports and for 'other' (i.e. non-traditional) exports.²⁷

Table C.2

Structure of exports

	(I) History 1993–94 to 1997–98	(II) Forecast 1997–98 to 2015–16
1. Wool	-4.6	0.1
2. Sheep	-2.2	1.8
3. Wheat	4.2	3.4
4. Barley	4.2	2.7
5. Other coarse grains	4.0	2.7
6. Meat cattle	22.7	4.8
7. Fishing	0.0	0.3
8. Iron ore	5.5	3.3
9. Non-ferrous metal ore	8.3	2.9
10. Black coal	5.8	4.2
11. Oil and gas	10.9	2.5
12. Meat products	1.1	2.3
13. Raw sugar (27)	7.0	3.5
14. Scoured wool and ginned cotton	6.2	1.9
15. Iron and steel	3.5	-2.0
16. Non-ferrous basic metals	1.0	6.0
Memorandum items		
17. Total exports: Tourism	7.0	6.0
18. Total exports: Other	9.9	6.3

The export forecasts in rows one through 16 are extrapolated from ABARE forecasts. ABARE expects good growth for the exports of meat cattle, black coal, raw sugar and non-ferrous basic metals (primarily, alumina and aluminium). Middle prospects are projected for wheat and

²⁷ Non-traditional exports cover all exports other than traditional exports (i.e. exports of commodities identified in rows one to 16 of Table 2) and tourism services (i.e. exports of air transport, hotels, accommodation, entertainment and personal services).

other grains, iron and non-iron ores, oil and gas and meat products. Poor prospects are given to exports of wool, sheep, fishing, lightly processed wool and cotton, and iron and steel.

For international tourism, the latest forecasts provided by the Tourism Forecasting Committee (TFC) were used. However, a downward adjustment for the effects of the GST was made. The introduction of a GST harms the export prospects of the tourism industries. Commodity exports will not be subject to a GST. On the other hand, foreign tourists will find that most of their purchases in Australia are subject to the GST. For tourists, the projections suggest that the foreign-currency price of their holidays in Australia will jump by about 3.5 per cent. Taking this into account the forecast rate of growth of tourism was adjusted from the TFC number of 7.4 per cent annual growth to the number shown in Table C.2, 6.0 per cent annual growth.

Given the macro forecast for aggregate exports in Table C.1, the forecasts for traditional exports and tourism exports shown in Table C.2, the model deduces an average growth rate for the volume of non-traditional exports. Volumes of these exports are forecast to grow at an average annual rate of 6.3 per cent. This is less than the average growth rate of recent years. However, non-traditional export volumes have now reached a level that makes continued growth at such high rates unlikely.

C.2.3 Assumptions for changes in technology and tastes (Table C.3)

Table C.3 shows assumptions for changes in the preferences of households and in the production technologies of industries, divided into 22 sectors. These are aggregations of the preference and technology assumptions introduced to MONASH at its full level of disaggregation, i.e. at the level of 112 industries and 114 commodities.²⁸ The detailed input, shown in Appendix Table D.1, are extrapolations of trends calculated from a MONASH simulation for the period 1986–87 to 1993–94.

28 MONASH recognises two more commodities than industries. Outside of the agricultural sector there is a one-to-one relationship between industries and commodities. For agriculture, the model makes explicit allowance for multi-product industries, with seven agricultural industries producing nine agricultural commodities.

Table C.3**Technology and household taste assumptions for sectors: (average annual percentage changes)**

Sector	(I)	(II)	(III)
	Household preferences ^(a)	Technology: Intermediate input-using ^(b)	Primary-factor using ^(c)
1 Agriculture, forestry and fishing	0.2	-0.1	-2.0
2 Mining	-0.8	-1.0	-0.6
3 Food, beverages and tobacco	0.1	-0.2	-0.9
4 Textiles, clothing and footwear	-1.6	-0.5	-1.9
5 Wood and wood products	-0.5	-0.5	0.0
6 Paper, paper products, printing	1.5	-0.3	-0.2
7 Chemicals, petroleum, coal products	0.4	0.5	-0.1
8 Non-metallic construction materials	-1.5	-0.3	-0.9
9 Basic metal products	-0.1	0.6	-1.0
10 Cars and other transport equipment	0.6	0.9	-1.5
11 Electronic, other specialist equip.	2.5	1.5	-1.5
12 Leather, rubber, plastic products	-0.3	-0.7	-0.1
13 Electricity, gas and water	0.2	0.2	-3.4
14 Construction	1.9	-0.1	0.0
15 Wholesale and retail trade	-1.9	-1.5	0.0
16 Transport and storage	0.5	-0.3	-1.2
17 Communications	0.0	2.4	-5.5
18 Finance and business services	1.3	1.3	-2.8
19 Dwelling ownership	0.1	0.0	0.6
20 Public administration and defence	-1.1	-0.7	-0.3
21 Health, education and welfare	0.7	-0.6	-0.3
22 Hospitality, leisure, other services	0.0	-0.4	0.0

(a) Annual rate of shift of consumption function.

(b) Annual rate of change of use of the commodity identified on the left-hand panel per unit of output of industries using the commodity.

(c) Annual rate of change of use of all primary factors (labour, capital and agricultural land) per unit of production of the industry identified on the left.

In MONASH, household preferences are described by a utility function leading to demand functions of the form:

$$X_i = H_i(P, C, T)$$

where: X_i is household preference for good i , H_i is consumption of good i per household; P is a vector of commodity prices; C is total consumption expenditure per household and T is a taste change variable. The assumptions for these are summarised in column (I) of Table C.3. For example, it was assumed that consumption of Electronic and other specialist equipment (sector 11) will increase at a rate 2.5 per cent a year faster than can be explained on the basis of changes in prices and changes in the average budget of households.

The numbers in column (II) of Table C.3 are initial²⁹ assumptions for the average annual rates of change in the usage of commodities as intermediate inputs per unit of production in industries throughout the economy, and as inputs per unit of capital creation. For example, it was assumed initially that in each year industries will increase their usage of Finance and business services (sector 18) by 1.3 per cent more than their outputs.

The initial³⁰ assumptions for each industry concerning average annual changes in primary-factor usage per unit of output are shown in column (III). Primary-factor inputs in the MONASH model comprise labour, capital and agricultural land. Thus, for example, the initial assumption for Electricity, gas and water (sector 13) is that output will increase on average by 2.1 per cent a year relative to the sector's overall usage of primary factors.

Outstanding features of the consumer-preference assumption in column (I) of Table C.3 are the trends against Textiles, clothing and footwear (sector 4), against the usage of Wholesale and retail trade (sector 15), and in favour of Finance and business services (sector 18). However, many of the interesting trends incorporated into the forecasts are hidden in column (I) by the aggregation of commodities into sectors. For example, as shown in Table D.1, the strongest trend within Textiles, clothing and footwear is against clothing, representing a shift towards less formal modes of dress. In Food, beverages and tobacco (sector 3), there are strong trends against both tobacco and alcoholic beverages and in favour of fruit and vegetable products. The shift towards electronic and other specialist equipment is concentrated in the area of computers and new communications products, while the shift toward finance and business services clearly favours non-bank financial institutions, perhaps reflecting the increasing tendency to seek advice on financial matters.

The shifts in technologies indicated in column (II) of Table C.3 favour the use of high-technology products as inputs to industries. These include inputs of Communications services (sector 17), mainly telephone-related services, and of Electronic equipment (sector 11). Also favoured strongly are inputs of Cars and other transport equipment (sector 10) and of Finance and business services (sector 18). The trend toward the latter in part reflects the increasing use of outside, rather than in-house, financial and business services.

Assumptions for all-factor-using technological change in column (III) of Table C.3 point to large productivity gains in Communications (sector 17) and Electricity, gas and water (sector 13). This reflects the continued impact of reforms in these sectors, which started in the late 1980s. Substantial gains are also assumed for industries in Agriculture, forestry and fishing (sector 1), in Textiles, clothing and footwear (sector 4), and in Finance and business services (sector 18).

29 Results from each forecast simulation imply annual changes in input-output coefficients (i.e. in the coefficients for the use of commodity *i* per unit of output of industry *j*) that are slightly different from those indicated in column (II) of Table C.3. The entries in this column are entered as exogenous shocks applied in each year of the forecast period. Where the shocks called for an increase in use of commodity *i* by industry *j*, we endogenously scaled down all other inputs (intermediate and primary factor) so as to leave industry *j*'s unit costs unchanged. Similarly, all inputs to industry *j* were scaled up if the initial shock called for a decrease in use of commodity *i*.

30 Results from each simulation imply annual changes in primary-factor usage per unit of output in each industry different from those given in column (III) of Table C.4. Apart from the endogenous adjustments described in the previous footnote, endogenous adjustments are also made to reconcile the industry results with the macro forecasts of GDP, aggregated employment and aggregate investment (and hence overall capital stock).

C.3 MONASH forecasts for industry output and employment

This section presents forecasts for growth in industry output and employment. The relationship between growth in output and employment in the MONASH model is explained in section B.2.

Table C.4 shows forecasts for industry output and employment divided into 22 sectors. More detailed forecasts are given in Appendix Table D.2.

Table C. 4

Output and employment (average annual percentage growth rates for sectors)

Sector	Production:			Employment ^(a) :		
	1993–94 to 1997–98	1997–98 to 2015–16	Rank based on forecast growth	1993–94 to 1997–98	1997–98 to 2015–16	Rank based on forecast growth
Communications	9.0	6.5	1	0.0	-2.9	21
Finance and business services	6.8	5.2	2	1.3	0.8	12
Electronic, other specialist equip.	4.8	4.8	3	0.9	1.8	4
Transport and storage	4.9	3.7	4	2.1	0.8	13
Basic metal products	3.2	3.5	5	1.0	2.0	3
Wholesale and retail trade	4.2	3.4	6	3.1	2.4	2
Chemicals, petroleum, coal products	2.3	3.3	7	-0.5	1.4	10
Health, education and welfare	4.0	3.3	8	2.9	2.6	1
Hospitality, leisure, other services	4.2	3.2	9	2.4	1.7	5
Electricity, gas and water	3.6	3.2	10	-5.2	-5.7	22
Mining	5.2	3.0	11	0.3	-0.3	17
Food, beverages and tobacco	2.5	2.8	12	1.0	1.6	7
Dwelling ownership	2.1	2.6	13	0.0	0.0	16
Paper, paper products, printing	2.1	2.6	14	-1.2	-0.9	18
Leather, rubber, plastic products	1.0	2.6	15	-0.7	1.6	6
Construction	6.1	2.4	16	5.1	1.5	8
Agriculture, forestry and fishing	1.2	2.4	17	1.0	0.1	15
Public administration and defence	2.6	2.0	18	0.8	0.8	11
Wood and wood products	1.0	1.8	19	0.2	1.4	9
Cars and other transport equipment	2.9	1.7	20	-2.0	-2.4	20
Non-metallic construction materials	2.3	1.7	21	0.7	0.4	14
Textiles, clothing and footwear	-1.5	1.0	22	-4.6	-2.0	19

(a) The numbers reported in this table for growth in employment by sector are wage-bill weighted averages of industry-level projections for growth in hours worked.

The section works through the forecasts starting with the sector (Communications) having the highest forecast growth rate for output and finishes with the sector (Textiles, clothing and footwear) with the lowest forecast growth rate.

Communications (ranked 1)

Communication services are sold throughout the economy. In the absence of technical change, the output forecast for communications would be close to the GDP forecast. However, communications is heavily favoured in the forecasts by technology changes which result in its output being used more intensively by other industries (see column (II) of Table C.3).

Productivity growth over the historical period was 9.0 per cent per year. The base case forecasts imply continued strong productivity growth, with communications employment falling at an annual rate of 2.9 per cent. Part of this fall can be attributed to the assumption of strong primary-factor saving technical change continuing in the sector (column (III) of Table C.3). The rest can be attributed to a forecast of good profit growth, encouraging rapid capital growth.

Finance and business services (ranked 2)

The finance and business service sector benefits from technological changes which result in more intensive use of its products by industries and from a shift in household preferences (column (I) of Table C.3). These factors give it a growth rate of over five per cent per annum.

The forecast of employment growth in the sector implies productivity growth of 4.4 per cent a year. This is similar to the productivity growth in the historical period. With productivity growth at this rate, the sector ranks twelfth in employment growth prospects.

Electronic and other specialist equipment (ranked 3)

As with the sectors ranked one and two, Electronic and other specialist equipment is favoured strongly in the forecasts from technological shifts. These have been apparent since the mid-1980s. However, in the 1980s, output growth in the sector was retarded by rapid growth of imports. In the 1990s, the sector began to specialise in the provision of parts and repairs, making its products complementary with imports rather than competitive. This has allowed the sector to achieve strong growth over recent years, in line with growth in the economy's stock of electronic equipment. It is expected that this will continue through the projection period.

The employment forecast for the sector is 1.8 per cent average annual growth, implying average annual productivity growth of 3.0 per cent. Productivity growth is strong because forecasts imply that the sector has good profit prospects, encouraging investment and hence capital growth.

Transport and storage (ranked 4)

Strong growth in tourism exports (see Table C.2) enhances the growth prospects of air transport, and hence of the transport and storage sector generally. Transport services are also used intensively in facilitating international trade, and with trade forecast to grow rapidly throughout the forecast period (see Table C.1), this gives a further stimulus to the sector's growth prospects. This stimulus would be even stronger were it not for the restraints imposed by technological changes economising on the use of transport inputs.

The forecasts used imply productivity growth for the transport and storage sector of 2.9 per cent, about the same rate as that achieved over the historical period. Together, output and productivity forecasts imply average annual growth in employment of 0.8 per cent.

Basic metal products (ranked 5)

The industries in this sector produce basic iron and steel, basic non-ferrous metals and simply transformed products such as metal sheets. The largest industry is non-ferrous basic metals (mainly aluminium and alumina). This has very good growth prospects, due to a forecast of

strong export growth (see Table C.2). The iron and steel industry has relatively poor prospects. Exports of iron and steel are expected to grow slowly (Table C.2) and domestic sales adversely affected by continuation of trends against the use of iron and steel as intermediate inputs. The industries producing simply transformed metal products have mixed prospects in the forecast period. Those with close connections to construction and motor vehicles have poor prospects, while others such as sheet metal products have good prospects due, in part, to an assumption that trends in technology favouring their use as intermediate inputs will continue.

Overall, the sector's output is forecast to grow at an average annual rate of 3.5 per cent. Productivity growth of about 1.5 per cent is expected, leaving an average annual rate of growth of employment of 2.0 per cent.

Wholesale and retail trade (ranked 6)

Wholesale and retail trade have above-average prospects in the forecasts. Wholesale trade is used intensively in facilitation export and imports. With international trade growing rapidly (see Table C.1) one would expect to see projected growth for the wholesale industry well above that of GDP. However, the industry is held back slightly by an economy-wide technological shift away from the use of wholesale trade for facilitating transactions.

Among the 22 sectors, wholesale and retail trade ranks second in employment prospects. Relatively slow growth in the industry's capital stock is expected, reflecting a relatively low ratio of investment to capital in the initial year (1997–98). This leads to a forecast of relatively slow productivity growth which, in combination with a forecast of strong output growth, generates a forecast of strong employment growth.

Chemicals, petroleum and coal products (ranked 7)

Factors underlying the forecast of good growth prospects for this sector are:

- strong export growth, especially important for basic chemicals, paints and pharmaceutical goods;
- shifts in technologies favouring the use of the sector's products (e.g. more intensive use of chemical fertilisers in agriculture);
- a shift in consumer preferences favouring greater use of pharmaceutical goods, and cosmetics; and
- and rapid productivity growth, which allows it to compete effectively with imports.

Strong productivity growth reduces the sector's employment ranking below its output ranking. While its output prospect is ranked seventh, its employment prospects are ranked tenth, with an average annual growth rate in employment of 1.4 per cent.

Health, education and welfare (ranked 8)

Despite slow growth in public consumption (see Table C.1), Health, education and welfare (ranked 8) has above-average growth prospects in the forecasts. This is because it has been assumed that the sector will increase its share of public spending in line with recent trends.

The forecast of employment growth in the sector implies productivity growth of 0.7 per cent a year. Low productivity growth results from the

forecast of a 0.1 per cent decline in capital per year. Capital declines because of a low initial investment to capital ratio and because of relatively weak investment growth through the forecast period. With low productivity growth, the sector ranks first in employment growth prospects.

Hospitality, leisure and other services (ranked 9)

The forecast for average annual growth of output in this sector is 3.2 per cent, only slightly above GDP growth. In the forecast period the sector's growth will be influenced by two counter-acting forces. On the positive side is strong growth in tourism exports (see Table C.2). On the negative side is a weak technological trend against the use of its products. Prompted initially perhaps by changes in the FBT tax, businesses have been reducing their use of hotel and restaurant services per unit of output. The forecasts assume that this trend will continue.

The sector's employment growth ranking (fifth) is higher in the forecast than its output growth ranking. This reflects weak productivity growth.

Electricity, gas and water (ranked 10)

The close-to-average forecast for growth in Electricity, gas and water is explained by the interaction of three forces. First, it is assumed that recent rapid microeconomic reforms in this sector will continue. This makes its products relatively cheap and encourages substitution towards them by consumers. Second, a continuation of a trend towards increased use of the sector's products per unit of industrial output is assumed. Against these forces is an unfavourable sales pattern heavily weighted towards slower growing sectors such as Public administration and defence (ranked 19).

With rapid microeconomic reform (see column (III) of Table C.3) it has been forecast that employment in the sector will continue to decline in line with recent historical experience.

Mining (ranked 11)

Aggregation of ABARE-based forecasts gives average annual export growth for mining of 3.6 per cent. This is the main ingredient in the forecast of average annual output growth of 3.0 per cent.

Over the historical period, productivity growth in the mining sector was rapid and employment growth was close to zero. This is expected to continue through the forecast period.

Food, beverages and tobacco (ranked 12)

Food, beverages and tobacco has average annual output growth in the forecasts of 2.8 per cent. It owes this below-average ranking to several factors. First weak growth in the exports of meat products is forecast (see Table C.2). Second, income elasticities of demand are low for most products produced by the sector. Thus growth in domestic sales from the sector will be comparatively insensitive to per capital income growth in the forecast period. Third, several of the sector's products (e.g. tobacco and alcohol) are subject to adverse shifts in consumer's preferences, though some industries such as fruit and vegetable production and milk products benefit from preference shifts.

At the beginning of the forecast period the ratio of investment to capital in this sector was quite low and the sector is forecast to experience

relatively weak investment growth through the forecast period. This generates in the forecast quite weak productivity growth (1.2 per cent per year) and hence relatively strong employment growth (1.6 per cent per year).

Dwelling ownership (ranked 13)

The output of the dwelling ownership sector is the services of the economy's dwelling capital stock, which consists of rent and imputed rent (i.e. the rental value of the housing stock, even if it is being occupied by the dwelling-owner and therefore not rented). The expenditure elasticity of demand for these services is above one. However, the growth prospects of the sector are well below the growth prospects for private consumption (see Table C.1). This is due to a negative substitution effect arising from an increase in the price of dwellings relative to the CPI. Little technological improvement in construction methods for houses is forecast. With more rapid technological improvements in the rest of the economy, housing services become comparatively expensive.

Paper, paper products, printing (ranked 14)

Output growth in this sector mainly reflects output growth in the two largest components, newspapers and books and commercial printing. The newspaper and book industry suffers in the forecasts from an unfavourable taste change by consumers, leaving its output growth at around 1.0 per cent per annum. The forecast for output growth in commercial printing is considerably higher due more intensive use of printing services by industries.

Other industries in this sector included pulp and paperboard, and bags and containers. For pulp and paperboard, relatively weak growth in customer industries is expected, offset by strong growth in pulp and paperboard exports. Weak growth for the bags and containers industry is forecast. This industry suffers from technological changes economising in the use of its products.

The forecast for labour productivity in paper, paper products and printing sector is average annual growth of 3.5 per cent, giving employment growth of 0.9 per cent. The model projects strong growth in the sector's capital stock, which explains the forecast of strong productivity growth.

Leather, rubber and plastic products (ranked 15)

The main positive force underlying the growth prospects of Leather, rubber and plastic products (ranked 10) is strong export growth. This is particularly influential for leather products. On the negative side, the sector is forecast to experience strong increases in import pressure, which restrains the prospects for rubber and plastic goods.

This sector is expected to have relatively slow productivity growth due to weak growth in capital. Thus employment in the sector is forecast to rise relatively strongly at an average annual rate of 1.6 per cent.

Construction (ranked 16)

The starting point for the forecasts was a high output year for both dwelling and non-dwelling construction. Thus, as can be seen in the Appendix table D.2 and from the general investment forecast in Table C.1, quite weak growth for both forms of construction over the forecast period has been forecasted.

Productivity growth in the construction sector is expected to be quite weak at 0.9 per cent per year, reflecting weak growth in profitability and hence investment through the projection period. This gives the sector an employment growth ranking for the forecast period of eighth, despite its low output ranking.

Agriculture, forestry and fishing (ranked 17)

The low ranking of Agriculture, forestry and fishing is mainly a reflection of the forecast of weak growth in exports (see Table C.2). Comparatively slow growth in the sector's domestic sales has also been forecast. Most of these sales are to the slow growing areas of the food, beverages and tobacco sector.

Within agriculture, the industries with the best growth prospects are milk cattle (benefiting from good prospects for the exports of milk products) and the other farming industries (which generally include export-oriented activities such as wine-grape and sugar cane production). Forestry and logging benefits from good prospects for exports.

Employment in the sector is expected to exhibit a small positive rate of growth in the forecast period. The employment and output forecasts imply labour productivity growth through the forecast period of 2.3 per cent.

Public administration and defence (ranked 18)

The forecast for output growth in the sector is 2.0 per cent per year, slightly below that of public consumption (Table C.1). Within the sector, it has been assumed that the trend over the last decade of lower spending on defence will continue.³¹ Output growth in public administration and defence is measured by the ABS largely by labour inputs. Nevertheless, ABS statistics for the sector imply productivity growth of about 0.8 per cent per year. It has been assumed that productivity growth will continue at roughly this rate, giving employment growth for the sector at the average annual rate of 0.8 per cent.

Wood and wood products (ranked 19)

The industries in this sector have diverse output growth rates in the forecasts. Overall, the sector's growth rate is expected to be 1.8 per cent per year, considerably below that of GDP.

The slowest growing industry in the sector is forecast to be sawmill products. About 20 per cent of this industry's output is exported, but the industry is expected to suffer from slow growth in its export sales. The sector's fastest growing industry is forecast to be veneers and wood boards. This benefits in the forecast from a strong shift in consumer tastes towards its product. The prospects of the other industries in this sector reflect a mixture of increasing import pressure, offset by fairly good export growth.

Employment in the sector is expected to grow at the average annual rate of 1.4 per cent, with productivity growth of only 0.4 per cent per year.

³¹ Recent policy developments may alter this trend. Increases in defence spending would imply that the modelled results understate the potential impact of greater use of e-commerce on this sector.

Cars and other transport equipment (ranked 20)

The dominant industry in this sector (about 65 per cent of value added) is motor vehicles and parts. After having output growth at about that of GDP over the historical period, it is forecast that the industry is likely to grow slower than GDP over the forecast period.

This forecast is based on the following factors. First, the industry is now exporting a significant fraction of its output (over ten per cent in 1997–98). However, it is expected that growth in export sales will drop away over the forecast period, dampening output growth. Second, it is expected that the industry will continue to lose share in the local market, albeit at a slower rate than in recent history. This occurs despite rapid productivity growth and the consequent slowing in the rate of deterioration of the industry's competitive advantage against imports. Finally, lower growth in investment, which accounts for 35 per cent of motor vehicle demand, is expected in the forecast period than occurred in the earlier period (see Table C.1). Offsetting slightly these negative factors is an assumption of continuation of technological and taste changes favouring the use of motor vehicles (see Table D.1).

The remaining industries in this sector are ships, aircraft and railway rolling stock. For the ship and aircraft industries, strong growth in output is forecast. In the forecast period both industries are expected to continue the trend towards becoming specialised in parts and repairs, thereby producing products that will be complementary with imports. For railway rolling stock a negative projection has been made.

With strong productivity growth in the sector, employment is expected to fall at the rate of 2.4 per cent per year through the forecast period.

Non-metallic construction materials (ranked 21)

The non-metallic construction materials sector is ranked below the construction sector because of technology assumptions. As shown in Table C.3, it is assumed that inputs of the sector's products per unit of output in customer industries will decline by 0.3 per cent per year. The sector's main customers are in construction, which has a forecast growth rate of 2.4 per cent. The output forecast for the non-metallic construction materials sector is annual average growth of 1.7 per cent. Within the sector, the industry with the highest forecast growth rate is non-metallic construction materials nec. This industry has a comparatively high export share and it is expected to benefit from strong export growth. The industry with the lowest forecast growth rate is cement. It suffers from having the largest adverse shift in customer-industry technologies.

Employment in the sector is forecast to grow at the rate of 0.4 per cent per year. This reflects average productivity growth combined with subdued output growth.

Textiles, clothing and footwear (ranked 22)

Textiles, clothing and footwear (TCF) ranks last in the output forecasts. Nevertheless, it is expected to have a higher growth rate in the forecast period than it had over the period 1993–94 to 1997–98. In the historical period, the TCF sector experienced substantial structural change which will ease in the forecast period. This is the main factor underlying the forecast of improved prospects. Another positive factor is strong export growth, albeit from a small base.

Employment prospects in the sector also have a low ranking (19). An average annual decline in employment of 2.0 per cent and productivity growth of 3.0 per cent is forecast. High productivity growth will be important for the sector's survival against import competition.

Appendix D

Tables of detailed assumptions and results

This Appendix contains tables, which show assumptions and forecasts for all 112 industries/114 commodities in the MONASH model.

Table D.1

Assumptions for industry technology and household tastes at the detailed commodity/industry level (average percentage changes)

Commodity	(I) Used by:		Industry	(III)
	Consumers			Primary
	(a)	(b)		factor inputs(c)
<i>Agriculture, forestry, fishing</i>				
1 Wool	-0.3	-0.2		
2 Sheep	1.0	-0.9		
3 Wheat	-0.3	-0.3	1 Pastoral zone	-1.8
4 Barley	1.0	2.6	2 Wheat-sheep zone	-2.6
5 Other coarse grains	1.2	0.7	3 High rainfall zone	-1.5
6 Meat cattle	0.6	-0.8	4 Northern beef	-1.0
7 Milk Cattle and Pigs	0.1	-0.1	5 Milk Cattle and Pigs	-2.9
8 Other Farming Export	-0.9	-0.9	6 Other Farming Export	-2.0
9 Other Farming Import	0.5	-0.1	7 Other Farming Import	-2.7
10 Poultry	0.6	0.7	8 Poultry	-4.6
11 Services to Agriculture	-1.2	-0.4	9 Services to Agriculture	0.0
12 Forestry and Logging	-0.5	0.5	10 Forestry and Logging	0.0
13 Fishing and Hunting	0.7	-0.8	11 Fishing and Hunting	-3.9
<i>Mining</i>				
14 Ferrous Metal Ores	-0.8	-1.2	12 Ferrous Metal Ores	-7.1
15 Non-Ferrous Metal Ores	-0.6	-3.2	13 Non-Ferrous Metal Ores	-5.4
16 Black Coal	-2.3	-1.8	14 Black Coal	0.0
17 Crude oil, gas and brown coal	-0.8	-0.2	15 Crude oil, gas and brown coal	0.0
18 Other Minerals	1.1	0.1	16 Other Minerals	-0.2
19 Services to Mining nec	-2.6	-3.0	17 Services to Mining nec	0.0
<i>Food, drink and tobacco</i>				
20 Meat Products	1.0	0.8	18 Meat Products	-1.3
21 Milk Products	0.6	0.3	19 Milk Products	-3.7
22 Fruit and Vegetable Prods	2.4	-0.3	20 Fruit and Vegetable Prods	-6.5
23 Margarine, Oils, Fats nec	-1.7	-2.7	21 Margarine, Oils, Fats nec	0.0
24 Flour and Cereal Products	0.6	0.1	22 Flour and Cereal Products	0.0
25 Bread Cakes and Biscuits	-1.4	-0.6	23 Bread Cakes and Biscuits	0.0
26 Confectionery and Cocoa	-1.3	-0.4	24 Confectionery and Cocoa	-0.3
27 Other Food Products	0.8	-1.2	25 Other Food Products	-1.1
28 Soft Drinks, Cordials	0.9	-0.6	26 Soft Drinks, Cordials	0.0
29 Beer and Malt	-1.4	-0.8	27 Beer and Malt	0.0
30 Other Alcoholic Drinks	-0.9	-0.5	28 Other Alcoholic Drinks	0.0
31 Tobacco Products	-2.6	-0.7	29 Tobacco Products	0.0

Table D.1 continued

<i>Textiles, clothing and footwear</i>						
32	Cotton Ginning, etc.	1.0	-0.3	30	Cotton Ginning, etc.	-1.9
33	Man-Made Fibre, Yarns	1.8	0.7	31	Man-Made Fibre, Yarns	-1.1
34	Cotton Yarns, Fabrics	-0.5	-1.0	32	Cotton Yarns, Fabrics	-1.2
35	Wool, Worsted Fabrics	-2.0	-2.5	33	Wool, Worsted Fabrics	0.0
36	Textile Finishing	0.0	-0.4	34	Textile Finishing	-0.5
37	Textile Floor Coverings	-4.3	-1.5	35	Textile Floor Coverings	-3.2
38	Other Textile Products	0.1	-0.9	36	Other Textile Products	-2.0
39	Knitting Mills	-1.9	-2.0	37	Knitting Mills	-1.1
40	Clothing	-1.7	-0.4	38	Clothing	-2.8
41	Footwear	-1.9	-0.3	39	Footwear	-1.1
<i>Wood products</i>						
42	Sawmill Products	-3.9	-2.6	40	Sawmill Products	0.0
43	Veneers and Wood Boards	3.3	0.6	41	Veneers and Wood Boards	0.0
44	Joinery and Wood Products	-2.0	-1.4	42	Joinery and Wood Products	0.0
45	Furniture and Mattresses	-0.5	2.1	43	Furniture and Mattresses	0.0
<i>Paper products</i>						
46	Pulp, Paper, Paperboard	1.1	-0.4	44	Pulp, Paper, Paperboard	-0.3
47	Bags and Containers	1.0	-0.4	45	Bags and Containers	-1.5
48	Paper Products nec	4.8	-3.6	46	Paper Products nec	-0.9
49	Newspapers and Books	-1.5	-2.7	47	Newspapers and Books	0.0
50	Commercial Printing	2.7	0.7	48	Commercial Printing	0.0
<i>Chemicals, petroleum</i>						
51	Chemical Fertilisers	2.4	0.1	49	Chemical Fertilisers	0.0
52	Other Basic Chemicals	4.8	1.3	50	Other Basic Chemicals	0.0
53	Paints and Varnishes	2.0	-0.2	51	Paints and Varnishes	-0.1
54	Pharmaceutical Goods	2.9	2.0	52	Pharmaceutical Goods	0.0
55	Soap and Detergents	-1.2	-3.7	53	Soap and Detergents	0.0
56	Cosmetics and Toiletries	0.5	-3.8	54	Cosmetics and Toiletries	-0.9
57	Other Chemical Goods	6.2	1.9	55	Other Chemical Goods	-0.5
58	Petrol and Coal Products	-1.7	-0.4	56	Petrol and Coal Products	0.0
<i>Non-metal construction prods.</i>						
59	Glass and Glass Products	-2.2	-0.5	57	Glass and Glass Products	-0.2
60	Clay Products, Refractories	-2.6	-0.7	58	Clay Products, Refractories	0.0
61	Cement	0.1	-1.2	59	Cement	-0.4
62	Ready Mixed Concrete	-0.6	-0.6	60	Ready Mixed Concrete	-1.6
63	Concrete Products	-1.9	-0.3	61	Concrete Products	-1.3
64	Non-Metallic Mineral Prods	3.9	1.2	62	Non-Metallic Mineral Prods	-2.5
<i>Basic metal products</i>						
65	Basic Iron and Steel	3.2	0.5	63	Basic Iron and Steel	-1.4
66	Non-Ferrous Metals	4.1	1.1	64	Non-Ferrous Metals	-2.5
67	Structural Metal Products	-0.5	0.8	65	Structural Metal Products	0.0
68	Sheet Metal Products	-4.8	-2.4	66	Sheet Metal Products	-0.3
69	Other Metal Products	-0.1	1.0	67	Other Metal Products	0.0
<i>Cars, transport equipment</i>						
70	Motor Vehicles and Parts	0.6	1.3	68	Motor Vehicles and Parts	-0.4
71	Ships and Boats	-1.4	0.0	69	Ships and Boats	-4.0

Table D.1 continued

72	Railway Rolling-stock	-3.8	-3.7	70	Railway Rolling-stock	-3.7
73	Aircraft	0.3	-1.1	71	Aircraft	-5.1
<i>Electronic, specialist equip.</i>						
74	Scientific Equipment	3.5	2.1	72	Scientific Equipment	-3.6
75	Electronic Equipment	3.8	1.9	73	Electronic Equipment	-2.4
76	Household Appliances	-2.2	2.1	74	Household Appliances	-2.9
77	Other Electrical Goods	-3.6	0.5	75	Other Electrical Goods	-2.7
78	Agricultural Machinery	3.2	1.7	76	Agricultural Machinery	0.0
79	Construction Machinery	1.1	1.7	77	Construction Machinery	0.0
80	Other Machinery	0.9	1.0	78	Other Machinery	0.0
<i>Other manufacturing</i>						
81	Leather Products	-2.3	-2.9	79	Leather Products	0.0
82	Rubber Products	2.1	0.3	80	Rubber Products	-0.4
83	Plastic Products	0.6	-0.7	81	Plastic Products	0.0
84	Signs, Writing Equipment	-1.1	-2.9	82	Signs, Writing Equipment	0.0
85	Other Manufacturing	-2.1	-2.5	83	Other Manufacturing	0.0
<i>Electricity, gas and water</i>						
86	Electricity	0.2	0.5	84	Electricity	-4.1
87	Gas	0.2	-0.2	85	Gas	-2.7
88	Water, Sewerage, Drainage	-0.3	-0.7	86	Water, Sewerage, Drainage	-2.4
<i>Construction</i>						
89	Residential Building	3.9	0.1	87	Residential Building	0.0
90	Other Construction	3.9	-0.3	88	Other Construction	0.0
<i>Wholesale and retail trade</i>						
91	Wholesale Trade	-2.6	-1.2	89	Wholesale Trade	0.0
92	Retail Trade	-2.1	-0.3	90	Retail Trade	-0.1
93	Mechanical Repairs	-1.8	-2.3	91	Mechanical Repairs	0.0
94	Other Repairs	-2.4	-1.8	92	Other Repairs	0.0
<i>Transport and storage</i>						
95	Road Transport	-1.0	0.2	93	Road Transport	-0.8
96	Rail and Other Transport	-1.8	0.0	94	Rail and Other Transport	-6.6
97	Water Transport	-3.9	-3.4	95	Water Transport	-1.2
98	Air Transport	1.0	-1.8	96	Air Transport	-4.7
99	Services to Transport	-0.2	0.1	97	Services to Transport	0.0
<i>Communications</i>						
100	Communication	0.0	2.4	98	Communication	-5.5
<i>Finance and business services</i>						
101	Banking	0.1	2.4	99	Banking	-4.1
102	Non-Bank Finance	2.0	2.5	100	Non-Bank Finance	-6.1
103	Investment and Services	1.5	2.2	101	Investment and Services	-4.1
104	Insurance	3.5	2.4	102	Insurance	-3.6
105	Other Business Services	0.2	0.2	103	Other Business Services	0.0
<i>Ownership of dwellings</i>						
106	Ownership of Dwellings	0.1	0.0	104	Ownership of Dwellings	0.8
<i>Public administration</i>						
107	Public Administration	-1.1	-0.7	105	Public Administration	-0.1
108	Defence	-0.7	0.0	106	Defence	-1.4

Table D.1 continued

<i>Health, education, welfare</i>						
109	Health	0.2	-0.7	107	Health	-0.4
110	Education, Libraries	2.9	-0.6	108	Education, Libraries	-0.4
111	Welfare Services	-0.9	-0.6	109	Welfare Services	0.0
<i>Hospitality, personal services</i>						
112	Entertainment, Leisure	1.1	0.6	110	Entertainment, Leisure	0.0
113	Restaurants, Hotels	-0.9	-1.0	111	Restaurants, Hotels	0.0
114	Personal Services	-0.6	-0.6	112	Personal Services	0.0

- (a) Annual rate of shift of consumption function.
- (b) Annual rate of change of use of the commodity identified on the left-hand panel per unit of output of industries using the commodity.
- (c) Annual rate of change of use of all primary factors (labour, capital and agricultural land) per unit of production of the industry identified on the left.
-

Table D.2**Output and employment: (average annual percentage growth rates for industries)**

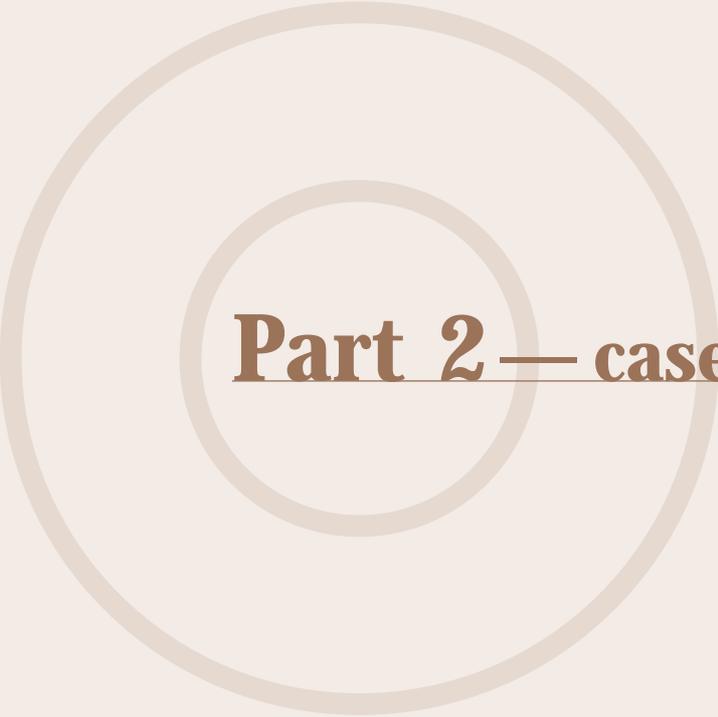
	Industry	Production		Employment (hours):	
		1993–94 to 1997–98	1997–98 to 2015–16	1993–94 to 1997–98	1997–98 to 2015–16
1	Pastoral zone	-4.3	0.6	1.1	-1.7
2	Wheat-sheep zone	3.1	2.7	2.7	-0.4
3	High rainfall zone	-10.1	1.0	-0.4	-1.1
4	Northern beef	1.9	0.9	0.6	-0.5
5	Milk Cattle and Pigs	3.8	3.0	0.4	-0.2
6	Other Farming Export	2.1	2.3	-0.8	0.0
7	Other Farming Import	4.1	2.9	0.5	-0.5
8	Poultry	3.7	3.5	0.5	-0.3
9	Services to Agriculture	1.7	2.6	1.5	3.0
10	Forestry and Logging	2.5	2.8	1.5	2.2
11	Fishing and Hunting	2.2	2.5	-2.6	-1.4
12	Ferrous Metal Ores	4.1	2.8	-5.0	-5.3
13	Non-Ferrous Metal Ores	5.7	2.7	-3.1	-5.5
14	Black Coal	4.8	3.7	5.1	2.2
15	Crude oil, gas and brown coal	5.8	2.3	5.8	-3.7
16	Other Minerals	5.6	3.9	3.0	0.9
17	Services to Mining nec	0.3	-0.7	-1.0	-1.5
18	Meat Products	3.3	3.4	2.3	2.3
19	Milk Products	2.8	2.5	-1.4	-1.5
20	Fruit and Vegetable Prods	3.8	3.6	-3.2	-3.3
21	Margarine, Oils, Fats nec	-1.7	0.9	-0.2	1.7
22	Flour and Cereal Products	4.6	4.7	3.3	4.2
23	Bread Cakes and Biscuits	-0.2	0.7	-0.7	0.8
24	Confectionery and Cocoa	-0.3	1.1	-0.8	0.8
25	Other Food Products	2.9	2.4	1.2	1.0
26	Soft Drinks, Cordials	3.2	2.8	2.8	2.3
27	Beer and Malt	0.3	0.7	-0.6	0.2
28	Other Alcoholic Drinks	4.3	5.3	3.4	4.7
29	Tobacco Products	-1.1	-0.2	-2.0	-0.2
30	Cotton Ginning, etc.	5.5	1.9	2.4	-2.2
31	Man-Made Fibre, Yarns	-1.8	2.7	-5.4	-0.8
32	Cotton Yarns, Fabrics	-2.4	2.9	-4.9	0.3
33	Wool, Worsted Fabrics	-5.0	-0.5	-5.4	-0.8
34	Textile Finishing	-0.6	1.2	-2.4	-0.4
35	Textile Floor Coverings	-1.3	-0.2	-5.4	-4.4
36	Other Textile Products	0.8	2.2	-3.7	-2.3
37	Knitting Mills	-2.8	-0.1	-4.8	-2.0
38	Clothing	-1.6	0.7	-5.0	-2.6
39	Footwear	-5.2	-1.1	-6.1	-2.4
40	Sawmill Products	-2.3	0.2	-2.5	0.2
41	Veneers and Wood Boards	3.2	3.5	1.4	2.5
42	Joinery and Wood Products	0.4	0.9	-0.3	0.7
43	Furniture and Mattresses	2.7	2.9	1.6	2.2
44	Pulp, Paper, Paperboard	0.2	1.9	-6.7	-3.7

Table D.2 continued

45	Bags and Containers	2.2	2.3	-3.3	-3.0
46	Paper Products nec	2.0	2.6	-3.1	-2.9
47	Newspapers and Books	-0.4	1.0	-2.9	-1.8
48	Commercial Printing	3.8	3.6	0.9	0.2
49	Chemical Fertilisers	-5.1	-2.6	-7.1	-3.8
50	Other Basic Chemicals	1.5	3.2	-2.0	0.9
51	Paints and Varnishes	2.6	2.9	0.5	1.5
52	Pharmaceutical Goods	4.1	4.6	0.4	2.2
53	Soap and Detergents	-1.0	0.4	-2.6	-0.7
54	Cosmetics and Toiletries	-0.9	0.7	-3.2	-0.8
55	Other Chemical Goods	3.9	4.5	1.5	2.4
56	Petrol and Coal Products	2.6	2.8	0.9	2.1
57	Glass and Glass Products	1.0	1.8	-0.2	1.2
58	Clay Products, Refractories	-0.8	0.7	-2.3	0.2
59	Cement	1.4	0.2	1.2	-0.6
60	Ready Mixed Concrete	4.3	1.8	2.7	0.0
61	Concrete Products	5.2	2.2	3.6	0.6
62	Non-Metallic Mineral Prods	3.9	3.3	0.6	0.1
63	Basic Iron and Steel	0.9	1.0	-2.2	-1.4
64	Non-Ferrous Metals	2.1	5.3	-0.6	3.4
65	Structural Metal Products	7.3	3.2	5.7	2.1
66	Sheet Metal Products	4.8	4.6	3.2	3.6
67	Other Metal Products	1.6	2.9	0.0	2.0
68	Motor Vehicles and Parts	3.0	1.4	-1.3	-2.0
69	Ships and Boats	4.2	3.8	-2.4	-2.2
70	Railway Rolling-stock	-2.7	-2.1	-8.5	-7.1
71	Aircraft	3.5	3.4	-3.3	-3.1
72	Scientific Equipment	3.5	3.0	-2.5	-2.1
73	Electronic Equipment	8.8	8.7	3.7	4.6
74	Household Appliances	1.6	2.5	-4.1	-2.1
75	Other Electrical Goods	1.3	1.8	-3.9	-2.4
76	Agricultural Machinery	1.1	0.2	-1.2	-1.2
77	Construction Machinery	4.9	3.9	2.3	2.3
78	Other Machinery	3.7	2.8	1.8	1.7
79	Leather Products	8.2	7.3	7.7	6.9
80	Rubber Products	0.3	1.8	-1.6	0.7
81	Plastic Products	0.2	2.0	-2.0	0.8
82	Signs, Writing Equipment	-1.0	1.3	-2.2	0.7
83	Other Manufacturing	0.3	1.5	-0.3	1.3
84	Electricity	4.2	3.6	-5.6	-6.3
85	Gas	3.8	3.4	-6.2	-5.8
86	Water, Sewerage, Drainage	2.4	2.3	-4.3	-4.9
87	Residential Building	2.0	2.5	1.9	1.8
88	Other Construction	7.5	2.4	6.1	1.4
89	Wholesale Trade	4.3	3.3	3.3	2.3
90	Retail Trade	4.8	3.9	3.9	3.1
91	Mechanical Repairs	0.8	1.2	-1.6	-0.2

Table D.2 continued

92	Other Repairs	1.0	1.3	-0.7	0.3
93	Road Transport	4.5	3.3	2.6	0.8
94	Rail and Other Transport	4.1	2.8	-3.5	-4.7
95	Water Transport	1.5	2.3	-0.9	0.2
96	Air Transport	6.0	5.1	-3.1	-2.4
97	Services to Transport	5.6	4.0	4.5	2.4
98	Communication	9.0	6.5	0.0	-2.9
99	Banking	8.4	6.3	-1.9	-4.9
100	Non-Bank Finance	8.8	5.9	-9.1	-6.2
101	Investment and Services	9.8	7.3	-2.5	-4.6
102	Insurance	9.3	7.3	3.4	1.1
103	Other Business Services	4.6	3.6	3.2	2.8
104	Ownership of Dwellings	2.1	2.3	0.0	0.0
105	Public Administration	3.1	2.3	1.7	1.6
106	Defence	1.0	0.3	-2.3	-2.3
107	Health	3.9	3.4	2.1	2.1
108	Education, Libraries	4.4	3.3	3.7	3.0
109	Welfare Services	3.7	3.2	2.7	2.6
110	Entertainment, Leisure	6.3	4.6	4.5	3.0
111	Restaurants, Hotels	3.6	2.	1.9	1.8
112	Personal Services	2.9	2.2	-0.1	-1.7



Part 2 — case studies

Section One

Introduction

This Part sets out case studies that discuss the impacts e-commerce might have on a number of key sectors.

1.1 Approach

Of the wide range of possible impacts e-commerce may have, this study has sought to concentrate on those impacts that are viewed as being most probable. Of these probable impacts, the analysis has aimed to capture insight from two subsets:

- impacts that can be picked up in qualitative case studies; and
- quantitative impacts that are analysed in the modelling.

This part concerns itself primarily with discussing the qualitative impacts. Where possible, the conclusions drawn from the following sections have been used to guide the rationale behind the impacts included in the quantitative modelling.

Each of the following sections looks at an industry sector. These differ from the separate MONASH industries and commodities discussed in Part 1. Sectors are often broader than the industry/commodity split in the MONASH model, often incorporating many MONASH sectors. Some sectors are also amalgams of commodity groups identified in the MONASH model (and national accounts). The analysis in each section follows the following format:

- a *description of the sector* and the way in which e-commerce is affecting it;
- *cost savings* that might be made as a result of e-commerce activity;
- *new costs* that might be incurred in order to facilitate e-commerce;
- *new business models* or industry structures that may become possible due to the changes that e-commerce will bring to the nature of businesses in the industry;
- *jobs and skills* issues that arise out of the changing nature of work in the sector; and
- *external dimensions* that may result from the impact of e-commerce technologies on the sector.

1.2 Identifying sectors

This Part discusses the impact of e-commerce on broad industry sectors. These sectors were chosen for two reasons:

- the need to capture the areas of greatest impact due to e-commerce; and
- the need to represent the major areas of activity in the Australian economy.

In addition, the choice of sectors was also influenced by the wish to make maximum use of the experience and interests of the Industry Reference Group (IRG).

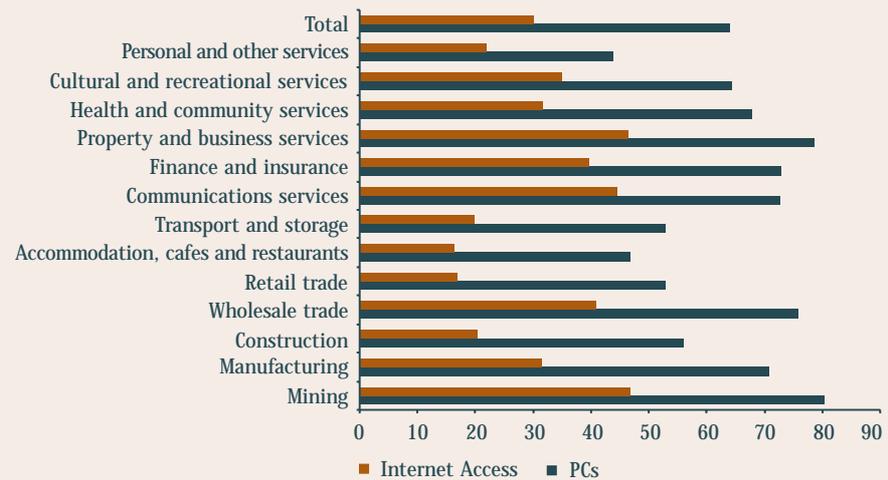
Industry sectors' use of e-commerce

There are very few reliable statistics to facilitate comparison of differing sectors use of e-commerce. There is some data, however, that assists in painting a few outlines.

Although somewhat dated, ABS data indicates that most business sectors are making progress towards obtaining the key infrastructure that is required to participate in e-commerce. See the Exhibit below. This shows the proportion of businesses in differing industry sectors that use personal computers (PCs) as well as the percentage that have Internet access.

Exhibit 1.1

Employing businesses with PC and Internet usage (percentage)



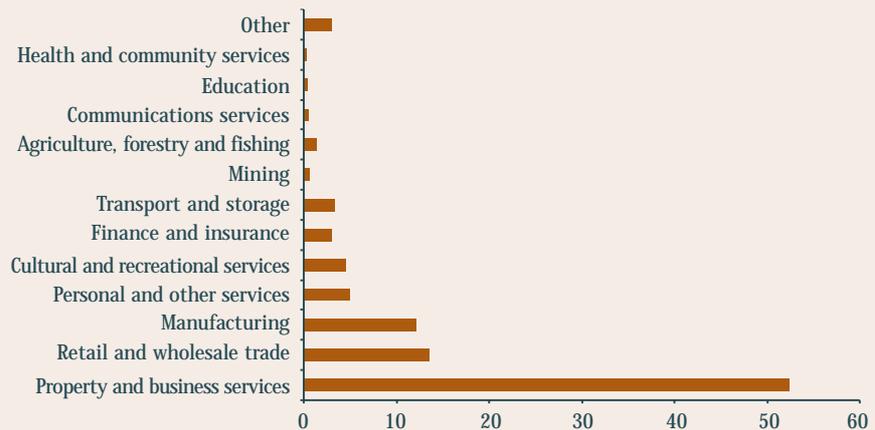
Source: ABS Publication 8133.0, *Business use of Information Technology 1997-98*, April 1999, p. 5.

While this ABS data is not a direct indicator of e-commerce utilisation, it does give some insight into which sectors are working towards having the essential infrastructure in place which is necessary to proceed to e-commerce. The data indicates that on average it seems that 64 per cent of businesses utilise PCs, while 30 per cent of businesses also have Internet access. Interestingly, mining appears to be a leading sector (particularly in PC utilisation) while services-related activities are consistently strong in obtaining Internet access.

Other Government agencies have looked at the sectoral composition of Australian e-commerce sites of the Internet. The Department of the Communications, Information Technology and the Arts recently conducted a survey into the distribution of websites by industrial classifications. Results showing the allocation of surveyed sites are plotted in the Exhibit below.

Exhibit 1.2

Distribution of websites according to industrial classification

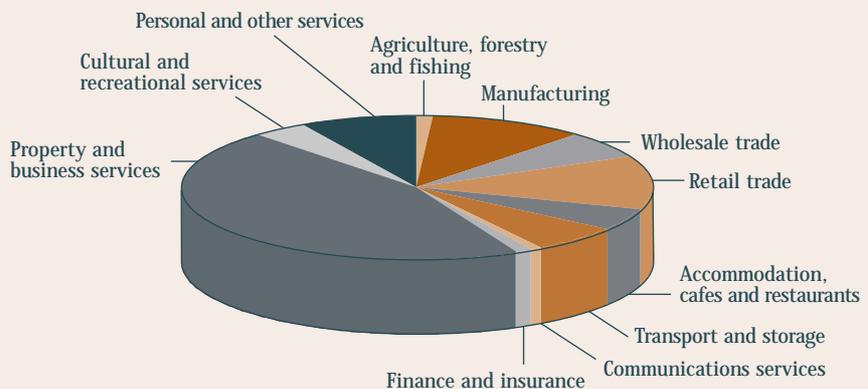


Source: John Street and Danielle Aeuckens, *Results of a Survey: Electronic Commerce on the Internet*, Department of Communications, Information Technology and the Arts, 1999.

These results indicate that most Australian e-commerce sites are related to key service sector activities. Taken at face value, in contrast to the ABS capacity statistics, this data suggests that mining companies make up a small proportion of those that have e-commerce sites in Australia. It should be noted, however, that the study was preliminary in nature. While providing some interesting insights, inference is limited by the fact that only 790 domains were classified and that these were all sourced from one directory. Furthermore, only .com.au domain names were surveyed, under-representing industries with other domain suffixes (that is .gov.au, .net.au, .edu.au).

Exhibit 1.3

Internet commerce by industrial classification (per cent)



Source: John Street and Danielle Aeuckens, *Results of a Survey: Electronic Commerce on the Internet*, Department of Communications, Information Technology and the Arts, 1999.

Overall, there is little quantitative evidence to point to about differing sectors' use of e-commerce techniques in Australia at present, but the data that is available generally points to services being significant users.

None of these surveys suggests any limits to the adoption of e-commerce, or the nature of the potential benefits and other impacts. To do that it is necessary to examine sectors on a case by case basis.

E-commerce intensive sectors

In order to capture areas where the largest impacts of e-commerce would occur, sectors that are viewed as being intensive users or rapid adopters of

e-commerce were chosen. Key questions used in identifying these sectors included the following:

- Is there a high reliance on information?
- Is the product or service easily virtualised?
- Is the product more important than its location?
- How extensive is the existing information infrastructure in the sector?

Sectors that rate very highly against these criteria include Banking and Finance, Information Technology, Communications, Business Services, Health, Retail and Media and Entertainment.

Broader economic activity

In addition, it was recognised that the ubiquitous nature of e-commerce would mean that it would impact upon a broad range of sectors of economic activity. Therefore, in order to have an overall sense of the impacts, sectors that represented significant components of the national economy would need to be included. These include sectors such as Manufacturing, Agriculture and Mining.

A further need to include these sectors, Agriculture and Mining in particular, stems from their significance to economic activity in regional Australia. If a picture of the regional impacts of e-commerce is to be constructed, it is vital to include sectors that constitute the bulk of regional activity.

Section Two

Banking and finance

2.1 Nature of the sector and the context

The economic role of the banking and financial services sector is to mobilise funds between savers and investors.

The sector includes financial intermediaries and financial markets. Financial intermediaries include the deposit taking banks, building societies and credit unions, insurance companies (life, health and general) and superannuation funds. The sector also includes value that is added by market institutions, such as the Australian Stock Exchange and the Sydney Futures Exchange.

Total finance sector expenditure in 1997–98 was \$32 398 million, or around 5.8 per cent of Australia's GDP.¹ As of May 1999, the industry employed 300 400 people.²

Overall, the market environment in the banking and financial services sector is becoming increasingly competitive. While seeking to mitigate the risk of systemic financial failure, the thrust of regulatory reform following the Wallis Committee's report to the Government has been to encourage a more efficient and flexible financial system.³ Previous regulatory fetters and cross subsidies have been progressively removed.

As imperfections in the operation of markets have receded with the development of new transactions technology and new ways of harnessing information, trade in markets has increasingly substituted financial intermediation. It seems that further change is ahead with the new capacities introduced by the use of e-commerce.

2.2 Role for e-commerce

The banking and finance sector was one of the first industry sectors to benefit from the use of information technology more generally.

Early computers were used for scientific and military purposes, not for commerce. They first made their way into commercial applications in the 1960s, with ERMA (the Electronic Recording Machine—Accounting). Banks were swamped with the growing volume of checks that needed to be processed (between 1943 and 1952, check use had doubled from 4 billion to 8 billion checks written each year). By automating the function with ERMA, the first bank to use the computer, Bank of America, reported that nine employees could do the job that previously took 50 people.

Henry D, Cooke S, Montes, 1998, *The Emerging Digital Economy*,
US Department of Commerce 1998

The banking and finance sector has been a rapid adopter of e-commerce. The sector displays many characteristics that will facilitate the adoption and extension of e-commerce activities, such as the importance of product over location, many of its key services are easily virtualised, and great importance is placed on quick response times.

Technological innovation has been a major force shaping financial service delivery over the past two decades and appears likely to accelerate over the next few years.

The Wallis Committee

1 ABS.

2 ABS.

3 Financial System Inquiry 1997, *Final Report*, AGPS, Canberra.

Banking

For some time now most of the transactions between banks in the payments system have been undertaken electronically.

Banking systems have also progressively automated deposit taking and payments. Key developments have included the now widespread acceptance and utilisation of ATMs and EFTPOS.

Use of Internet banking is also growing rapidly. Of the 1.7 million Australians using the Internet regularly (more than once a week), nearly 150 000 are involved in Internet banking. This is a threefold increase from a year ago. Internet consultancy www.consult projects that there will be about 270 000 Internet banking users by the beginning of 2 000. Most (nearly 90 per cent) users are expected to extend their existing banking relationships.⁴

According to www.consult, while the four big domestic banks have Internet-banking offerings, the Commonwealth Bank is the largest. Forty five per cent of regular Internet banking users bank online with the Commonwealth Bank and nearly 30 per cent with Westpac. National Australia Bank is Australia's biggest banker to small business. Users of NAB Internet Banking, are reported to have increased from 8 000 to 26 000 in two months and are signing up at twice the rate of personal customers.⁵

The key attributes that the commercial banks offer in their Internet banking facilities typically include:

- review transaction details;
- transfer funds between accounts;
- pay bills (typically using BPAY);
- transaction records and account statements;
- buying or selling of funds that can be used in other e-commerce sites (e.g. the *ecash* system supported by St George);
- communicate securely with the bank;
- standard fees, or sometimes, lower banking fees per transaction; and
- customer convenience in terms of 24 hours a day, seven days a week service, without queues and from the comfort of one's home or office.

The National Australia Bank includes a 'pay anyone' feature in its Internet service which enables customers to transfer funds to accounts at other banks, a function that is not widely available on Internet based systems in Australia.

Statistics from the US give an indication of why people use Internet banking and why they do not.

4 Margaret Banaghan 'Inside Story – Part two: Cyber retail case studies', *Business Review Weekly* Vol. 21, No. 29.

5 Gayle Bryant, 'Online banking: Small business joins the rush', *Business Review Weekly* Vol. 21 No. 28.

Table 2.1**Banking online: why and why not**

Reasons for		Reasons for not	
Convenience of day or night access	93.4%	Financial institution does not offer it	60.9%
Getting up to date information	94.7%	Haven't got around to it	13.1%
Helps balance accounts more easily	94.1%	Too expensive	12.1%
		Security concerns	5.8%

Source: May 1998 survey by Genesis from *The Emerging Digital Economy*, US Department of Commerce 1998.

Financial markets

Financial markets have also been quick to adopt e-commerce and electronic trading. The Australian Stock Exchange (ASX) introduced the Stock Exchange Automated Trades System (SEATS) in 1987. Trading floors were abolished in 1990 and all trading was conducted electronically on SEATS. In 1994 the ASX introduced electronic and clearing settlement (CHESS). Reflecting continued use of e-commerce techniques, by 1999 settlement time was reduced to the trade date plus three business days (T+3).

Since the arrival of open access systems using the Internet, ordinary investors have also been quick to buy and sell shares electronically. Many new purely online brokers have emerged offering very low fees and several full service brokers have responded by offering online trading facilities of their own. Over 15 per cent of households in the US are reported to have conducted equity trades online. This compares with less than five per cent that bank online.⁶

Box 2.1**THE ASX and e-commerce**

Most of what the ASX does is e-commerce, for example electronic trading of shares and executions has been occurring for 12 years.

Given this history, the ASX believe that further creation of value from e-commerce will be due to increases in speed. For example, gross settlements now take three days, but they are gearing up to handle real time settlements. In that respect it will be a new product for the ASX, and will also change the risk characteristics of trades.

There is also value added by the speed of the transaction as the value of the trade can change while it is taking place.

The ASX is also working with the NASDAQ to allow the joint buying and selling of shares on their indexes. Currently, if an Australian wants to trade with NASDAQ they have to find a broker with a US affiliate or contact a broker in the US. The funds for the trade have to be raised separately. When the new service is in place, the sale of shares on one index can be used to fund the purchase of shares on the other. This service will also allow the ASX to use its IT infrastructure more intensely.

Re-intermediation could also occur, with brand name labelling of shares and finance. Quicken in the US is trying to provide bundling via a portal to banks, brokers, insurance and more. The seamlessness of any new service will be important.

Another factor is that new players do not have commitments to existing players that existing players have amongst themselves.

The business elements of e-commerce will evolve slowly—the ASX has need of digital certification and increased reliability.

Source: Interview: Jason Anderson, Australian Stock Exchange, IRG member, 12 July 1999.

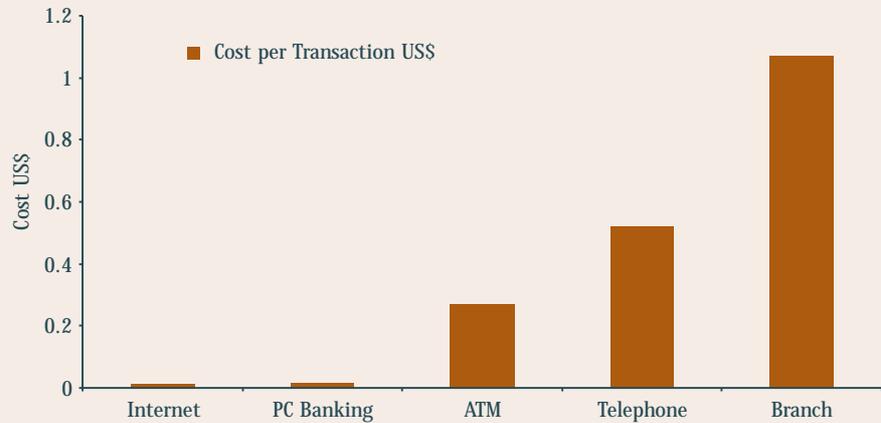
⁶ *The Economist*, 'Online Banking: Death By A Thousand Clicks', 4–10 December 1999, p. 21–23.

2.3 Cost savings

Banks are keen to make greater use of Internet banking for many reasons, but a key factor is the substantial cost advantage this activity enjoys. The range of channels that the banking sector can use at present and their differing cost is illustrated in the following graph.

Figure 2.1

Costs favour electronic banking



Source: *The Emerging Digital Economy*, US Department of Commerce 1998.

Similar cost differentials in Australia are driving the banks to rely more on electronic banking channels. The Commonwealth Bank states in its 1998 Annual Report that 72 per cent of all banking transactions are conducted through electronic channels, such as telephone, the Internet, ATMs, and EFTPOS terminals. Similarly, Westpac states that around 80 per cent of their transactions are done electronically. The National Australia Bank have recently reduced the percentage of transactions through branches from 19 per cent to 14 per cent. Every customer that is to switch from a branch transaction to a lower cost channel results in a substantial saving. Competition will force the banks to pass these savings on to customers as lower fees and prices.

Using the Internet for bill payment can provide savings to all parties involved including the merchant, customer and the bank. Electronic billing is likely to be a significant growth area in the economy in 2000.

Table 2.2

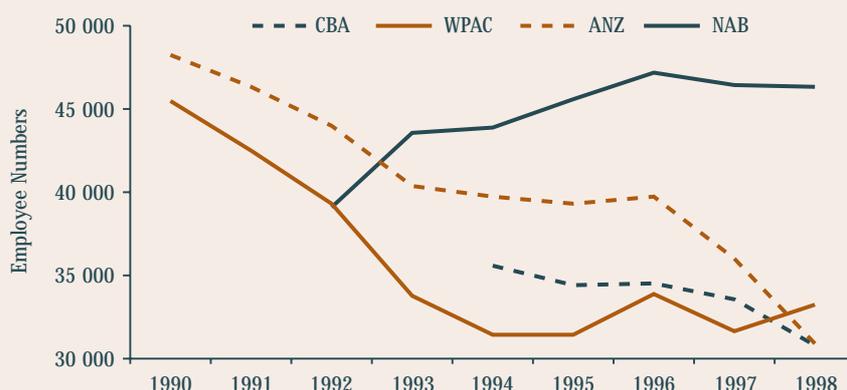
Online banking equals lower service costs and fees

US\$	Traditional (cheque by mail)	Online (Internet and credit card)
Cost to merchant	1.65–2.70	0.60–1.00
Cost to customer	0.42	0.00
Cost to bank	0.15–0.20	0.05–0.10
Cost to all parties	2.22–3.32	0.65–1.10

A flow on impact of greater use of the electronic channels and consolidation in general has been the reduction in staff required. The following graph indicates the change in employee numbers of the four Australian major banks. It is important to note that these employee numbers include those added through domestic and international acquisitions by these banks.

Figure 2.2

No. of banking employees



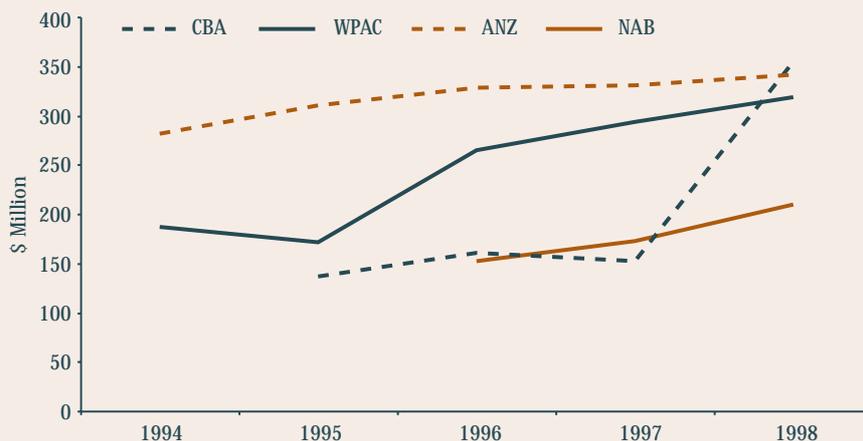
Source: ETC.

2.4 New costs and intermediaries

In order to obtain the cost savings offered by the Internet, the banking and finance sector is buying significant volumes of IT inputs.

Figure 2.3

Trends in major bank expenditure on IT



Source: Banking Annual Reports.

It seems likely that the major banks have raised their IT spending to accommodate a major upgrade of e-commerce requirements. It is not clear if they intend to raise spending above these levels or merely to sustain them, or indeed, if the new capital expenditure round is now complete.

In order to compete in the Internet market, banks and other financial sector firms must ensure that consumers are aware of their presence in this new context. The financial sector is the biggest spender on Internet advertising in Australia, nearly a quarter of the total spent coming from the sector. Five of the top-ten online advertisers in 1998 were from the financial services industry.⁷

⁷ Margaret Banaghan 'Inside Story – Part two: Cyber retail case studies', *Business Review Weekly*, Friday 30 July 1999.

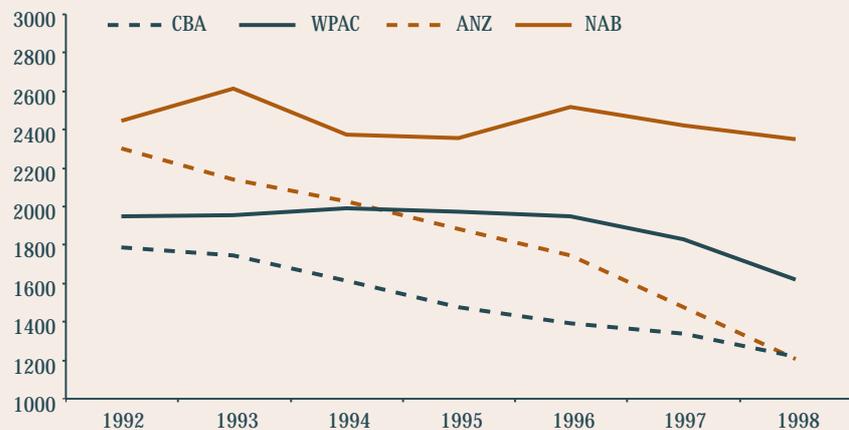
2.5 Changing business modes

Branch banking in decline

The branch is the traditional image of a bank. The following graph illustrates the trend towards reducing numbers of branches.⁸

Figure 2.4

Bank branch numbers



Source: Bank Annual Reports.

The traditional concept of a branch offering all services is also changing. Banks are setting up specialist transaction centres and centres that target specific audiences. The National Australia Bank (NAB) has 219 specialist business centres in addition to its 903 traditional branches and in Australia. The ANZ has a Business Direct Centre that offers lower priced products for smaller business with simple lending and financial service needs.

Mobile personnel

There is a trend toward the use of mobile lenders and investment advisers. Westpac have 1 000 mobile staff and during a 12 month period the Commonwealth Bank's mobile bankers conducted almost 50 000 home loan interviews, and over 24 per cent of all Commonwealth home loan approvals were generated by mobile bankers.

New intermediaries

The Commonwealth Bank has traditionally used Post Offices to provide additional branch type services for their customers. The Commonwealth plans to extend this with Woolworths Ezy Banking (see <http://www.commbank.com.au/Today/ShareholderInfo/TBC-Prism.htm>)

Westpac is working with rural communities and introducing in-store branches in pharmacies, general stores and newsagencies.

Disintermediation in financial services

Banks have traditionally provided an intermediary service of matching deposits with funding for loans. E-commerce provides an opportunity for banks to be disintermediated from this activity. The direct provision of loans by non-banking entities such as superannuation organisations and insurance companies could be an indication of this disintermediation.

⁸ Calculated from information provided in the annual reports of the National Australia Bank, Commonwealth Bank of Australia, Westpac and the Australian and New Zealand Banking Group Limited. The data does not separate out increases in branches obtained through acquisitions of overseas activities, so probably understates the fall in branches used in Australia.

Traditionally banks have played an important role in the payment approval process. The trend towards the use of credit cards (versus cheques) has had (and still does have) the potential to reduce the role of banks in the payment loop. Banks have retained some control in this area to date as the card issuing body. The move towards SET in the online payment areas will re-intermediate banks back into the online payment approval process.

The likely acceptance of some form of digital cash in the future could potentially disintermediate banks again from the payment approval process.

Elimination of value is also possible in the sector. Banks now act as intermediaries in matching depositors with funds to loan applications. The function could move to brokered markets, and even to a direct market.

With payments, the provision of EFTPOS enabling payments was a valuable service to bank customers. Now with services such as Telstra's SureLink, the payment service is provided as part of a larger service. This commoditises the pure payment service.

Interview: Tim Batten, National Australia Bank,
IRG member, 12 July 1999

Value has been eliminated by Internet trading: buyers can now trade for \$30 per trade regardless of the value of the trade, whereas it would have been twice that cost. This also creates the opportunity for unbundling, for example for third party clearing perhaps.

One of the reasons for the changes at the ASX is the possibility of losing to new competitors. The ASX is not a core service provider, but could be unbundled from this position, in fact disintermediated.

The advent of digital certification will be important for the ASX. This will open possibilities for further unbundling and is a risk for brokers who currently play a 'certifying' or risk management role for trades.

Interview: Jason Anderson, Australian Stock Exchange,
IRG member, 12 July 1999

New value and services

Greater use of e-commerce is also opening new opportunities in this sector.

Regulatory reform, competition and the potential of the new technologies are breaking down distinctions between the roles that companies in the banking and finance sector play.

E-commerce over the Internet has enabled banks to move into stock trading. The Commonwealth Bank's ComSec is a predominantly online share trading service, although it does provide a supporting telephone service. The ANZ has recently announced an alliance with E*TRADE Australia for ANZ customers to trade securities online.

There is a trend for banks to offer complete financial services to individuals and organisations. This typically includes investment advice, insurance, superannuation, share trading, and funds management.

E-commerce is creating new value in the banking and finance sector. E-commerce assists organisations in becoming virtual CFOs for small businesses by handling all financial services and providing accounts receivable and payable services. The aim is to provide a full service from operational through to strategic.

For consumers, the concept is to package services around 'life events' (marriage, retirement) and to provide focussed advice and services.

Internally, e-commerce is moving processes from the bank to the customer, for example instead of a loan officer completing an application in a face-to-face interview, the customer completes a form on the web.

Interview: Tim Batten, National Australia Bank,
IRG member, 12 July 1999

Banks are also looking to take advantage of the collection of information to tailor their services and improve their marketing. The NAB announced in their 1998 annual report the development of a sophisticated information-based system that identifies customers with specific financial service needs. Called National Leads, the system provides high quality data and strong customer calling opportunities.

New internet banks

There is a trend in the US (led by the Security First Network Bank and Atlanta Internet Bank) for the development of pure Internet banks—banks whose primary communication channel with customers is the Internet.

Internet banks are able to design their business without wasteful and lower value 'bricks and mortar' assets and liabilities. They may have a 'second mover advantage' because they do not have to face the cost of restructuring. There is evidence that they are able to offer financial services at prices well below traditional firms.

This has not had an impact in the Australian banking industry at present. This may be because the traditional banks still offered a wider range of services that customers considered safe or perhaps reflect the fact that Australia's major banks have been quick to develop their own relatively sophisticated online banking functionality—a 'clicks and mortar' strategy. The Commonwealth Bank was online in December 1995 and had Internet Banking in February 1997.

Nevertheless, traditional banking approaches are increasingly under competitive pressure.

Relationship marketing is becoming more difficult as more organisations enter the market. Banking and finance institutions now face competition from online trading organisations that gain a complete picture of a consumer's financial relationships by building around the equity holdings and into banking, insurance, superannuation, etc. This can lead to an unbundling and rebundling of services.

For example, Microsoft is providing financial and home advisory services.

Interview: Tim Batten, National Australia Bank, IRG member, 12 July 1999

This also mean a blurring of the lines between the financial industry and the e-commerce industry, as e-commerce link could be intermediated by different parties at different stages, with clearing and settlement done by yet another party.

Interview: Jason Anderson, Australian Stock Exchange, IRG member, 12 July 1999

Bill-paying over the Internet

Bill-paying over the Internet is likely to become business-as-usual within just a few years. The Gartner Group predicts that in two years virtually all banks will offer online bill payment, and industry analysts believe that Internet portals such as America Online (AOL) and Yahoo! will soon be offering (and heavily promoting) online payment under their own brands. AOL's Rob Shenk says, 'A lot of people have stock portfolios, but everyone has a checking account. So it's a much more elemental service.'⁹

A reluctance on the part of customers to switch to new providers may make sense: good financial relationships should not be thrown away for the sake of small short-term savings.

The Economist, December 1999

9 NewsScan Daily, 4 August 1999, USA Today, 4 Aug 1999. <http://www.usatoday.com/life/cyber/tech/ctf758.htm>

Not everyone is quick to change

Not all firms in the sector are rapidly embracing the opportunities. There is some evidence that insurance firms as a group are lagging. Just 37 per cent of insurance companies consider the Internet integral to their business strategy, according to a report by Booz-Allen & Hamilton. Firms in this study report a focus remains strongly on the web as an additional marketing tool rather than as new means by which to sell insurance. The majority of firms in the study, 58 per cent, were not in a position to respond to a basic email question from a consumer.¹⁰

The growth of Internet banking and new competitors does not imply the end of traditional banks or financial services brokers. Reflecting existing strengths and consumer awareness, it may be a matter of changes in roles and involvement at different levels.

One example of the transfer of value from the industry is the bundling of financial services as part of another transaction, e.g. buying a car, or factory equipment. The finance can be provided or facilitated by a party other than one from the industry, distancing banking and finance from their customers, or replacing them. However, if banking and finance take a higher view of their role, using a business event model (expanding production not just buying equipment) this opens opportunities for creating value and improving relationships using e-commerce in ways which it would be too expensive to do face-to-face. There are issues here of who has the 'right' or credibility to provide the service, i.e. who bundles whom.

Interview: Tim Batten, National Australia Bank,
IRG member, 12 July 1999

The transfer of value occurs if the service that brokers offer is unbundled. Brokers currently offer advice, risk management and execution. Risk management could be unbundled to the insurance sector, or new participants could enter using e-commerce services. Executing trades could be commoditised by anyone providing an interface between the ASX and customers, perhaps Coles-Myer, say.

Interview: Jason Anderson, Australian Stock Exchange,
IRG member, 12 July 1999

2.6 International dimensions

Banks from smaller countries in Scandinavia and Europe have been very aggressive in penetrating larger European markets with an Internet banking presence.¹¹ Is there a scope for entry of banks from abroad into Australia using a similar strategy?

There is no evidence to indicate that there has been a significant transfer of value to overseas firms through widespread offshore banking or other financial transactions. In contrast, there is anecdotal evidence to indicate that despite falling transaction costs and improved information, many investors find overseas investment or deposit in overseas banks to be too risky.

Industry sources indicate however that there is some scope for migration of this service, albeit over time.

Transfer to or from overseas occurs partly due to globalisation facilitated by e-commerce, as overseas competitors move to Australia. E*Trade is one example. They bring ideas in, but also take value out. Where the need for branch networks was once a high barrier to entry into the market, the increasing willingness to use online banking has reduced this barrier.

Also, partnership may be formed in one location and then migrated to other locations, e.g. Chase Manhattan and Telstra were initially local, but they are now working together in the US.

¹⁰ Nua Internet Surveys: June 29th, 1999, <http://www.bah.com/default.html>

¹¹ Nua Internet Surveys: July 26th, 1999, <http://www.blueskyinc.com/pressreleasejune99.htm>

NAB, as a multinational, is already experiencing some of this, even internally. Their New Zealand website is operated in Australia.

Interview: Tim Batten, National Australia Bank, IRG member, 12 July 1999

The transfer of value overseas can occur as the processing of transactions can be done anywhere.

Interview: Jason Anderson, Australian Stock Exchange, IRG member, 12 July 1999

The inflow of value from overseas is not significant and would be predominantly from the acquisition of international banking operations by the Australian banks and any associated movement of functions to Australia. For example The Bank of New Zealand owned by NAB operates its Internet site and undertakes all its processing in Australia including monitoring and supporting its ATM network. E-commerce is a major enabler of this, specifically EDI, the Internet and other dedicated networking systems.

Value can be transferred from overseas in the form of staff. The ASX has one-third of its employees in IT and software roles and is looking to source staff from overseas.

Interview: Jason Anderson, Australian Stock Exchange, IRG member, 12 July 1999

Key points

The opportunities opened up by e-commerce is a factor driving change in the banking and financial services sector. Use of e-commerce is shifting demand and supply in the sector to lower cost more convenient service delivery channels. In meeting the broad range of financial service needs that customers have within a single entity, the distinction between banks and other traditional financial service roles is becoming blurred. The potential of online financial services has reduced many barriers to entry and is increasing competitive pressures. It is likely that cost savings that will result from this process will be passed on to consumers.

When looking at quantitative analysis of the sector it seems reasonable to factor in a wide range of direct changes:

- direct labour savings extending the staff reductions the sector is already achieving;
- banking is also expected to be able to disintermediate other input costs, particularly those that relate to the operation of branch networks. To reflect this it can be assumed that a small reduction in inputs of construction and paper products is achieved (equal over time to about three and five per cent of those inputs);
- reflecting the increased convenience of online banking and financial services, time savings should be included as an efficiency gain for other industries that use the services of the sector as well as households;
- the sector has already boosted expenditure to purchase e-commerce inputs and these are already factored in to the base case forecasts. Nevertheless, it is prudent to make an allowance for additional investment reflecting assumptions about greater use of e-commerce and online financial services; and
- for the moment it is assumed that this sector will not face greater international competition or experience a significant boost in exports from e-commerce.

Section Three

Information Technology (IT) industries and e-commerce

Computing power has been doubling every 18 months for the past 30 years. At the same time, the average price of a transistor has fallen by six orders of magnitude, due to microprocessor development. In just six years (1991 to 1997), the cost of microprocessor computing power decreased from \$230 to \$3.42 per MIPS. No other manufactured item has decreased in cost so far, so fast.

Henry D, Cooke S, Montes, 1998,
The Emerging Digital Economy,
US Department of Commerce 1998

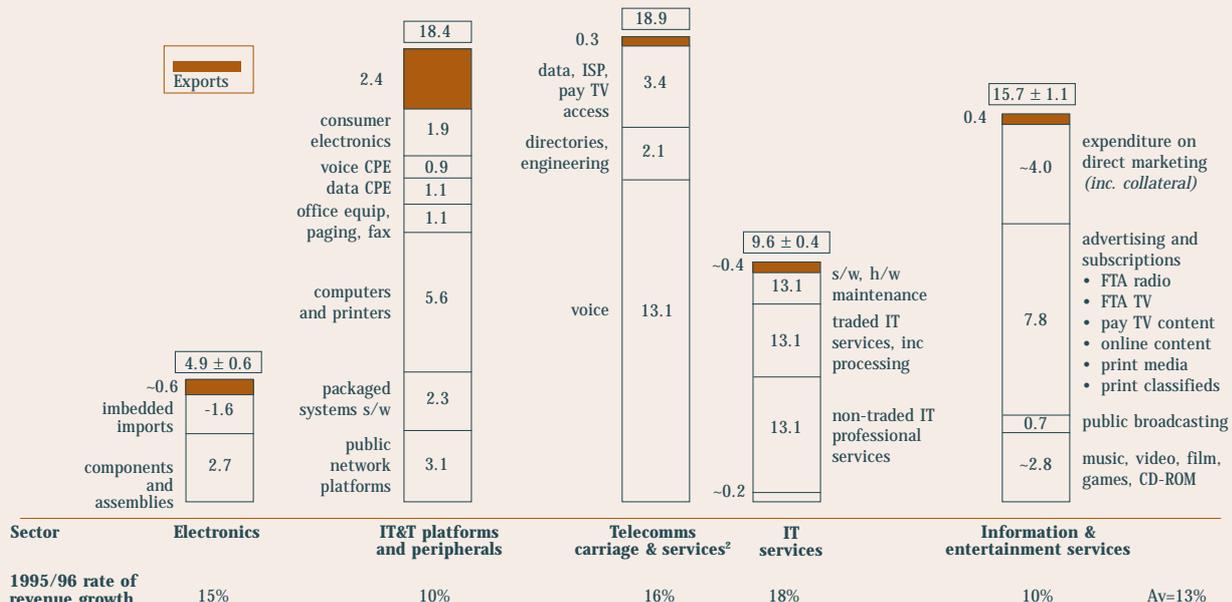
The IT industries are relatively new and dynamic in nature. The IT industries have a number of unusual characteristics. They are among the fastest growing industries. Technological change is rapid and product life cycles are short. Most product and service prices are falling rather than rising. Convergence in the industries is leading to the increasing inter-relation and interdependence of computing, communications and the media. This is also profoundly changing the structure and dynamics of the IT industries.¹² Change in the IT industries and their capacity is driving change in the use of e-commerce while the IT industries are also being driven by changes in e-commerce usage.

3.1 The IT industries

Data reported in the report *Spectator or Serious Player?* indicated that Australia's information industries generated \$66–69 billion of market revenues in 1995. That is some 7.5 per cent of turnover in the Australian economy.

Figure 3.1

Australia's information industries—market revenues (A\$ billion)



Notes: 1. Defined as markets that are now exposed to the digital convergence phenomenon. Total revenues are estimated to have been A\$67.5 ± 2.1 billion in 1995.
2. Telstra earned another \$0.3 billion from offshore ventures.

Source: The Allen Consulting Group, *Spectator or Serious Player?*, p. 9.

The IT industries extend through a value chain including electronics (approximately \$5 billion) to computing and telecommunications platforms, office equipment and consumer electronics (\$18 billion), telecommunications carriage and services (\$19 billion), IT services (approximately \$10 billion) and to information and entertainment services (approximately \$18 billion). These estimates include some

12 See Houghton, J., Pucar, M., Knox, C., *Mapping The Information Industries*, Staff Information Paper, Productivity Commission, AGPS, Canberra, July 1996.

activities such as consumer electronics sales and direct marketing expenditures that have not traditionally been included in measures of IT & Telecommunications (IT&T) industries. They also contain estimates for significant non-traded or in house activities.

Whether traded or non-traded, the IT industries are growing strongly at a rate in excess of ten per cent per annum.

It is estimated that approximately 500 000 Australians are employed by, or spend a substantial part of their time engaged in the commercial activities of the information industries.

Official statistics indicate that use of IT in Australia by the private sector is high: companies employing 100 or more people are almost fully computerised; 50 per cent of smaller companies (employing from one to 19 people) are computerised and this rate is growing.¹³

3.2 Use of e-commerce by the IT industries

The IT industries have been rapid adopters of e-commerce technologies and business models. The following box reports on sales figures that indicate the scale of the transition to e-commerce.

It is notable that the biggest advances in this sector have been in business-to-business e-commerce. More use is being made of e-commerce to facilitate the purchase of goods and services by consumers, but it is still very much behind the magnitude of sales made between businesses.

Box 3.1

Some indicative statistics about the significance of e-commerce for IT industries

Intel

Internet sales now account for 40 per cent of Intel's total sales, generating US\$1 billion in revenue per month. The revenue generated online is higher than had been expected in the fourth quarter of 1998, when the company predicted that it would sell US\$830 million a month in 1999.

Based on the current figures, the company expects online sales to account for 42 per cent of the total revenue by the end of the year. Overall, Intel reported first quarter revenue of US\$7.1 billion.

Nua Internet Surveys: 26 April 1999

<http://www.intel.com/pressroom/archive/releases/cn041399.htm>

25 Per cent of Dell revenue generated online

Dell Computers currently generates an average of US\$14 million per day in Internet sales, up from an average of US\$5 million per day in June of 1998. At present, online sales account for 25 per cent of Dell's total revenue. The company expects this percentage to increase to 50 per cent by end of 2000.

In order to maximise its online business, Dell is currently engaged in a project to develop web pages for its top 30 suppliers. The idea is that the computer company's top customers will be able to access Dell's manufacturing lines directly to determine when they need to place their next order. Dell currently runs a six-day inventory, dramatically reduced from its previous inventory of 30 days due to the introduction of new technology.

In the US, analysts estimate the computer and electronics industry will generate US\$50.4 billion in domestic online sales this year.

Nua Internet Surveys: 19 April 1999

13 NSW Department of State and Regional Development, *Information Technology and Telecommunications, Industry Overview*, 1999.

Dell Computers: Dell sells US\$18 million per day online

Internet sales at Dell Computers exceeded US\$18 million per day in the first quarter of 1999, according to the company's quarterly earnings report. Overall, Internet sales accounted for 30 per cent of the company's total revenue in the first quarter of the year.

Dell also reported that the use of the Internet to develop and support other sectors of the business had increased by close to 30 per cent, specifically in the areas of business procurement, customer support and relationship management. The report estimates that dell.com received over 25 million visits in the last quarter.

Total revenue for the quarter was over US\$5.5 billion. Worldwide, Dell now holds the number two position in the computer company rankings. Revenue in the Americas market was up 45 per cent, year-over-year, while in Europe the increase was 29 per cent. In the Asia-Pacific region, revenue was up 48 per cent.

Nua Internet Surveys: 25 May 1999

Sources: as indicated

3.3 Potential benefits

Representatives on the IRG indicated that the greater use of e-commerce in the sector has the potential to add value or reduce costs in the following areas:

- value chain disintermediation;
- enhancing value in sales and after sales support activities; and
- improved operations (e.g. financial management, improved employee communication and administration).

Changes in supply chains and disintermediation

There are many areas where greater use of e-commerce can bypass costs. The IT industry is now able to deliver many of its products using e-commerce. Items such as software and documentation that traditionally had to be shipped can now be delivered online.

Hardware is also becoming upgradeable without the need to physically replace parts. Software can be delivered online to allow customers to upgrade hardware such as modem cards.

In general, there are many areas where businesses in the IT industries or their customers are using e-commerce to reduce supply chain costs, or enhance their convenience. This was a consistent theme in comments received from IRG members.

Warehousing, inventory and the volume of product in the cycle are much less than would otherwise be. This has also reduced the real estate required to store the inventory.

The number of suppliers has been reduced, Cisco now tends to deal with the original manufacturer and manufacturers of components. The additional suppliers added time to the process and also forced Cisco to be a manufacturer. In some cases, Cisco has eliminated its own involvement. The other major elimination that has occurred is in the number of trips provided by the transport sector, now that many deliveries take place directly from the supplier to the customer.

Interview: Gary Jackson, Cisco,
IRG member, 20 July 1999

A case study

All of the above factors can be seen at work in the approach adopted by Cisco. The approach and the outcomes achieved are summarised in the box following.

Box 3.2

Building a business on e-commerce—the case of Cisco

Cisco builds virtually all its products (routers, switches and other network interconnect devices) to order, so there are very few off-the-shelf products. Before the company established an Internet sales capability, ordering a product could be complicated. Generally, an engineer at the customer site knew what type of product was needed and how it should be configured. The engineer communicated this information to his procurement department who then created the purchase order and sent it to Cisco via fax, phone or email. A Cisco customer service administrator entered the order into Cisco's system. If the order went through 'clean', it would be booked and production scheduled within 24 hours. Nearly one out of four orders didn't get a 'clean' bill of health, however. Instead, when Cisco's system tried to validate the order, it discovered an error in how the product was configured. The 'dirty' order would be rejected, the customer contacted and the procurement cycle would begin again.

In July 1996, Cisco rolled out its web-based ordering and configuring system. Today, that same engineer can sit down at a PC, configure the product online, know immediately if there are any errors and route the order to the procurement department. Because the customer's pricing structure is already programmed into the Cisco site, the authorised purchaser can complete the order with a few keystrokes. And, rather than calling Cisco to find out the status of the order, invoice or account information, a customer with the proper authorisation can access the information directly on the website. With the online pricing and configuration tools, about 98 per cent of the orders go through the system the first time, saving time both at Cisco and the customer's site. Lead times have dropped two to three days, and customers' productivity has increased an average of 20 per cent per order.

E-commerce is now fundamental to Cisco. Eighty per cent of orders in Australia (78 per cent worldwide) are generated by e-commerce, up from 40 per cent three years ago. The objective is to grow the orders received electronically to 90 per cent next year. Cisco's business is \$400 million in Australia and \$12 billion worldwide.

As well as the benefits to Cisco, this use of e-commerce impacts on a lot of businesses that buy from Cisco.

The use of online ordering has reduced the headcount in the order entry department by one in the last two years, although the volume of orders received has tripled. The quality of order entry has also improved, due to online checking at the time of entry, from a 30 per cent error rate to less than two per cent. Customers can also check delivery schedules online.

The whole process is more profitable, and better for customers. Orders are faster, cleaner, are checked against the manufacturing cycle, while more orders can be processed using fewer people. Customer satisfaction has increased from 3.5 to four, with five being a perfect score.

The users of the system, Cisco's customers, are medium to large businesses. Cisco does not sell direct to consumers.

Cisco is also working on supply chain management, aiming and succeeding in being a 'virtual organisation'. Suppliers provide components, such as chips and boards. Cisco demands that suppliers be online. This has eliminated complex processes, and made a tighter link to manufacturers with no middlemen. Effectively, 50 per cent of the physical boxes are delivered to the customer direct from Cisco's supplier.

Cisco has an Intranet used by employees and suppliers alike. Suppliers access the same forecasting information as Cisco.

Eighty to 85 per cent of software is now downloaded by customers, whereas it was previously distributed by CD-ROM. It used to cost \$125 to send a CD, downloads cost \$5. This has also eliminated the deliveries (and redelivery) of CDs.

All product information, including technical information is available online. Eighty per cent of technical information is now sourced online by customers. Customers can also enrol for seminars online. This has achieved the objective of increasing customer satisfaction, while saving on the cost of distributing physical documentation.

Internally, expense accounts are submitted online and profiled automatically. Payments are made by direct credit to the employee's bank account. This system is used by all 18 000 employees worldwide. Cisco hopes to have invoicing online soon.

The main benefits to Cisco of e-commerce have been the reduced head count, reduced inventory (especially from the forecasting system), reduced paperwork, and reduced direct costs such as with the downloading of software.

In *The Emerging Digital Economy*, it was reported that Cisco estimated that putting its applications online had saved the company US\$363 million per year, or approximately 17.5 per cent of total operating costs.

This is comprised of the following operating cost savings per year:

- technical support \$125 million;
- human resources \$8 million;
- software distribution \$180 million; and
- marketing materials \$50 million.

It is now estimated that e-commerce in general saved the company some US\$550 million last year.

Source: Henry D, Cooke S, Montes S, *The Emerging Digital Economy*, US Department of Commerce 1998, p. A3-11 to A3-13 and Cisco.

3.4 New costs

IT industries will also have to purchase more electronic inputs from new intermediaries in order to engage in greater e-commerce. The indications are that these costs will be relatively modest, certainly in proportion to the potential efficiency gains that IT industries are likely to obtain.

The use of e-commerce is also increasing the complexity of the information technology requirements. Many organisations are outsourcing the management of their information technology systems.

There is a transfer of value into the IT sector brought in by the outsourcing of IT and services from other industries, such as government, finance and travel.

Interview: Stephen Braim, IBM, IRG member, 12 July 1999

3.5 Industry structure/ new business models

Greater use of e-commerce is likely to drive changes in the way that business is done in the IT industries. It appears that there will be swings transferring value between activities in the IT industries.

The first is the potential transfer from hardware to software—this is predominantly caused by the rapid reductions in costs of hardware while software has maintained its value. E-commerce has not been a major driver of this.

There is a transfer from commodity manufacture (such as mainframes) to mass customisation. This has also resulted in a transfer in value from whole items to components. This is being driven by the varied nature of e-commerce and the many applications for the use of information technology in this area, resulting in the need to customise hardware.

For value creation there are very strong possibilities in many sectors, particularly in government. There are cost saving and productivity improvements possible from the use of e-commerce. The opportunity to create value is also high in IT services. IBM believe that software and especially services will be the drivers for growth, while the value creation in hardware is lessening. This means a transfer of value within the IT sector from hardware to software and services.

This transfer of value is leading to a move from commodity manufacture to mass customisation, particularly for large customers, and the management of the assembly. The trend to network computing is leading to the value being held in the network not on the hard drive of the computer.

Interview: Stephen Braim, IBM, IRG member, 12 July 1999

One of the issues for all industries today, is how a business becomes an e-business. That is, not only setting firms up online, but helping them to deal with customers online, and integration into their existing systems and processes. IBM has used its own experience to assist its customers.

Interview: Stephen Braim, IBM,
IRG member, 12 July 1999

The process of convergence is also reshaping what it is that businesses in the IT industries will offer in future. Some companies that have been established in the industry for some time have responded dramatically to challenges and opportunities raised by e-commerce.

IBM is in the IT sector, but also heavily involved in the e-commerce sector. The IT sector is a key facilitator for e-commerce, and will be one of the big winners.

Some in Australia focus on creating the hardware sides of IT and e-commerce in Australia (chip and other hardware manufacture) but IBM does not see enough critical mass in Australia to support these hardware efforts. Rather, IBM believes that Australia's opportunities are in services and content development which have a much higher value add.

The value proposition in the e-commerce world is different than for many other industries. In manufacturing, automotive for example, a basic model car is developed as the lowest common denominator, then features are added to add value. In e-commerce, the 'lowest common denominator' is the high end or perfect product, from which features are removed to subtract value.

The model is more akin to book publishing, where the hardcover is published, and some time later a cheaper paperback is released. Time is also a driver of value, for example the latest stock prices on websites are available at a higher cost than those whose publication is delayed.

Interview: Stephen Braim, IBM,
IRG member, 12 July 1999

3.6 Jobs and skills

The growth of e-commerce internationally has led to a huge demand for high quality IT personnel. Many international countries (i.e. US and UK) are willing to pay quality IT personnel more than Australian companies. This is particularly the case with start-up IT (and more likely e-commerce) companies.

The transfer of value to or from overseas can occur with the rise of the Internet and network computing, with the offering of remote services, for example, remote education, application development, etc. The direction of the service flow will determine the direction of the value transfer, i.e. whether Australia positions to provide remote education services, or is the recipient of them.

Interview: Stephen Braim, IBM,
IRG member, 12 July 1999

3.7 International dimensions

Australia has some advantages over other countries that are resulting in an inflow of value from overseas. These advantages include:

- well educated and technically competent workforce;
- well positioned for Asian markets;
- large number of staff with multilingual skills; and
- globally located to support international call centres working on around the clock.

These advantages were reflected in comments received from IRG members about their evolving business strategies.

Cisco is trying to drive a 'borderless business', which is not concerned where manufacturing or ordering takes place, the 'most appropriate' is chosen for a host of reasons. Cisco does conduct R&D in Australia due to the technical competence of local labour.

Cisco worldwide has four post-sales facilities, call centres that answer customer queries and resolve problems. These are located on the US East and West coasts, in Brussels, and in Sydney. These four locations provide global coverage on a 24 x 7 basis. Each site has a six hour slot when all calls from around the world are handled. For Sydney this is 11am to 5pm. For the rest of the day regional calls are handled.

One of these facilities was sited in Australia in recognition of the technical competence of local labour, the telecommunications capability, and the ability to source technically capable staff with multilingual skills, especially in the Asian languages.

Interview: Gary Jackson, Cisco, IRG member, 20 July 1999

Key points

The IT industries have been rapid adopters of e-commerce technologies and business models. The biggest advances in this sector have been in business-to-business e-commerce, though more use is being made of e-commerce to facilitate the purchase of goods and services by consumers. There are many areas where businesses in the IT industries or their customers are using e-commerce to reduce supply chain costs, or enhance convenience. Disintermediation is occurring as items such as software and documentation are now delivered online.

The IT industries are not represented individually in the National Accounts, but instead consist of parts of manufacturing, communications, and business services. Accordingly the IT sector itself was not directly impacted in the modelling exercise, however its component parts were. These impacts may be found in the respective sections of this Part.

Section Four

Communications services

4.1 Description of the sector

The Communications services sector is made up of telecommunications services, postal services and courier services. The sector contributed over \$16 billion, or around 3.0 per cent, of GDP in 1997–98 and employs approximately 155 000 people.

E-commerce appears to be having mixed effects in the sector. While telecommunications companies are big players in the e-commerce marketplace, postal and courier services are generally viewed as risking having their value being eroded as more information is shifted electronically rather than in physical form.

4.2 E-commerce and communications

E-commerce is having a remarkable impact on the communications industry. Telecommunications carriers have an obvious role to play in providing the communication lines and bandwidth to make network access and ultimately e-commerce possible.

Of major importance for telecommunications carriers is the impact of increasing data traffic and the use of the Internet for voice traffic.

Box 4.1 discusses changes that have already been felt.

Box 4.1

Telecommunications and the Internet

Earlier this year, Telstra's data traffic volume—everything ranging from plain-text EFTPOS transactions to multimedia Internet traffic—overtook voice traffic.

The Internet has changed the face of telecommunications. Although the quality is not consistently high, telephone calls over the Internet are proving a much cheaper alternative to earlier arrangements. Doug Campbell, group managing director of Telstra's carrier services, says Telstra has nearly completed the digital upgrading of its network. 'We are now looking at our data mode-of-operation project to assess our network technology and how it will accommodate data and the Internet. The assumption we are working on is that the Internet is going to grow very rapidly, and voice over Internet will, in the fullness of time, become the primary means of voice communications.'

Source: Margaret Banaghan, *Business Review Weekly*, June 22 1998.

The impact of e-commerce on communications is not restricted to the telecommunication companies. Postal services are also being impacted by e-commerce, as discussed in Box 4.2 below.

Box 4.2

Australia Post and e-commerce

One might expect that as the sole supplier of traditional regular mail services in Australia, Australia Post would suffer a decline in the demand for its services as a result of increasing use of e-commerce. However quite the opposite has occurred—the number of items carried by Australia Post grew by 3.4 per cent last year from 4.3 billion to 4.5 billion.

Even so, Australia Post is undertaking a number of strategies to find a fulfilling role in an environment of greater use of e-commerce.

Australia Post is expected to launch its Internet Fulfilment System (IFS) shortly, which will move beyond simple delivery to include electronic integration of its warehousing, distribution and track and tracing capabilities for online retailers. Australia Post already delivers an average of 22 000 items from Amazon.com every month and is the largest delivery network to 8.5 million households and businesses in Australia. IFS will enable it to compete effectively for the increased delivery of Internet-ordered products as traffic grows into the future.

In addition, Australia Post will launch a web-based bill presentation and payment system, which it expects to grow to 20 million transactions by 2003 (Note: Through its network of post offices, Australia Post currently handles around 170 million bill payments annually). Unlike online banking bill payments systems, Australia Post will offer bill presentment and will give customers the option to pay bills using accounts from more than one financial institution. Australia Post will not charge customers for using the services, instead it will charge billing principals for using the system. Consumers can pre-register with bank details and relevant information and an account or credit card can be debited with a single mouse click.

Source: Helene Zampetakis, 'Snail mail unveils its e-commerce side', *Australian Financial Review*, October 28 1999, p. 27.
Emma Connors, 'Rain, sleet or cyberspace, Australia Post will Deliver', *Australian Financial Review*, October 5 1999, p. 28.

4.3 Cost savings

Use of the Internet for billings, particularly for business-to-business transactions, is less expensive and more timely than traditional paper billings that use postal and courier services.

The trend in electronic billings is expected to continue due to reduced transaction costs and improved service, and a greater insistence on the part of large businesses that suppliers be linked into their e-commerce systems (OECD, 1998).

Use of the Internet also offers cost savings from the standardisation of technologies that have historically been incompatible, for example, for fax transmission, broadcasting and telephone circuits, though opportunities for some functions are presently constrained by bandwidth limitations. (OECD, 1998)

A cost saving for business generally that may affect telecommunications businesses is increased use of the Internet for selling at the expense of telephone selling and call centres. Automated selling is likely to require less labour for the selling process and for delivering after sales services, which is likely to consist of manuals and databases accessible to consumers over the Internet, with perhaps a small team of people on hand to solve difficult problems.

Communications companies themselves, particularly postal and courier services, are also reducing costs as users of e-commerce services.

E-commerce in the procurement of machinery and equipment was projected to compress wholesalers' margins by 25–30 per cent over the period under consideration. Also e-commerce would increase competition and more sophisticated competition would put downward pressure on the producer's prices.

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E-commerce was thought to be pretty fully implemented in supply areas like fuel, so little further impact was projected. People noted that there were conflicting trends on fuel utilisation arising from e-commerce—greater customisation meant more frequent deliveries of smaller loads, so possibly increased costs, but computer assisted routing meant that the effect was small.

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4.4 New costs

Telecommunications companies in the sector are incurring costs in creating new products.

Telecommunications companies (Telstra, Optus, AAPT, etc.) are moving into e-commerce and application development and finding new value. They are moving more into Internet Protocols and data transmission. This is opening up a whole lot of new opportunities for them, especially in developing applications to suit different customer requirements, in this new environment that can mean developing software.

Telstra is increasing value in existing value chains by providing e-commerce services. Telstra is not only a provider of e-commerce systems and services, but also a large user.

Interview: Tony Richardson, Telstra,
IRG member, 9 July 1999

Communications sector companies are becoming involved in new areas of business, enabled by e-commerce and new technologies.

Underpinning these lines of business are new technologies. A new technology which should have a big impact on the sector, and on business in general, is mobile e-commerce based on Wireless Access Protocol (WAP). Internet phones and Internet payment devices will also impact. One of the drivers of e-commerce is the availability of Internet devices. People are using Personal Digital Assistants more, and tapping into the existing mobile base depends on the right applications.

Interview: Alan Rousselot, Ericsson,
IRG member, 5 August 1999

4.5 New business models

The impact of e-commerce is different for the two main industries which comprise this sector. The telecommunications companies are big players in the e-commerce marketplace, providing many of the products and services on which e-commerce is based, as well as moving up the value chain to provide e-commerce services directly. Telecommunications companies are also acting as re-intermediators and disintermediators in setting up electronic marketplaces (Telstra SureLink, for example). Postal and courier services are seeing traditional markets erode but, at the same time, new markets evolving.

Telecommunications sector

The communications sector, particularly the telecommunications industry is one of the sectors which is merging into, or morphing to, the e-commerce sector. Many of the companies, for example Telstra, provide 'traditional' telecommunications services such as voice lines, but derive and increasing amount of their business from e-commerce activities, either in providing the infrastructure or by providing the services directly.

Opportunities are being created for telecommunications companies as IT and communications converge.

E-commerce will create new value for the communications sector by opening new markets and new lines of business. Where communications companies were once largely voice based, with the convergence of voice and data, these companies are now providing services and solutions. These include; consulting, web development, systems integration, software sales, outsourcing, and trading partner management.

... Transfers of value between industries are occurring. Some value is transferred from the IT sector, where services newly provided by the communications sector were once only provided by the IT sector—consulting, web development and systems integration. However the IT sector is providing communications services too. Buyouts are happening now.

Interview: Alan Rousselot, Ericsson,
IRG member, 5 August 1999

The telecommunications companies are seeing the creation of new value for their businesses, sometimes at the expense of other industries in the sector, and at the expense of other sectors.

In many cases, the decrease or elimination of value in other industries is a transfer or new value for telcos. For example, the move from postal services to email. The communications industry is tied in with the Media and IT industries, the three are merging with many benefits flowing into the communications industry.

Interview: Tony Richardson, Telstra,
IRG member, 9 July 1999

Value is also being transferred within the industry, as e-commerce bites into traditional methods of doing business.

Interactive Voice Response (IVR) is a good technology to use when people are looking for information, e.g. information about share floats. However, Internet Protocols can be developed further to not only provide the information but the goods too, e.g. software, music, and other items capable of electronic delivery. Pay-TV may also be used as a channel for electronic delivery.

Interview: Tony Richardson, Telstra,
IRG member, 9 July 1999

Value is also transferred into the industry as companies expand from offering products to offering services as well.

Transfers of value within the industry occur when companies start selling solutions. Where companies in the sector used to sell bulk product or service to operators, they are now selling more directly to corporates.

These new applications drive an increase in the number of calls. While some value is transferred from the operators, the increased calls increase value for them, so both types of companies in the sector see an increase in value.

Interview: Alan Rousselot, Ericsson,
IRG member, 5 August 1999

The telecommunications industry has experienced some disintermediation in their own channels, but these have not been complete.

The communications company's role is more into re-intermediation than disintermediation. Disintermediation has been fairly patchy, due to other business issues as new channels do not entirely replace the existing channels. In travel, automotive and telcos, the providers may sell directly, but must also work with agents/dealers and maintain some consistency in their approach to the different channels and the offers to them.

Interview: Tony Richardson, Telstra,
IRG member, 9 July 1999

Telecommunications companies face the elimination of value where some of their products are becoming standardised and commoditised, and the existing companies face increasing competition from new entrants.

One of the few examples of the decrease in value to telcos from e-commerce is the commoditisation of bandwidth, although the networks are always evolving and being written off. However, the discontinuity seems to be greater in the current move to digital and data modes.

Interview: Tony Richardson, Telstra,
IRG member, 9 July 1999

However, there is some disagreement on this, as for other telecommunications companies, no such elimination has been identified.

No examples of the elimination of value occur in the industry—it is not affected this way. However, companies are using technology more wisely, for example in the supply chain for savings and improved productivity.

Interview: Alan Rousselot, Ericsson,
IRG member, 5 August 1999

Communications sector firms are themselves major purchasers of communications services. Re-sale and interconnect arrangements represent an increasingly sophisticated form of e-commerce among industry firms, particularly as it affects billing.

Postal and courier services

The postal and courier services risk their value being eroded as more information is shifted electronically rather than in paper form. Courier services have already perceived a reduction in their business document transfer business. Postal services are still rising, due to organisations billing more frequently, but may start to reduce or even out as electronic payment services such as Bpay reduce the return postal task.

One way for the postal and courier services to balance the erosion in their document transfer business, is to get involved in the delivery of products ordered over the Internet. Some of the products would previously have been 'delivered' by the consumer themselves, for example in taking home records and books from shopping centres. This can be taken further by the creation of the services themselves.

By providing delivery services to shopping websites, Australia Post has the opportunity to leverage their brand name.

The Internet Fulfilment Service Australia Post is developing will also be targeted to its parcel customers, providing a total fulfilment solution.

Interview: David Hart, Australia Post,
IRG member, 12 July 1999

4.6 External dimensions

As yet, the communications sector has not seen a noticeable transfer of value overseas. This may change in the future.

Value transfer to or from overseas can occur due to the global and distance independent nature of the Internet. Any component can be anywhere in the world. The logistics are determined by the size of the market and the delivery mechanism/s. Another example is gaming [betting] sites locating to avoid regulation. If retail sites are located overseas to avoid tax, then local retailers and the government lose out.

The current practice seems to be that Australian owned sites are still located here, often as they are plugging into a local network and applications, although there are instances of sites located overseas. This may change in future, particularly if the overseas operation becomes much cheaper than locally.

Interview: Tony Richardson, Telstra,
IRG member, 9 July 1999

Value can be transferred into Australia, in the form of R&D operations.

Transfers of value to or from overseas are not large; not much is going overseas. Ericsson does a lot of R&D globally, and in Australia. In Australia they have 500 people involved in R&D. It is believed there is no danger from overseas companies coming here.

Interview: Alan Rousselot, Ericsson,
IRG member, 5 August 1999

Key points

Communications is a major input sector to e-commerce. Greater use of e-commerce is likely to generate an overall boost to communications activities and the nature of services offered is likely to change. New demands will alter inputs required and allow intermediaries to be bypassed. New communications technologies will have a large impact on the future conduct of e-commerce.

Based on the above review and input by the IRG, the quantitative analysis in this pilot study should include:

- communications sector transactions with other businesses will obtain a general small reduction in margin costs by bypassing various wholesale and retail activities;
- reflecting the capacity of firms in the communications sector to increase their purchase of inputs directly from producers, it is expected that the sector will obtain an additional reduction in wholesale margins; and
- increased expenditure of communications inputs in order to conduct more e-commerce.

The MONASH model will be able to evaluate the general lift in communications activities that stem from any change in general activity. It is not necessary or desirable to seek to specify this by assumption.

Section Five

Business services

5.1 Description of the sector

Business services has been one of the fastest growing sectors of the economy over recent years and is a significant employer of skilled labour. Combined with property services, business services sector expenditure in 1997–98 was \$56.1 billion, or around 10.8 per cent of Australia's GDP. In May 1999, the sector employed just under one million people.¹⁴

The business services sector covers an array of professional services, including: architectural services; surveying services; consulting engineering services; technical services; computer services (including information storage and retrieval, computer maintenance, and computer consulting services); legal and accounting services; and marketing and business management services.

The sector is undergoing a phase of conglomeration, as large firms increasingly offer accounting, legal and other business services under the banner of a 'one-stop-shop'. The industry is now made up of several multi-disciplined global firms with a number of smaller domestic niche players that focus on a single expertise.

The main advantages of e-commerce to the business services sector, also frequently referred to as 'knowledge industries', are in accelerating knowledge transfer and improving the quality of data transfer. The characteristics of the business services sector explain the rapid take-up of e-commerce in the sector:

- it is comprised of many activities that have a high reliance on information;
- many business services (e.g. accounting or legal advice) are easily virtualised;
- generally, there is a need for information to be delivered quickly; and
- the sector is already well supported by information infrastructure.

5.2 Cost savings

Cost savings to the sector can be realised from e-commerce as either:

- improvement in the efficiency of internal processes—in the same way that efficiency gains are being made in firms right across the economy in ordering business inputs, transferring data and billing systems; or
- savings in the cost and time of delivery of products to clients—gains that are specific to industries that are able to distribute their product electronically, such as the 'knowledge' and entertainment industries, and rely less on physical data storage units.

With respect to the latter point, essentially these savings are due to the increased speed of transferring data (efficiency gains) and the improvements in the quality of data transfer (less need to rework data and fewer mistakes). Use of electronic mail and the Internet generates opportunities for business services organisations to provide more time-critical services to customers.

14 ABS Special Collections.

Continued use of email and the development of expert systems and client extranet access is likely to lead to significant efficiencies and cost savings in the provision of all professional services. In addition, use of these services by clients is likely to cause higher levels of client loyalty to professional service firms, rather than individual practitioners.

Survey Response: Duncan Giles, Blake Dawson Waldron,
IRG member, 20 July 1999

Feedback from industry sources indicates that greater use of e-commerce will stimulate disintermediation in this sector. In fact, many changes have already been made.

Real efficiencies in supply side value chain contractions are being seen already with the creation of software and websites allowing, for example, cradle to grave solutions for conveyancing transactions, including the creation and authentication of documents, finance approvals and provision, registration of documents and securitisation of loans. Consumer side efficiencies will also follow with the acceptance of more sophisticated expert systems and extranet access to real time project management, document development, billing and document storage systems. Customised repackaging and streamlining of advice will also become available using knowledge management and datamining techniques.

Survey Response: Duncan Giles, Blake Dawson Waldron,
IRG member, 20 July 1999

The reduced cost and the ease of undertaking some process activities electronically by e-commerce may lead individuals and organisations to undertake tasks themselves that were previously purchased from business services providers. For example the ATO provides a capacity for individuals to complete their tax returns over the Internet, which may reduce the demand for tax accountants. However, this argument focuses on administrative processes rather than the added value provided by business services firms. Ultimately, business services firms are likely to concentrate on providing core value adding activities, such as highly skilled knowledge services, rather than associated administrative services.

5.3 New costs

There will be some additional costs for the business services sector in order to procure the capacity to undertake e-commerce. The cost of hardware to process and store information, maintenance of hardware, purchase of new or updated software applications, and applications training are all business costs associated with e-commerce.

In particular the dynamism of e-commerce means new methods of transferring information often require the latest hardware, as well as requiring skilled labour and compatible communications equipment. In legal services, court rooms increasingly need to be equipped with up to date hardware to read electronic information:

Digitisation has caused, and will continue to cause, an enormous increase in the amount of information generated, shared and stored by organisations and individuals. Labour, IT and communications (primarily bandwidth) costs will increase significantly because of this and new tools are required to manage these information channels and stores. From a forensic point of view, analysing digitised information is becoming a critical part of most major pieces of litigation and is beginning to slow court proceedings where sophisticated access and analysis tools (such as Lantern™, eDiscover™) are not available or used. On the other hand, where these tools are used very significant cost savings can be effected over traditional methods of discovery and court presentation.

Survey Response: Duncan Giles, Blake Dawson Waldron,
IRG member, 20 July 1999

The costs of developing websites and new Internet related products may be incurred by internal departments or by engaging the new breed of e-commerce consultants.

R&D on information technology is expected to grow as firms seek a competitive advantage.

Professional service firms are incurring a significant increase in research and development expenditure to ensure that effective and competitive use is made of information technology in e-commerce. As a broad indicator, an estimate of approximately one per cent of gross revenue would be an appropriate measure of current professional services R&D expenditure. Ten years ago this is likely to have been almost negligible (at around 0.1 per cent of gross revenue). We anticipate that figures of three per cent and five per cent are not unrealistic estimates for professional service firm's R&D expenditure in 2005 and 2010 respectively. This spend is likely to be concentrated in the legal services sector on knowledge management, development of e-services and development of information technology. It is likely that this R&D expenditure will cause a shift from traditional spending in 'physical' R&D. It will clearly be necessary for the regulatory and taxation environment to take account of these shifts.

Survey Response: Duncan Giles, Blake Dawson Waldron,
IRG member, 20 July 1999

It has not been practical to quantify the additional costs that business services firms will incur in order to meet the growing e-commerce needs in a way that is reasonably representative of the sector at large.

5.4 New business models

E-commerce may force some business service organisations to reconfigure the way in which they conduct their business. This may result in a change in the compilation of the sector's inputs, as some are reduced while others are increased. For example the use of teleworking may reduce office space costs (which are about 15 per cent of business service organisation costs):

Significant reductions in both bandwidth costs and infrastructure accessibility seem likely to occur in the 2000–2005 timeframe which will lead to very large and perhaps ubiquitous adoption of very high bandwidth services, certainly in the larger professional service organisations. Although teleworking (and the paperless office) have been touted as one of the most visible manifestations of the information economy for many years, it seems probable that this period will see much more user friendly and acceptable home work environments (such as effective video conferencing) and is likely to lead to the creation of teleworking scenarios that offer a genuine and long term alternative to traditional office based work. As this happens, there will be a downward pressure on salaries and real estate costs which presently account for approximately 25 per cent and 15 per cent of professional services organisations' gross costs respectively.

Survey Response: Duncan Giles, Blake Dawson Waldron,
IRG member, 20 July 1999

The view emerged from working group sessions of the Industry Reference Group that it would be reasonable to foreshadow that approximately five per cent less labour would be required to carry out current business functions as a result of the internal efficiencies e-commerce would create within the business services sector. It was also expected that there would be a reduced need for consumables such as paper as information products are stored and delivered electronically.

It is likely that 20 per cent of all legal services will be delivered electronically by 2005 and probably 40 per cent by 2010. Examples abound in the consumer market in the areas of conveyancing, debt recovery, financing transactions and registrations. Many of these services will be provided in the normal course without any human involvement. Larger legal service providers will also utilise electronic preparation and delivery of services and are likely to be best placed to spend the significant amounts required on research and development of these services and products.

Survey Response: Duncan Giles, Blake Dawson Waldron,
IRG member, 20 July 1999

E-commerce allows some flexibility in the types of products that can be offered to clients and also in the range of products that can be presented to customers. In conjunction with advances in other business software, the benefits of speed of transfer using email and Internet can lead to a number of different products being presented to customers easily and quickly. For example, architects could create different building designs using special software, and then send them to the customer electronically for their consideration. Similarly, engineers could present electronic versions of different design prototypes to customers.

Box 5.1

E-commerce and the legal profession

Blake Dawson Waldron is recognised internationally as an innovator and leader in the application of information technology to the practice of law. They have created a range of new e-commerce products and services that have altered the way in which the legal profession interacts electronically with the wider community.

SOAL™ (Summaries of Australia Legislation)

SOAL™ is a database containing summaries of environmental and occupational health and safety statutes and regulations in force throughout Australia. Its purpose is to inform employees in organisations about their legal obligations so they can deal with situations as they arise or seek further assistance. Developed for non-legal personnel, it is written in plain English and keyworded.

The product is to be made available shortly on the Internet and has received an award in the 1999 NSW CCH Emerging Legal Technology Awards.

Due diligence/legal audits

Blake Dawson Waldron design and implement computerised systems for use in due diligence investigations, legal audits and legislative reviews. These systems provide a systematic approach to gathering and processing information and produce useful and detailed reports and databases for later use. This in turn provides significant cost and time savings, particularly by reducing the amount of management time expended on the investigation.

These systems include imaging and the use of CD-ROM and online delivery methods to create 'virtual data rooms'.

Virtual Legal Advisers

Blake Dawson Waldron is developing a range of online Virtual Legal Advisers for the Australian legal and corporate market. These are browser-based expert systems that can be accessed over the Internet or an organisation's Intranet.

Using a Virtual Legal Adviser, an organisation's legal department can deploy applications that provide answers to legal questions and, where they cannot do so, intelligently interview users to collect the information needed to assess a situation.

The benefits of deploying a Virtual Legal Adviser over the web are enormous and include significant time savings, 24 hour a day access, increased awareness of legal requirements and minimising the 'human error' factor.

Source: Blake Dawson Waldron Legal Technology Group.

5.5 External dimensions

E-commerce is facilitating Australia's interconnection with the global market.

Use of e-commerce in business services is a global phenomenon and in this respect many firms recognise that it is imperative to maintain the pace of the global adoption of e-commerce to be competitive.

Development of new electronic business modes of service delivery will not only enhance the efficiency with which services can be delivered, but augment access to larger markets. Business services firms located in Australia have indicated that with e-commerce and other infrastructure

they expect to meet increasing demand from Asia. They see e-commerce as removing a constraint to allow Australia to take advantage of its relatively inexpensive professionals and its time-zone complementarity with Asia.

The free flow of information in the professional services sector and relaxation of barriers to competition will enable cross-jurisdictional provision of services. Many large Australian professional service firms are already globalised (particularly accounting and business services), and we are now seeing the beginnings of globalisation of Australian law firms. This trend is likely to accelerate at an increasing rate in the medium term. Those organisations which are able to take advantage of a global market while at the same time protecting existing revenue will see increasing returns and reduced costs, while those who cannot, will face significant threats to their existing business.

Survey Response: Duncan Giles, Blake Dawson Waldron,
IRG member, 20 July 1999

Just as e-commerce allows overseas firms to establish in Australia, so it allows Australian firms to undertake work overseas. The net effect is dependent on the extent to which the Australian business services sector can compete in an increasingly global market.

It is important, however, to bear in mind that some barriers to trade in this area are likely to remain. Many of the business services sector functions are based around legislation or guidelines that are unique for each country (e.g. law, accounting, surveying). Some functions such as advertising and graphic design require an understanding of the local environment and culture to be successful.

Perhaps the greatest influence the business services sector has on Australia's trade performance is as an input to other businesses. A business services sector that uses e-commerce efficiently to deliver high quality services to Australian industry will undoubtedly assist Australian industry compete on world markets.

Key points

The main advantages of e-commerce to the business services sector are in accelerating knowledge transfer and improving the quality of data transfer. Cost savings to the sector can be realised from improvement in the efficiency of internal processes as well as savings in the cost and time of delivery of products to clients, while greater use of e-commerce will stimulate disintermediation in this sector. E-commerce will also allow greater flexibility in the types and range of products that are presented to customers.

When looking at quantitative analysis of the sector it seems reasonable to factor in:

- modest savings in retail margins in the sector (i.e. reduced costs through greater disintermediation);
- direct labour savings;
- time saving as an efficiency gain for industries that use business services as well as households; and
- reduction in sector inputs such as paper; machinery and equipment, and financial and business services.

Section Six

Health

6.1 Description of the sector

The Health industry is a service industry characterised by its hugely varied service types, high proportion of independent professional providers and diverse and decentralised industry structure. It comprises major multi-specialty public and private referral hospitals, small specialised private hospitals, general district hospitals, nursing homes, and independent medical specialists, general practitioners, allied health professionals, community health centres and related business support and industry associations. The majority of health services are provided by self-employed medical practitioners operating in solo practice or in partnership with a small number of other practitioners.

This has sometimes lead to references to health as a ‘cottage industry’ in which individual craftsmen still fashion individual customer solutions using a set of skills that are resistant to industrial models of organisation.

The health sector is an important part of the total Australian economy, with private and public outlays totalling in excess of \$42 billion per year.

The use of information technology in the health sector is very varied and overall rather primitive compared with other service industries. However powerful drivers underlie a dramatic change in the way information is collected, managed and communicated in the health industry. These include:

- the explosion of knowledge in medicine and biotechnology resulting in an increasing focus on quality and evidence based treatment;
- shifts in demand from brief acute episodes of care to extended clinical care for long term health conditions with a consequent demand for better integration and coordination of clinical care across organisational and temporal boundaries; and
- explosive increases in health care costs and consequent strategies to better manage health care at both the system and health care provider levels.

6.2 Service delivery channels and the Health Value Network

Changing patterns of health practice have put the issue of coordination and integration of services by multiple providers at the top of the health industry agenda. Increasing specialisation of skills and technologies among consultants, diagnostic specialists, proceduralists and dispensers of powerful therapeutic agents have dramatically increased information flows among health providers. Improved treatment outcomes mean patients live longer with continuing health problems, increasing the need for information dissemination and retrieval among providers over a longer time frame. The health value network is now comprised of many suppliers of goods and services over an extended period of time. In addition, the increasing demands of accountability for professional and management purposes has seen a dramatic increase in record keeping and administrative information flows.

Drug therapy constitutes an increasing proportion of healthcare intervention, and this trend is expected to continue with the biotechnology revolution now underway. New and more effective drugs

IT&T capabilities in most public hospitals provide sub-optimal support for many hospital activities. In fact IT usage in most hospitals appears to be at least a decade behind many commercially oriented organisations. Furthermore, current capabilities would provide negligible support for the anticipated clinical care and business processes inherent in an integrated health care model.

*Victorian Department
of Human Services (1996)*

are introduced to market at a startling rate each year. This trend is itself changing the use of delivery channels in health as reduced length of stay in hospital is strongly associated with more effective pharmaceutical use.

The major issue posed by e-commerce in the service delivery channels is the requirement to settle on a standard form of electronic record keeping and to establish systems for storing and communicating information which are appropriately authorised by patients and providers, which are secure and reliable, and which are efficient in the face of the different contexts and requirements of the vast range of episodes of care.

General practitioner services

The Australian healthcare system is built around the general practitioner (GP). As gatekeeper of the system, access to specialist health providers and much hospital and nursing home admission requires referral from a general practitioner, who provides an initial assessment and makes or assists in the choice of secondary health provider.

Computerisation of general practice accounting functions is commonplace but the use of information storage, retrieval and communication to support direct clinical practice has, until recently, been very limited. The early applications on the GP desktop have been electronic script writing applications. However, electronic messaging from the GP desktop has been slow to develop and is still in trial mode as there is no widely accepted encryption/authentication protocol in place to ensure appropriate security and privacy of electronic messages. Several trials of electronic messaging in ordering and reporting on diagnostic tests, communications with other practitioners, discharge summaries from hospital treatment episodes and continuing medical education are underway.

The Australian Government's General Practice Strategy Review made recommendations designed to accelerate the use of appropriate technology to support general practice. Government introduced a Practice Incentive Payment to encourage computerisation and electronic communication by GPs, which is having a marked effect on the penetration of clinical computing and communications applications. In addition, work is proceeding on a standard Australian electronic health record for GP use.

Specialist medical services

Specialist medical consultation services are generally provided by independent practitioners in solo or group practices, or by public hospital outpatients' clinics. Many public hospital outpatients' clinics also have links to university medical education programs.

The level of technology awareness and penetration of computing and communications equipment is generally higher in specialist practice. Electronic communication among practitioners is increasing, and many of the research databases and specialist biomedical journals are now available electronically. Professional collaboration for training and quality improvement is generally organised by the specialist Colleges, which increasingly are using electronic messaging and Internet technologies to support their work. For example, the Royal Australasian College of Surgeons has been holding an online virtual conference for several months, and the Royal Australasian College of Physicians has extensive online resources including their newsletter and a 'jobs vacant' service for members.

New approaches to knowledge management for medical practice have evolved under the label of 'evidence based medicine'. This involves systematic compilations of quality-assured clinical research findings such as those of the global Cochrane Collaboration (which has an Australian Centre supported by the National Health and Medical Research Council) as well as development and dissemination of clinical practice guidelines.

The use of video conferencing facilities for patient consultation is beginning to be used to provide access to specialist medical practitioners for those in rural and remote areas. It is often impossible to attract and retain specialist practitioners outside the major population areas. For example, these 'telemedicine' facilities have been used for child psychiatry consultations in Victoria and for monitoring of patient progress in renal dialysis centres in South Australia.

Diagnostic pathology and imaging services

Diagnostic services are a widely used and rapidly growing part of the health service picture. Although increased testing is a direct requirement of new health treatments, there are considerable concerns about increasing costs, unnecessary or inappropriate testing and multiple testing because of failure to share test information among health practitioners and agencies.

Pathology and imaging services are rapidly consolidating and many services are highly automated internally. There are currently several trials of electronic messaging for ordering of tests and for communicating results back to referring medical practitioners.

Advances in telecommunications bandwidth, data compression technology and medical telemetry permit the positioning of imaging, testing or other monitoring devices remotely from the person interpreting the information generated from these devices.

This is enabling developments such as:

- a specialist radiologist reviews images in real time without being in the same location as the patient, with consequent increases in patient and doctor convenience and reduced cost; and
- pathology testing or patient monitoring equipment can be located in a patient's home, with information communicated automatically to a supervising hospital or medical practitioner, permitting safe home treatments like intravenous administration of drugs which would otherwise require hospital admission.

Community health and related community services

Integrated health care for the increasing number of people disabled by a chronic health condition requires effective collaboration and communication among many service providers. In the past, this has been conveniently and cheaply provided in institutional settings but changing patient demands, social attitudes and cost structures have meant that the majority of such care is now provided to patients who live in their own homes. Integrated care in the community is a major issue for all providers.

A number of 'coordinated care' trials have been funded by Commonwealth and State Government health authorities, and many of these have involved an element of electronic messaging for transactions among the different agencies. There are significant opportunities to

reduce the duplication of assessment processes so that each agency agrees to work from a shared assessment information base. More systematic implementations of integrated patient information storage and communications systems are also being explored, most notably in the Northern Territory with its new Community Care Information System.

The GP is in the best position to act as the gatekeeper and information switcher between hospital systems and community care systems. Again, a standard electronic health record is seen as a necessary enabling tool.

Domiciliary nursing care is a high volume distributed service which requires extensive information exchange between nurses in the field and organisational databases. The Royal District Nursing Service in Melbourne is experimenting with mobile communications for hand-held devices operated by nurses.

Community pharmacy services

Community pharmacies are a key service channel in the Australian health system, with around 15 per cent of Commonwealth health outlays accounted for by therapeutic drugs dispensed through pharmacies under the Pharmaceutical Benefits Scheme.

Issues associated with pharmacy services involve action to ensure appropriate use of medication where indicated and to reduce inappropriate use of medication.

The Pharmacy Guild of Australia has documented a wide range of research studies showing the economic and health benefits which may flow from more effective community pharmacy services involving information management and compliance support for prescribed drugs.

Hospital services

Both public and private hospital systems in Australia have information and communications systems of highly variable quality and utility. Larger public and private hospitals have made some progress in basic computerisation of internal information functions but the use of technologies for communicating externally to the hospital or for supporting clinical transactions is generally primitive.

Innovative developments are often limited to one section of the hospital with little integration within an overall e-commerce strategy for the hospital. A widespread weakness in change management for implementation of new information and communications tools for hospitals means that many promising pilot studies cannot be replicated in the wider system and that more than half of all hospital information technology systems initiatives fail.

More recently some individual hospitals have implemented new and more integrated systems. St Vincent's Hospital in Melbourne has implemented a range of information and communications systems supporting clinical care, including sophisticated information management systems for the Intensive Care Unit and systems which have permitted total re-engineering of the admissions process by decentralising admissions processes to wards, eliminating the central admissions facility. The new Children's Hospital in Sydney is being designed around a paperless record system which will automate transactions such as ordering tests and reporting them back within the hospital.

A significant driver of change in hospital use of information management and communications tools for clinical care lies in the drive for quality and safety. A worrying level of adverse events are associated with medical treatment, with around eight per cent of hospital utilisation occurring as a result of potentially preventable adverse events. Adverse events are often associated with problems in information flows across the boundaries between different episodes of care, or between hospital and community care, or because of discontinuity in the provision of care.

Hospital supplies involve significant wastage and delays, and a major change in supply chain relationships is being promoted by electronic procurement systems. St Vincent's Hospital in Melbourne has already achieved significant improvements in cost and timeliness through electronic procurement, and the Pharmaceutical E-commerce and Communications project has done significant work on the architecture and standards necessary for widespread adoption of electronic procurement of hospital supplies. The Commonwealth Department of Health and Aged Care has recently commenced a major mapping exercise of practice in this area across Australia.

New information channels to the public

A significant development in the health industry over recent years has been the rapid growth in the use of the electronic media to communicate with the public. Mainstream media lifestyle programs have supplemented advertising messages by public health agencies and pharmaceutical companies aimed directly at the public. More recently, the use of interactive media such as the Internet and telephone call centres for information dissemination and response to consumer queries has experienced explosive growth.

Whilst many of these channels build on traditional medical encyclopaedia and other print forms of consumer information, the volume of information available and the capacity to customise information delivery to consumer queries is producing a qualitative change which heralds a new 'direct to consumer' health service channel.

Examples of this are:

- the Commonwealth Government's HealthInSite initiative, which is establishing a quality-controlled health information Internet site for the Australian health consumer;
- the West Australian government's HealthDirect call centre which is designed to divert 80 000 consumer telephone queries a year from hospitals; and
- the National Heart Foundations Heartline call centre consumer information service.

There has been a dramatic growth of pharmaceutical advertising direct to the consumer (DTC), largely through television. In the US, DTC drug advertising has doubled in the last year. In Australia the trend is also evident but less marked than in the US, in part because of the stringent controls on advertising contained in the Broadcasting Services Act.

6.3 Cost savings as a result of electronic transactions

Efficiencies in procurement of supplies by health providers

The Pharmaceutical E-commerce and Communication (PECC) project has estimated that \$340 million savings are available from full implementation of a range of supply change management improvements using e-commerce. This is based on extrapolations from a US survey showing that 23 per cent of the cost to hospitals of consumables is attributable to supply chain costs. Sources of inefficiency and loss are:

- within the manufacturing sector e.g. where sub-optimal forward demand intelligence leads to inefficiencies in ordering raw materials and components and in the scheduling of production;
- within wholesalers e.g. where 'picking' errors result in double handling of items and returns;
- in the transport sector e.g. where less than optimum pick up and delivery schedules cost time and money;
- within hospitals, including:
 - wastage (e.g. by lack of attention to use by dates);
 - picking errors by stockroom staff;
 - theft;
 - individual staff members creating 'just in case' stockpiles of consumables; and
 - failure to effectively recover the cost of consumables used by (or for) individual patients (for example when doctors fail to complete prescriptions for medications administered); and
- between the various components of the supply chain due to inefficient means of communication, resulting in, for example:
 - incorrect orders/deliveries (wrong products or quality);
 - double or triple manual handling of data (i.e. at order, receipt, and invoice payment);
 - high rates of telephone or paper based checking of orders placed; and
 - deliveries ending up in the wrong hospital.

Box 6.1

Potential for savings in the pharmaceutical industry

Industry sources indicate that greater use of e-commerce in the pharmaceuticals industry could reduce costs. The PECC project in particular is expected to result in substantial savings.

'The pharmaceuticals industry's five wholesalers—which control 95 per cent of the \$5 billion a year industry—will start interacting electronically with its 693 suppliers and manufacturers.'

'Wholesalers report it costs up to \$75 to process an order by paper chase—with the new system, the costs could be brought down to as low as \$5.'

'The wholesalers involved include Australian Pharmaceutical Industries Limited, Faulding Healthcare Pty Ltd, HAS Trading Company, Sigma Company Limited and W. H. Soul Pattinson Limited.'

Source: *FEN (Factory Equipment News)*, July 1998, p. 6.

Whilst this level of cost saving is available theoretically, it is unlikely that these savings are achievable, given the high failure rate of hospital IT projects and the industry-wide cooperation that is required for full achievement. However the PECC project does report at least one 500 bed hospital which has achieved savings of this magnitude.

Efficiencies resulting from clinical quality/safety improvements

There are significant gains in health outcomes and decreases in 'episode of care' and whole-of-life costs arising from utilisation of e-commerce tools in clinical care.

Box 6.2

Avoiding adverse reactions

The president of the Australian National Patient Safety Foundation, Professor Bill Runciman, is reported as estimating the national cost of admitting patients to public hospitals due to adverse reactions to medicines at about \$500 million per year.

'It's huge. It's over ten per cent of the annual pharmaceutical budget, which is \$4 billion,' Professor Runciman is reported as saying.

Professor Runciman, the head of anaesthetics and intensive care at Adelaide university is reported as saying that the main drugs involved in adverse events in Australia are anti-coagulants, anti-inflammatories used in arthritis treatment and drugs used for heart failure and blood pressure.

An associate professor of medicine at Harvard Medical School, Dr David Bates, was reported as saying 'US studies show that up to 80 per cent of adverse drug events could be prevented by computerised drug ordering.'

Source: Sydney Morning Herald, 14 March 1998.

Preventable adverse events resulting from failures of information flow among health providers account for eight per cent of hospital activity measured in bed-days. The cost of inappropriate use of pharmaceuticals is estimated at \$500 million per annum. Australian research shows that general practitioners are unaware of 26 per cent of the medications being taken by their older patients, and amongst this age group adverse reactions to medication is estimated to cause one third of emergency hospital admissions.

On the positive side, there are significant health benefits which are achievable if doctors prescribe more knowledgeably or consumers comply with prescribed treatment (or even to have the prescription filled) have been well documented. The estimated benefits from this improvement is also estimated to be of the order of \$500 million, extrapolating from US studies.

The rise of evidence-based medicine has seen the proliferation of clinical guidelines by various authoritative sources. Medical practitioners can now have access to professional information services which can form the basis of 'expert systems' whereby information from a variety of sources can be brought to bear on a particular patient episode and the prescription of therapies by the medical practitioner.

An early example of this is the Clinical Information Access Project which the New South Wales Health Department has made available to health professionals in the public health system.

The primary e-commerce tools for improved clinical practice are information management tools which provide practitioners with real-time access to information needed in clinical decision-making:

- information from the patient's health record including previous history, investigation results and treatment; and
- information on clinical best practice and evidence about intervention which is customised to the particular situation (for example context-dependent information on drug interactions which is shown as an alert when prescriptions are being written).

A necessary precondition for these benefits to arise is a system of electronic health records. It is suggested that the first step (with the greatest potential pay-off) comes from having an online medication history available to treating doctors and pharmacists, along the lines of the Pharmacy Intranet project of the Pharmacy Guild of Australia.

Efficiencies in logistics and administration

There are significant benefits to health care providers and patients from electronic scheduling and practice management information systems which permit something more like 'just-in-time' best practices in scheduling and waiting for medical services. For example, it is possible to reduce length of stay in hospital by more efficient scheduling of tests required before hospital procedures in gastroenterology. Families of children with major disabilities can benefit greatly from integrated appointments systems which would reduce the need for multiple visits to hospital by scheduling all related appointments on one convenient day. There are pilot projects which demonstrate these benefits but as yet little application of these tools to Australian health care.

There are significant efficiencies to be had by implementation of e-commerce systems among health providers, the health insurance funds, the Health Insurance Commission (HIC), financial institutions and consumers. There are several significant trials of claiming systems in Australia but there is as yet no widespread system which is interoperable among all the participants in the healthcare payments network. Major benefits driving HIC is the reduced transaction costs of electronic claiming and the cost reductions available from closing inefficient branches. It has been estimated that paper-based claims cost insurers \$3-\$5 and that electronic processing would cost \$0.70.

6.4 New costs

The benefits of e-commerce in the health sector will only be achieved if new e-commerce systems are implemented, and these will involve some new intermediaries. The major issue for the Australian health system, with its mix of public and private provision, is who will pay for new facilities and who will control potentially powerful gateways.

Control and financing of information management facilities

The information management applications discussed above presuppose powerful new information systems:

- Patient information systems which have interoperable electronic health records which permit information transactions among health providers and with patients with appropriate security, data protection and authentication services to meet the complex legal and ethical requirements of the health system. These systems will require extensive

investment in next generation equipment, software and consultancy services and skilled human resources will be in very short supply.

- Evidence-based clinical decision support systems which enable search, discovery and access to a full set of clinical information across multiple information providers in Australia and globally, some of whom operate on a professional community basis and some of which operate as fully commercial information services.

There are many commercial and public policy issues to be resolved before these new information intermediaries can operate in an optimal way. They will be expensive to establish and there is little by way of defined protocols and expectations for public, professional and commercial roles.

Control of these new intermediaries is very attractive in the longer term and a range of commercial interests are pushing the envelope of public sector policy and capacity to pay.

There is general agreement among expert commentators that the benefits of these new intermediaries will far outweigh the costs. But the costs will be considerable, the investment is required upfront and the probability that benefits can be captured is not yet well defined.

There are very significant issues of control which arise. The rapid development and enormous valuations of US health electronic companies are based on the expectation of market dominance by a few early companies. The smaller market and mixed public/private sector control of health in Australia limits the commercial rewards available. However there are significant risks that supplier interests or intergovernmental inefficiencies will permit a 'blocking' role over the development of seriously useful health infomediary services. At the very least, the new infomediary requirements will challenge the current operating practices of the traditional intermediaries for information to medical practitioners, the medical journal, the medical school, the specialist college and the public health authorities.

Control of electronic procurement, logistics and payment systems

Similar issues arise for electronic procurement, logistics and payment facilities. State public hospital systems are developing their own electronic procurement initiatives, but these may not be specified or implemented in ways which enable the maximum national efficiency dividend from online procurement. Early entrants to the medical practice logistics systems field are struggling with the issue of open and interoperable standards in a context where returns on investment are uncertain in the short term and exclusive arrangements with customers are seen as an immediate remedy. And there are unclear lines of authority and control in relation to the authentication, security and payments systems which will be necessary for rapid adoption of e-commerce in the Australian health system.

The considerable costs of such systems and the relative immaturity of standards in these areas underscore the powerful network externalities which apply in e-commerce applications in the health sector.

6.5 New business models

The most dramatic emerging impact of e-commerce in the health sector lies in the significant consumer empowerment potentially available, and the development of powerful new intermediaries who will directly challenge the 'cottage industry' model of health care delivery.

New service modes and channels to the consumer

One of the most popular uses of the Internet by consumers, particularly those over 40, is searching for health-related information. And with the development of numerous online communities, consumers have taken advantage of the opportunities provided to communicate with others about health conditions that are of concern to them—with other consumers and with providers of health information right around the globe.

Box 6.3

The Internet and health information

Findings presented at Intel Corporation's Internet Health Day show that consumers increasingly seek medical information on the Internet and are using the web to take a more active role in managing their health. However, physicians are not adopting the Internet as quickly as their patients.

According to The Harris Poll, 70 million Americans went online between June 1998 and June 1999 looking for health information. A Cyber Dialogue survey found that 48 per cent of online users seeking health information would like to communicate with their doctor's office via email, but only three per cent are doing so, and only 11 per cent know their doctor's email address. Likewise, 74 per cent of online users seeking health information said a doctor or pharmacist recommendation would make them more likely to trust a website, but only four per cent are receiving this guidance. The study further revealed that 33 per cent of patients who want to communicate with their doctor via email would be likely to switch physicians in order to do so.

Source: Intel Corporation, 12 October 1999.

The increasing use by motivated and well-educated consumers of information on the Internet has several implications.

There is an issue of quality and safety—how can consumers be protected from erroneous, misleading or out-of-date information? And in online chat rooms for patient support groups, how can consumers be protected against exploitation (for example by the disguised advertising of 'miracle cures' by someone posing as a fellow sufferer of a disease). It is clear from market research that while consumers want some quality control or guidance about reliable information, in the absence of such information they will use their own judgement rather than avoid the Internet health sites. Several sites are being established to provide tested information—in Australia the HealthInSite project is an example, and in the US drkoop.com is another example.

The second major implication is the expectation that medical practitioners will be available to respond to email instead of telephone, and that they will provide information by a website as well as pamphlets in a waiting room. This has significant cost implications unless a cluster of medical practitioners and/or health agencies share the infrastructure costs. In the context of the US health care market, this development will be underwritten by health insurers, but in the Australian context this seems unlikely, at least in the short term.

The third major implication is the potential interpolation of a new intermediary between doctor and patient, as part of the medical role is filled by a 'health gateway' Internet service. There are active moves by owners of prestigious healthcare brands (like the Mayo Clinic) to expand the reach and earning power of the brand by moving into Internet health service. The next step is the online medical consultation and the online drugstore. Already there are significant clinical and regulatory concerns about the ability to buy drugs by e-commerce from international sources

in ways which bypass local clinical and ethical scrutiny. The aggregation of consumer presence in a 'health portal' site, with the referral of patients to medical practitioners on payment of a referral fee, opens up a major structural change in the industry at least as disruptive to the accepted institutional structure as the rise of the hospital was to the medical profession in the last century.

Models for rationalisation and consolidation of health

The globalisation of biomedical publishing and the development of the health super sites funded by US venture capital pose a considerable threat to Australia's health infrastructure.

At present it seems unlikely that the necessary coalition of healthcare providers will form to keep control of the information infrastructure of their industry. One possible scenario is the dominance of the Australian health information management market by the big players—HealthEon/WebMD, Medscape and the like. Indeed it will probably be attractive to some health information providers to form such alliances.

Such a development is likely to retard the development of widespread e-commerce in health in Australia. There is widespread evidence that health information systems do not transfer well in different national contexts.

It also seems unlikely that a public sector led model of health e-commerce can be successful. There are too many fiscal and institutional barriers in the existing roles of Commonwealth and State/Territory Governments to permit the speed, flexibility and scale required if Australia is to have a native health information management system and associated e-commerce capabilities.

The most likely outcome is therefore a systematic sub-optimal implementation of e-commerce in Australian health care.

Key points

Greater use of e-commerce could drive considerable change in health services. Significant efficiencies stand to be made in areas of health, such as pharmaceutical supply chains. Furthermore, e-commerce might change the way that these services are delivered, particularly through the potential for servers to coordinate and integrate services by multiple providers. Essentially, the change would result in better management of information and therefore better health outcomes.

Similar to other sectors, a key change would be to introduce more convenient service delivery channels, as well as introducing the potential for new services, or extending access to existing services (via distance health for example).

While there are quantified estimates about cost savings and other potential economic impacts, it was not feasible to include these into the modelling conducted in this pilot study. The main problem is that many of the changes foreshadowed rely on policy changes in public systems. These follow different trajectories to commercial outcomes that the rest of the study has focused upon.

Rather than merely estimating the impact of e-commerce in this sector, a separate study about what could be achieved if certain barriers were removed is called for.

Section Seven

Media and entertainment

7.1 Background of the sector

The media and entertainment sector is a dynamic and growing sector of the economy which will be at the forefront of business to customer Internet commercial activity over the next ten years. Presently, Australia's media and entertainment industries account for approximately \$50 billion in annual turnover (Table 7.1).

Table 7.1

Turnover of media and entertainment sector, \$m, 1997–98

Gambling, lotteries casinos	17 840
Print media, including printing, books, newspapers	16 466
Radio and television	4 585
Film and recorded media	3 935
Sport	3 010
Other, include libraries, parks gardens, recreation	5 575
Total	49 911

Source: IBIS Enterprise Database.

The industries in this sector essentially compete for people's free time, which among people aged 15 and over, accounts for about five hours a day.

The Internet impacts upon media and entertainment industries in different ways. In its own right, the Internet also competes for the consumption of free time. Of the 5.2 million people who used a computer at home in 1998, 29 per cent used it daily and 65 per cent used it at least once a week. The Internet competes with traditional media by providing a medium for low cost publishing and communications that can be distributed almost free of charge anywhere in the world. There are therefore hundreds of thousands of websites offering specialised domains.

However, it is also a new channel for the marketing and/or delivery of the products of some media and entertainment products. The development of the Internet as a new delivery channel will take place in different ways for various entertainment products:

- The Internet can be a means of purchase for physical goods, for example, books and CDs.
- The Internet can be a means for electronic delivery for physical products. This is so for gambling, newspapers and magazines and recorded music.
- The Internet can be a new means for electronic delivery of electronic product, such as radio and television. In the case of television (and film), bandwidth remains a constraint.
- The Internet may provide a new means of marketing for products in the 'experience sector', which cannot be brought into the home, such as parks and gardens, live performances and sporting events.

This Section will review the implications of greater use of e-commerce for cost savings, new costs, new business modes and international and other issues for the following subsectors of activity:

- newspapers and magazines;
- television;
- radio and recorded music;
- film and video production and distribution;
- books; and
- gambling

7.2 Newspapers and magazines

The sector

The newspaper and magazine industry employs approximately 30 000 people directly and turns over about \$5.9 billion a year. Its revenue has traditionally come from three sources: unit sales, display advertising and classified advertising.

The decline in circulations of newspapers is a global trend. The 1998 Media Usage Study by the Newspaper Association of America found that over 20 years, the proportion of the population reading a daily paper fell from 67 per cent to 51 per cent. (*The Economist*, 17 July 1999)

In Australia, the industry is highly concentrated, with two publishers, News Corporation and Fairfax, dominating newspaper production, and PBL and PMP dominating magazines. Magazine circulation has been fragmenting, with the mass circulation titles like Women's Weekly, New Idea and TV Week, falling sharply, while a proliferation of new titles has kept total sales steady.

Cost savings

The supply of online news and magazines reduces the massive overhead of printing and paper and makes it much easier to publish information, with opportunities for small and medium businesses, and community groups to publish their own special interest journals.

The newspaper and magazine industry is presently the largest consumer of printed paper, followed by retail catalogues and directories. The printing industry's annual sales (including services to printing and the manufacture of paper stationary) is \$6.8 billion. The National Accounts data suggest that the books and newspaper sector consumes \$886 million in paper, printing and ink. These costs may be substantially avoided by the electronic publishing of news.

Database driven direct marketing, such as telemarketing, direct mail and household distribution may be considered forms of e-commerce. The development of direct marketing, as a much more efficient means of reaching consumers than mass media, is also resulting in cost savings.

New costs

It would be reasonable to anticipate a two per cent decline in newspaper circulations over the next five years and a four per cent to ten per cent decline over the next ten years. The larger number would be due to a

deterioration in the economics of newspaper publishing which could possibly be caused by a combination of adverse circumstances:

- loss of classified advertising revenue;
- growth of online competition, including cannibalisation; and
- loss of display advertising to direct mail.

Together, these trends could force newspaper publishers to raise prices in a shrinking market.

Industry structure and new business models

The most obvious and immediate pressure upon the newspaper and magazine industry is the competition for time. There are a number of studies in the US pointing to the fact that people using the Internet make less use of traditional media. A study of PointCast users conducted by IntelliQuest found that 46 per cent spent less time reading newspapers, 23 per cent spent less time reading magazines and 21 per cent spent less time watching television (Editor & Publisher, 01-03-90. www.mediainfo.com). PointCast users are predominantly business people and were heavy newspaper readers. A more general tracking of Internet usage found that 16 per cent of Internet users reported spending less time reading newspapers and magazines.

The major newspaper companies have recognised that the Internet presents a challenge to their economic model and have started to build their own online businesses. These have largely involved the re-purposing of their print journalism for distribution online. Around the world, more than 2 700 newspapers have online businesses.

The ready availability of online sources of news will accelerate a trend in newspaper editorial coverage towards a more magazine type format, with greater use of colour, and an emphasis upon feature articles. Magazine markets are expected to continue to fragment.

In the US, newspapers have not succeeded in making themselves the first port of call on the Internet, a privilege that has gone to the search engines, which have subsequently developed as portals.¹⁵ They have the potential to emerge as competitors to the newspapers as suppliers of news online. This is a type of re-intermediation in the market.

At present, newspapers are subsidising their online presence with the enormous cash flows from print. When those cash flows come under pressure, there is a risk that their online business will not have developed the mass traffic of the search engines. This does not look like a near term threat for news organisations in Australia. The Fairfax web and News Ltd websites are in the top half dozen sites. Australia has always been a much more concentrated media market than the US.

However, there remains a possibility that content online will fragment in a manner similar to the magazine market. A newspaper is a package of content, from sport, to weather, to business, the arts, crime politics and general news. The package has been created to support the massive fixed costs of printing plant and machinery. Online, it can become unbundled, with specialised content suppliers, providing information and interaction

¹⁵ Research by the Pew Research Center in the US found that the number of people who get news online at least weekly has grown from four per cent in 1995 to between 15 per cent and 26 per cent now. The number of people getting news from newspaper sites, however, has fallen from 23 per cent to 16 per cent over the past four years (15 January, 1999, www.mediainfo.com).

of greater depth. (It should be noted, however, that the PointCast model of personalised news delivery has not been a runaway success. Many people like the package and the variety and surprise that it brings.)

Other major means for creation of value within the newspaper and magazine industry will be the development of new information services. Early examples are the searchable archives, personalised news services and stock price watch lists and graphing services.

Opportunities for and threats to revenue

The revenue stream for online news services is not yet established. In the US, online banner advertising reached US\$1.9 billion (\$A2.9 billion) last year, according to Forrester Research and it is tipped to reach US\$3 billion this year. This is still a small portion of an annual advertising spend in the US in excess of \$1.5 trillion. In Australia, banner advertising was just \$12 million last year.¹⁶

The problem is that the banner is an information-poor space of less than two centimetres depth at the top of a Internet screen page. According to Jupiter Communications, the number of Internet site visitors who click on banner ads has declined from two per cent to 0.5 per cent over the past 12 months.

Instead, according to Forrester, online advertisers in the US are intending to increase the share of their promotional budgets on traditional media from 44 per cent in 1998 to 52 per cent over the next two years. The traditional media advertising is used to attract readers to their own e-commerce websites. (*Sydney Morning Herald*, 19 July 1999)

The pressure on display advertising is less likely to come from banner advertising online than it is from direct marketing. Direct marketing crosses categories from traditional and relatively indiscriminating nationwide catalogue and magazine coupons, to highly targeted, database driven approaches, ranging from direct mail, to telemarketing. In Australia, direct marketing has surpassed mass media advertising rising 25 per cent to \$9 billion last year, against a seven per cent rise in mass media advertising of \$8 billion. Telemarketing and call centre bureaux rose by 203.4 per cent last year to \$6.4 billion.

It is therefore possible that newspaper and magazine *display* advertising will continue to show modest growth. There will be pressure on newspapers to upgrade their colour printing to support present display advertising better.

The bulk of the *classified* advertising revenue stream is likely to migrate online. The ability to use a search function gives the Internet an overwhelming advantage over print. This advantage is being supplemented by the model developed by eBay to operate classified advertising on an auction basis. EBay has formed a joint venture with PBL, while Fairfax has also entered a joint venture with an online auction house.

The appeal of the online medium for classified advertising crosses sectors: from property, where the house can have its own web page, to employment, where CVs can be lodged directly, as well as cars, and miscellanea.

PBL and Fairfax are well placed to divide this market. The most important thing is to have a mass audience so that advertisers have

16 www.consult.com.au

maximum choice. There may be a loss of market share for Fairfax, which currently dominates classified advertising in Sydney and Melbourne. However there may also be growth in the market. Smaller operators, like Trading Post and PMP's property.com may struggle to compete against the better known brands.

Jobs and skills

There is a risk that, over a ten year period, media organisations will not manage the transition to an online environment and there will be contraction of employment, including employment of the producers of content.

External dimension

Readers now have much greater access to international publications than ever before. Equally, there is scope for specialised content produced in Australia to attract international readers. No measurable economic impact from these trends can be detected because the linkage between readership and revenue online is so weak.

7.3 Television

The sector

The television industry in Australia includes 48 private broadcasters, of whom 34 are free-to-air businesses, seven are pay television business and seven are community broadcasters. The industry is dominated by the three large commercial broadcasters.

The industry is growing strongly, with revenue in 1996–97 of \$3.35 billion representing a 51 per cent increase in total income compared with 1993–94. (ABS 8680) pay-TV revenue has grown to in excess of \$1 billion since then. The emergence of pay-TV provides a contrast with online news, with people prepared to pay for a television service they used to get for free.

The outlook for television is clouded by a combination of political, corporate, media and social issues. The politics dictate that companies cannot control both print and television media. The corporate issues involve the tussles between the Packer Group, News Corporation, Telstra and the Seven Network. The technological issues are an uncertainty about what convergence of television and the PC will look like. The social issue relates to the choice of technology and whether we will continue to sit in the lounge room as a family, or retreat to our private PCs.

One solid trend that can be detected is the fragmentation of programming. Whether television is delivered over cable or by satellite or the web, there will be a large growth in the range of channels available.

Another likely trend is that growth in direct access to international television programming.

A third conclusion is that with close to half of all free time allocated to it, television will remain a powerful medium for some time yet.

The biggest impact of the Internet upon television is its impact on audiences. Although Australian television executives report there is no sign of this, it is now well established that it is taking place in the US. Intelliquest's tracking of Internet usage shows that 26 per cent of Internet users watch less television. A recent report by Forrester shows that online

consumers watch five per cent less TV news, ten per cent less TV movies and ten per cent less TV talk-shows than offline consumers.

Cost savings

The development of direct response television of which web TV will play a part will provide more efficient use of advertising investment. In the US, direct response television advertising is now a US\$18.6 billion industry (*Sydney Morning Herald*, 22/6/99).

The Internet is making possible the same diffusion of broadcasting power as with print. This is due to the lower costs of transmission. The 'web-cam', though usually delivering poor quality pictures, is a feature of many websites. Lower costs is enhancing the development of community television along the lines of community radio. Community radio employs about 500 people and turns over \$25 million. There would be potential for this to increase two or three times in a television environment.

New costs

The preoccupation with the politics of ownership and the concomitant attempt to impose regulation by partitioning technologies is likely to divert funds which might otherwise have been invested in content.

The uncertainty of technological direction is also likely to see some wasted investment, as with the duplication of investment in cable networks.

Industry structure and new business models

The future industry structure will depend upon the regulatory environment. There may be some new large players in the industry if the government allows new entrants, notably News and Fairfax to commence datacasting. Fairfax has argued that the opportunity cost of limiting access to digital television to the existing broadcasters is \$1 billion.

The strength of pay TV, which now has over one million subscribers, or 16 per cent of households, and has captured 7.3 per cent of the audience, points to the value of a proliferation of channels. There is an inevitable deterioration in the economics of content production when a given program is one of a hundred different choices compared to when it is one of four.

What will be delivered, where and by what is not so clear. George Gilder remarks that television and the personal computer will merge in the same way that the horse and cart merged with the automobile. In other words, he sees the triumph of PC intelligence.¹⁷

It is not clear what interactivity has to add to the genre of programming developed for television, or whether new forms of interactive programming will be developed. It is not clear how great the demand is for people to be able to read and see the news and see, or be able to enter a statistics database while watching the game. The most apparent commercial benefit of interactive television is the ability to conclude direct sales following advertisements, but there is not yet a new model for programming.

17 <http://www.forbes.com/asap/>

Soon, many Americans will be using their televisions to access the Internet. Present in nearly every household, TVs are easy to operate and require little or no maintenance. Digital broadcasting services (high-definition television, or HDTV) will be available in the top ten [US] markets by November 1999, and [US] broadcasters are expected to make the transition to digital broadcasting by 2006. With digital broadcasting, TV viewers will be able to interact with their televisions and surf the web, pay bills, plan a weekend trip, or make dinner reservations. Already, satellite dishes and signals carried over cable television lines enable consumers to receive data from the Internet through their TVs and television programming through their personal computers. At speeds of ten million bits per second, a household connected to the Internet via a cable modem can download a 3.5-minute video in 8 seconds. In most cases today, however, the outgoing communication (the speed at which the Internet receives the commands by the user) is still limited to the fastest modem speeds that copper telephone wires will support.

Henry D, Cooke S, Montes, 1998, *The Emerging Digital Economy*,
US Department of Commerce 1998, pp. 9–10

This lack of resolution to the above issues means that ‘web-TV’ boxes have only sold about 120 000 units in the US, despite a relatively low price of under \$200.

The capacity of the Internet that may become of most value for firms in television is the Internet’s search capacity, rather than its interactivity. As the technology develops to manage the storage and streaming of video, the potential to store television programming on a database for download at call, as is widely available now with music, the control of the television networks over the structure of programming will become less important. This is more likely over the five to ten year period, rather than over the next five years.

External dimension

At present, the Australian television industry spends approximately \$800 million on program rights, of which about 90 per cent comes from overseas. The proliferation of channels is likely to see an increased volume of overseas programming in Australia.

The cost of programming has risen sharply (300 per cent between 1993–4 and 1996–7). This is likely to continue.

Australian television programming has been a successful export. This is considered under film and video production.

7.4 Radio and recorded music

The sector

The commercial radio industry comprises 103 companies employing 4 361 people with total income of \$584 million. Sale of airtime provides 91 per cent of its revenue. (ABS 8680). The recorded music business comprises 541 enterprises employing 3 886 people with total sales of \$3 866 million.

The essential difference between the two is one of user control. With radio, the user cannot choose which music is played, although there is limited choice of channels. With recorded music, the user can choose to play their favourite music whenever they want. There is also a difference in quality of sound, however this difference is disappearing as radio becomes digital.

The underlying economic proposition of radio has been that access to people’s time provides value to advertisers. A portion of that value goes to the artists in the form of royalties, however the greater value to the

artist is the promotion which airplay brings. This enables them to make more money from sales of recorded music and live performance.

People spend an average of 77 minutes a day listening to radio, CDs, records and tapes. A substantial percentage of this time is spent while doing something else.

Cost savings

The cost of recording music has plummeted over the past ten years, with the cost of recording equipment for professional standard recording dropping from hundreds of thousands to less than ten thousand. Home produced CDs can be made for a few thousand dollars.

The barrier to the garage band has always been distribution. This barrier is now lowered. With new formats such as MP3 (see below), music may be distributed globally at virtually no cost. This enables performers who might otherwise not have developed a following to become successful. The value created is in performances by musicians who are in demand, rather than from sale of music.

Disintermediation is likely as more consumers purchase music from websites such as CD Now than from high street retailers. Web retailers are able to sell product at lower costs due to lower fixed costs, though there will be an increase in costs brought about by the delivery of goods e.g. courier delivery services.

It is reported that 'Last year in the US, 11 000 artists released their debut album' says Phil Tripp, founder of the IMMEDIA! music industry super site. 'Only 21 debut albums actually recouped all their recording, marketing, pressing, royalties and other costs.'¹⁸

New costs

There is substantial installed capacity in manufacturing and distributing CDs. This is threatened by the roll-out of the MP3 format. Forecasts are still relatively constrained, with Jupiter Communications (July 1999) expecting that by 2003, digital sales of music will be only US\$150 million, or roughly 1.1 per cent of the US music market. Over a longer term, as the technology is developed, the audio manufacturing business could almost be eliminated, as have vinyl record pressings.

In Australia, the manufacturing costs in the music industry are about \$200 million.¹⁹

Industry structure and new business models

Convergence between radio and recorded music is being driven by the new technology MP3, which is a format which converts sound into digital packets that may be transmitted over the Internet and stored in what is known as 'flash' memory.

There are a number of developments emerging from this. Internet radio is developing with a wide variety of choice of pre-set programming. There are also Internet services that make use of the search function to locate music from particular artists. New portable MP3 players are being developed, which provide a more robust format than portable CDs. Presently, there is considerable work being done to secure standards of 'watermarking' of MP3 recordings so that they may not be copied.

¹⁸ *Sydney Morning Herald*, 26 Jun 1999.

¹⁹ See ABS cat no 4143.

Physical recordings of music, in the form of CDs, has been an early success of e-commerce, with companies such as CD Now profiting from the search capacity of the Internet. Jupiter Communications postulates that online sales of CDs will generate \$2.6 billion in revenue, representing 14 per cent of the US Music Market by 2003. At present, online music sales are just 1.1 per cent of the market.

There is a challenging issue for FM Music radio. It could see some erosion of audience over the next five years (say five per cent to eight per cent) but a much larger erosion over a ten year period.

There is an argument which says that companies will increasingly seek to package their offering as a 'staged experience' rather than the delivery of a service.²⁰ It is postulated that 'experiences' will achieve a greater valuation in the disposition of free time. Esther Dyson also presents the argument that performance will be the means of capturing the value of intellectual property, rather than exacting a toll from copying.²¹

External dimensions

FM broadcasters essentially package international content for Australian audiences. There is little value added in this process, although the sale of air-time to advertisers is of value. It will become easier for people to access international content via Internet radio and MP3 downloads directly.

Australian music sales will be impacted by the growing popularity of online stores such as CD Now, with greater direct imports of music.

Australia is the third largest supplier of music content in international markets after America and Britain. The Australian popular music industry has been successful in generating a series of artists of world renown. As it distance becomes less of a barrier, there is likely to be greater interest in Australian music.

7.5 Film and video production and distribution

The sector

The film and video production and distribution industry generates about \$2 billion in revenue, divided between production \$1.1 billion and distribution \$900 million.²² The production industry received 33 per cent of its income from television programs, 23 per cent from the production of commercials, and 11 per cent from the production of feature films. Distribution obtains 45 per cent of its income from the rental and 26 per cent from sales of video tapes, disks, films and software.

Both businesses are enjoying rapid growth, with distribution's income up 52 per cent over the three years to 1996-97 and film and television's revenue up by 85 per cent over the same period.

Cost savings

Technology is making a big impact upon the physical production of films. George Lucas likens its effect to that of the introduction of oil paints in the sixteenth century, which enabled paintings to be worked and re-worked, rather than each stroke being indelible. Australia is emerging as a center for the digital reworking of film. It is arguable that this is not e-commerce.

20 See www.hbsp.com, July-August 1998.

21 See www.edventure.com.

22 See ABS cat no 8679.

New costs

The fragmentation and regulatory and technological uncertainty of the television industry is likely to result in cut backs in local production for television in the near term. There may also be an impact on production of television commercials until the industry stabilises.

Industry structure and new business models

The fragmentation of media will place an increasing premium upon content which can cut through the clutter. Television production houses that can demonstrate an ability to produce hit shows will do very well, despite what may be a difficult time over the next five years for television production.

Australia's film industry is likely to enjoy continued growth. It is an industry which is maturing, and consolidating with some substantial capacity.

Film distribution is likely to shift to online delivery over the next five to ten years. This will be the result of adoption of new proprietary technology by existing cinema distribution companies, rather than by new entrants using open systems.

Videos for home use are not likely to be distributed online until towards the end of the next ten years.

External dimensions

There is likely to be growing international interest in Australia's film and video industry, continuing a trend which has been underway now for ten to 15 years.

7.6 Books

The sector

Australia's book publishing industry turns over about \$1 500 million a year and meets approximately two-thirds of domestic demand. Approximately \$550 million of domestic demand is met by imports, while Australia exports about \$103 million. The largest section of the market is educational.

As with television, magazines and newspapers, the Internet, as a consumer of 'free time', poses a threat to book sales as it competes for people's time available for reading books.

Cost savings

The major area for the cost savings in the book industry is in the directory and encyclopedia area, where the database searching capacity of the Internet (and CD-ROM) provides significant new consumer benefit, in addition to the vastly lower production cost of new media.

As in music sales, disintermediation is leading to consumers shifting away from purchase of books from high street vendors to online sellers, such as Amazon, which do not face high fixed establishment costs and offer lower prices. People making Internet purchases obtain additional benefits in terms of reduced time spent shopping and access to greater variety. While individual consumers may well still enjoy shopping as a leisure activity in its own right, it is likely that many business customers will value the time savings that Internet purchases offer.

New costs

As in most areas of e-commerce, the consumer and the vendor have to acquire the capacity to engage in the new business mode. They most both have access to the Internet and payment systems. Obtaining this capacity will require new intermediaries and costs.

New business models

The book retail industry has been the scene of one of the most successful e-commerce ventures to date - Amazon.com. The ability to provide a huge searchable index, combined with the ability to create communities of interest around subject areas, and use efficient supply management and distribution has provided a significant value proposition.

There are now numerous online book stores. This has brought a ceiling to growth of traditional book retailing.

Academic book publishing has been under pressure for some years as a result of the preparation of 'reading packs' of photocopied material. This trend is likely to accelerate with the development of online courseware.

The shift from text book to CD-ROM has not occurred as some had anticipated.

There is considerable research work being done into improving screen resolution so that screens have equivalent readability to print. Microsoft has an e-book venture that has moved from research into product development. Rather than using new screen technology, it uses the colours to more sharply define the edges of type, with a software product called ClearType.

This is not likely to cause any significant erosion in the book industry over the next five years, but over the next ten years, this, and other methods of providing more readable text on screen, may start having an impact upon book publishers.

External dimensions

It is to be expected that book imports will increase in response to the greater variety, convenience and often lower price of purchase from online book stores

7.7 Gambling

The sector

Gambling is a substantial growth industry, with total expenditure reaching \$11.3 billion in 1997–98, more than double what it was a decade ago in real terms, and treble the level of 15 years ago. Expenditure is the amount that gamblers loose. The total amount gambled in 1998 was \$80 billion.²³

The greatest gambling innovation of the future promises to be Internet gambling, of which there are two distinct types available: virtual online gambling (e.g. software generated games such as slot machines, blackjack, roulette and baccarat) and gambling on single events.

The Productivity Commission's report asserts that gambling is a supply driven industry: the more outlets there are, the more money will be

Drawing on complicated algorithms, ClearType taps the power of the red, green and blue supplements of each pixel to allow characters to be sharpened with unprecedented subtlety, as though honed with an extremely fine electronic paintbrush. With a resolution of 200–300 dpi on a small display, even the italics in The Road Ahead emerge crystal-clear, and they look even better on a sharper screen. As Hill recalls: 'Bill (Gates) was so excited. We recognized this was a breakthrough, because if you can really read on a screen, it's going to change everything.'

:<http://www.upside.com/texis/mvm/story?id=378bdc8f0>

23 Productivity Commission, *Australian Gambling Industries, Draft Report*, <http://www.pc.gov.au>

gambled. The development of Internet gambling, which brings the means to gamble into the home, vastly increases the number of outlets and it follows that substantially more money will be bet.

The International Gaming and Wagering Business estimates that Internet gaming turnover will grow from US\$5 billion in 1998 to US\$25 billion by the year 2000.²⁴ Internet gambling will partially involve substitution of the Internet as a medium (see below) however it will also bring new people to the Internet. The Productivity Commission has noted that it would be attractive to those who:

- live in remote locations or are housebound;
- are concerned about safety at gambling venues;
- do not like the atmosphere of the venue, such as smoke or noise;
- are intimidated by other gamblers at gaming tables, or
- are already heavy users of the Internet.

Cost savings

Online gambling makes it possible for a whole new realm of business people to enter the gambling business. Whereas it costs hundreds of millions to set up a casino, an online gambling business can equip itself for US\$135 000. Internet Casinos Incorporated was developed for US\$1.5 million and employs 17 people.

New costs

It is commonly argued that Internet gambling will have a severe impact upon gambling tax. From an industry value added perspective, it would be providing a service at a lower cost, so this would be an enhancement, not elimination of value. However the Productivity Commission does not accept the case that tax revenue will be hurt. It argues that Australia is likely to gain as much income as it loses. Although Australian online gambling companies are taxed at a lower rate, the growth in the market should bring an increase in tax revenue overall.

The success of online gambling will be determined by the confidence of gamblers in the ability of the domain to provide security of payment. Online gambling sites will therefore be likely to incur costs from suppliers of Internet services to ensure the site is adequately secure to meet the concerns of customers.

Industry structure and new business models

There will inevitably be some leakage from existing gambling providers to the Internet. Gamblers who bet on racing by phone or purchase lottery tickets may find that the Internet is more convenient. Sports betting is a relatively new form of gambling and suited to the Internet and home based gambling. Its growth will be a new market, although it may take some business away from the traditional sports events like horse racing, trotting and greyhounds.

Research into why people gamble at clubs and casinos finds that about half do so to socialise, and about ten per cent for the atmosphere. Other reasons cited—the thrill of winning, favourite activity or passing the time—could as easily be met online.

24 PC Report p. 17.11.

If Internet gambling grows to about \$1 billion by 2003, one could postulate that between 50 and 70 per cent would be diverted from traditional channels.

External dimensions

There will be some leakage of gambling revenue overseas. This will particularly be the case if new and proprietary gambling games are devised by organisations with some integrity. The risks of online gambling, particularly with offshore companies, is that there is no assurance that the games are not rigged, nor is there redress if winnings are not paid. However the very success of online gambling indicates that providers are dealing with these problems

Because Australians are among the heaviest gamblers in the world, Australia has a large and sophisticated gambling industry. It already attracts significant overseas interest. It is likely that this will be continued online.

One of Australia's most successful e-commerce ventures is Centrebet, based in Alice Springs. Its turnover is \$3 million a week, with a third coming from overseas. In terms of visitors, 20 per cent are from Australia, 20 per cent from the US, 20 per cent from Scandinavia, 15 per cent from Asia and 25 per cent from other countries. It receives between 20 000 and 100 000 hits a day.

Key points

Greater use of e-commerce in the media and entertainment sector is likely to result in significant economic change. E-commerce will give the consumer greater choice about what, where, when and where to consume. New distribution and recording technologies will challenge traditional systems. Greater competition will also ensure that cost savings will be passed on to consumers.

Businesses in this sector face some interesting challenges. The arrival of the Internet as an explosive new medium has meant that media firms are forced to embrace the new technologies that become available.

When looking at quantitative analysis of the sector the following impacts can be identified that should be factored in:

- this sector has already seen some price reductions in key areas and more could be achieved over time through disintermediation processes in retail and wholesale margins in the sectors inputs;
- the sector is likely to purchase additional inputs of e-commerce related services proportional to its savings in retail margins;
- reflecting the increased convenience of e-commerce transactions in this sector, time savings should be included as an efficiency gain for other industries that use the services of the sector as well as households; and
- many of the goods and services produced by this sector are susceptible to greater international competition and could experience a significant boost in exports from e-commerce.

Section Eight

Retailing

8.1 Description of the sector

The retail sector is comprised of a large number of sellers that enter into transactions for final goods and services with customers. Within the supply chain, a retailer can be either a stand alone shop or be an arm of a manufacturer or provider of the good or service.

The retail trade sector contributed over \$30 billion, or 5.8 per cent, of GDP in 1997–98. The sector employed over 640,000 people as at June 1999, making the sector Australia's second largest employer after the manufacturing sector.

The main challenge e-commerce presents to the retail sector is the rise of Internet shopping. Internet shopping sites are being created by retailers, manufacturers, and e-commerce companies. Whether or not retailers in certain markets allow themselves to be disintermediated from their customers in future distribution arrangements will depend on their willingness to adapt to new environments of e-commerce. A number of lists of 'Top Shopping Sites' in various categories show e-commerce companies highly represented but traditional retailers barely represented.

An additional danger to retailers is that more consumers are using the web to research products and services before purchasing, instead of retail sales staff face to face. This emphasises the importance of product and service information on the web, as consumers may only contact a retailer once they have made their choice. This reduces the ability of sales staff to sell 'value-add' such as after sales service to compensate for higher prices.

8.2 Retail and the Internet

Purchasing and purchasing power is growing on the Internet. In the US, 53 per cent of Internet users shop online. The average transaction is now worth US\$4 600 although this figure varies for business-to-business and business-to-consumer spending.

The number of regular Internet users in Australia is around ten per cent of the population, and this sample is skewed toward middle to high income groups. The profile of Australians using the Internet to shop is summarised in the box below.

Box 8.1

Australians shopping in cyberworld

Australian frequent online shoppers are on average 25–35 years old, highly educated, 'early adopters' of the Internet & typically in professional occupations.

The online shopping experience is becoming popular amongst regular Internet users, but still remains a peripheral activity on the Internet, despite the degree of interest it excites. There are more than 66 per cent of regular Internet users who have tried online shopping in Australia more than once and the percentage of users who have tried online shopping more than ten times has increased to four per cent.

Australian online shoppers spent some \$139 million online in the 12 months to July 1998. The largest product categories continue to be books, music and software.

According to www.consult's Director of E-commerce and Online Shopping, Richard Sandlant 'Today's online shoppers are early adopters, adventurers & experimenters. Both buyers and sellers will have to expand their frontiers and explore new modes of commercial functionality on the Internet, because the task of converting Internet users into online shoppers is clearly not to be underestimated.'

Source: www.consult, <http://www.consult.com.au>

Making a purchase over the Internet is a new form of direct sales between the buyer and the manufacturer. It is a form of retail activity that is becoming more popular. Indications from the US suggest that there is already a large market where people are comfortable with this new type of transaction. The expected growth in Internet sales will in part come at the expense of existing direct shopping (e.g. via mail order) as well as traditional retail sales.

Box 8.2

Shift in direct shopping practices

When it comes to shopping, consumers are becoming more direct, says a new study released by Peppers and Rogers Group, Stamford, CT, and the Institute for the Future, Menlo Park, CA. According to the research, sales of products and services delivered directly to the home will realise enormous gains by 2010 and may account for as much as 24 per cent of all retail sales. However, while direct marketeers may benefit from the growth in consumer-direct sales, only those who adjust to changes in shopping channels will reap a chunk of the predicted \$438 billion to \$1.1 trillion revenues.

One of the factors driving the move toward direct shopping is the continuing growth in e-commerce—news that isn't all positive for traditional direct marketeers. The study predicts that the percentage of households shopping via direct mail and catalogues will drop 17 percentage points, to 50 per cent, from 67 per cent today. According to the study's authors, the businesses that capitalise on the growth in consumer direct sales will be those that develop systems to capture what they learn about a single shopper across all delivery channels—in stores, through catalogues and online — and personalise their response to individual customer interactions.

Source: Tipline, July12 from <http://www.targetonline.com>

As well as shopping online, consumers are shopping around online. Instead of visiting a number of retailers to compare products and prices, pre-purchase research is increasingly conducted on the web. This means that the only retailer they contact is the one they intend to buy from, reducing the effectiveness of sales staff, and emphasising the importance of the product information on the web.

A new study from JD Power & Associates has found that 40 per cent of US consumers who recently purchased a car or truck used the Net to shop for the vehicle. This compares to just 25 per cent of auto consumers last year.

The study calculated that in the first quarter of 1999, more than 25 000 car or truck buyers a month used the Internet when researching a new vehicle purchase, up from 12 500 per month in 1998. Overall, 2.6 per cent of car buyers now use the Internet, compared to 1.1 per cent last year.

In terms of used car buyers, the study found that 26 per cent of US car consumers that purchased a model in the 1994 to 1999 range used the Internet when making a decision. This compares roughly 14 per cent of the same consumer group in 1998.

Nua Internet Surveys, 19 July 1999
<http://www.jdpower.com>

8.3 Cost savings

Businesses that are implementing e-commerce solutions are finding that the process throws the costs of their supply chain under the spotlight. With e-commerce they have been able to slice out parts of their supply chain that add little value. Applied more generally, this could result in significant economic savings in traditional retail activities.

A Coopers & Lybrand (C&L) study (1995) estimated that supply chain management improvements could result in savings of \$1.1 billion on total Australian sales of \$20 billion for dry grocery items (i.e. 5.4 per cent of sales).

PECC the way forward, Price Waterhouse,
Department of Industry, Science and Tourism, 1998

Businesses that are setting up based on utilisation of e-commerce are in a position to start fresh without the overheads and long supply chains.

The real opportunity is for new businesses following new models (e.g. greengrocer.com). In these cases they do not so much disintermediate, as not become involved with the current intermediaries.

The new models are also seen in online supermarkets [e.g. shopfast.com], where warehouse operations are better set up for picking and delivery than existing supermarkets. This means an advantage to warehouse operations until supermarket operations make the shift.

Interview: Tony Richardson, Telstra, IRG member, 9 July 1999

Box 8.3

Case Study: 1-800-FLOWERS

Virtual stores report lower operating costs than their physical counterparts. Costs of supporting a store infrastructure—rent and depreciation, labour, utilities and other expenses—are almost entirely avoided online. 1-800-FLOWERS sells flowers through its own flower shops, affiliated flower shops in major cities across the country, by telephone sales and online. Although its online business generates only ten per cent of its total revenues, its profit contribution to the overall business is nearly that of its store-based business which generates 20 per cent of total revenues.

Source: Henry D, Cooke S, Montes, 1998, *The Emerging Digital Economy*, US Department of Commerce 1998, p. 37; Original Goth, Nikki C. "Sweet Smell of Success" HITS supplement. Red Herring online. Spring 1997. <http://www.herring.com/hits/03/800.html>

Existing retailers may see widespread use of e-commerce as a threat to the extent that it increases the capacity of manufacturers or service providers to sell direct to customers without traditional retail inputs. With e-commerce businesses can find and support their own customers at lower cost. The case of Dell is reviewed in the box below.

Box 8.4

Bypassing retailers: the case of Dell

Dell, a manufacturer of PCs and related items has revolutionised its sales approach. Rather than rely on traditional retail outlets to sell its computers, Dell is now able to sell a large proportion of its output over the Internet. The key advantages in this approach are set out below.

Additional revenues: Eighty per cent of the consumers and half of the small businesses who purchased on Dell's website had never purchased from Dell before. One out of four say they wouldn't have purchased if it wasn't for the website. And, their average purchase is higher than Dell's typical customer.

Lower sales/marketing costs: Dell's website gives enough product, pricing and technical support to help guide a customer through the purchasing process—information customers previously accessed by calling a telesales representative. As a result, Dell has been able to generate an increased sales volume to its consumer market with lower labour costs. Dell expects that its advertising costs should also be lower for its Internet customers, as 30 per cent of these customers had not seen a Dell ad, yet still bought online.

Lower service/support costs: Dell saves several million dollars each year by having basic customer service and technical support functions available on the Internet. Each week, about 20 000 customers use the website to check their order status. Some percentage of these would have come into the call center, at a cost of \$3–5 per call. If just ten per cent of these customers had called rather than using the online service, those 2 000 calls would have cost Dell \$6 000–\$10 000 per week.

Thirty thousand software files are downloaded each week from Dell's site. Answering these requests by phone and then sending each customer the software by mail would cost \$150 000 per week.

Customers who access troubleshooting tips online save Dell a \$15 call to a technical support person. If 2–3 per cent of the 30 000–40 000 technical information queries the website receives each week had reached Dell's technical support staff, it would have cost an additional \$9 000–18 000 per week.

One large customer in the auto industry reports saving \$2 million in its own technical support 'help desk' costs. Rather than calling up Dell's telephone support center and usually holding for about 3–5 minutes, they go to Dell's website for help.

Source: Henry D, Cooke S, Montes, 1998, *The Emerging Digital Economy*, US Department of Commerce 1998, p. A3–14.

Box 8.5

WW Grainger case study

In spring 1995, Grainger launched its website, giving small and medium-sized businesses the ability to search and order from its online catalogue, check product availability and pricing, and set up rules for who in the company is authorised to make a purchase from the website. Customers can identify and select products, check pre-negotiated account prices and determine product availability without leaving their desk, making a phone call, or generating a single piece of paper.

Not only does the site offer customers greater convenience, it also offers greater selection. Through its traditional paper catalogue, Grainger has a standard product offering of about 80 000 products. Its website has a selection of nearly 200 000 products. In the future, Grainger plans to significantly expand its Internet product offering by partnering with other 'best of class' suppliers.

Source: Electronic Trading Concepts.

Box 8.6

Daewoo plans Internet auto sales

Daewoo has stepped boldly into the future by being the first auto manufacturer to sell automobiles entirely through the Internet in the US. 'That would make Daewoo the first automaker in modern times to skip the middleman. This is potentially one of the most important developments in automotive retailing the last 20 years', says Chris Denove, director of consulting operations for industry consultant J.D. Power and Associates.

Source: *USA Today*, 3 February, 1999.

8.4 New costs

Retailers and their customers generally have to obtain access to the Internet or other networks in order to participate in e-commerce. This involves purchase of inputs from new intermediaries.

Retailers also face a challenge with the rise of what Kevin Kelly calls 'following the free' (*New Rules for the New Economy*, 1998). Increasingly products are being given away to sell ancillary products or services. Mobile phones are given away to sell phones services, refrigerators are given away to sell home shopping services, and computers are given away for information.

One example of value creation is of firms in the US providing free computers to consumers who fill in a lengthy questionnaire. The information is then sold to marketers to offset the capital cost of the technology.

Interview: David Hart, Australia Post, IRG member, 12 July 1999

In addition to losing goods to sell, retailers risk their customers moving to other forms of buying, such as online shopping, and to e-commerce companies intermediating themselves. Efforts to retain such customers may involve additional costs on the part of traditional retailers.

Elimination of value generally occurs where the involvement of the purchaser is low and there is a drift to commodity status. This in turn is creating the drift to the creation of loyalty programs to attract and retain customers and the aggregation of purchases under these schemes. The cost of developing and maintaining such schemes can be significant.

Interview: David Hart, Australia Post, IRG member, 12 July 1999

8.5 New business models

One area where retailers (and manufacturers) can create new value is by delivering existing products digitally. Products lending themselves to digital delivery include software, information, and music.

Purchasing software online still remains a large category, and enjoys an in-built advantage because the products are aimed at a target market already online and the latest software is much more readily available compared to waiting for outlets to stock their shelves.

www.consult, <http://www.consult.com.au>

Another way is for retailers to use e-commerce technologies to provide new, or better, services to consumers. For example, automatic price changes as fresh produce deteriorates on the shelves, rather than remaining unsold, or using barcoding and small chips to provide more information about a product that can fit on the label.

In a recent listing of the top ten websites, none of the place getters also operated as a traditional retailing organisation. Given that these top ten sites added together can claim 204 million unique users, and taking the US figure of 53 per cent of users shopping online as a guide, there are a great many online customer relationships being primarily managed by parties other than traditional retailers, and most of them are e-commerce companies. This is reinforced by a study of the top travel sites, and again traditional travel retailers are rarely represented.

As already noted one source of new retailers online are the manufacturers selling directly to end consumers. Well known examples include firms in the IT/communications sector such as Cisco and Ericsson.

It also seems likely that making the decision to trade on the Internet will impact on more than just the nature of marketing channels that a business uses. There is also reason to expect that it may change the offering that the company makes.

Box 8.7

Changing the business mix

We think that as much as ten to 20 per cent of total retailing could be taking place via the Internet within the next ten years. And then, finally, we think there'll be a kind of new type of business emerging, where affinity groups will come together and where companies will spring up that sell merchandise, but also sell advice and also sell advertising to the communities that grow up around that affinity group. So you might have a company that sells plants or flowers or garden implements via the Internet, but it will also be selling consulting advice from different places and also advertising to people, for advertisers who are interested in reaching gardeners or people who like to raise flowers and so on

Source: Intellectual capital interview, 17 July 1997.

Greater reliance on the e-commerce and the Internet may also change the relation the business has with other businesses. Some retailers already find that their customers search their Internet sites when looking for products or services that the customer associates with them, even if the business

they does not actually sell those items. To help the customer and retain their affinity with the site it may be helpful to point to other businesses. Choosing who to have pointers to and seeking reciprocal treatment can become an important part of a company's commercial strategy. See the box below.

Box 8.8

Retail affiliations

The Internet bookseller Amazon.com is widely credited with pioneering the affiliate model. The company began its 'associate' program in 1996, offering to pay websites that refer customers to Amazon a percentage of any resulting sale.

Amazon's legion of affiliates now numbers 230 000—a figure that attests to Amazon's vaunted marketing prowess, of course, but also to the considerable buzz that surrounds affiliate programs. The music seller CDNow has the second-largest affiliate program on the web, with 207 000 members, while other large retailers' programs are growing at a brisk pace.

According to industry executives, top-tier Internet retailers currently spend between \$20 and \$40 to acquire a new customer—an exorbitant amount compared with off-line retailers, and primarily a result of the high cost of advertising on web portals like Yahoo and Lycos to develop brand name awareness.

Source: *New York Times*, 21 March 1999.

A challenge for the traditional firms in the retail sector is to retain the value they have created, against the challenge of e-commerce companies. Moving retail stores onto the web, while seeming to create value to the consumer, is really attempting to prevent the consumer switching to the increasing number of new companies setting up web-based retail operations, sourcing supply direct from manufacturers and from the manufacturers sites. Amazon.com is perhaps the best known example.

Amazon.com ranks first in the list of shopping sites with 14.7 per cent market reach and ten million unique users. Its competitor, a traditional retailer, Barnes and Noble, ranked ninth with only a 5.3 per cent market share, a little over a third of the share held by the newcomer. (Nua Internet Surveys, 19 July 1999). This trend is also apparent in Australia.

Retailers using the Internet can reach global markets the size of which many retailers in physical establishments can only dream about. Access to markets is one factor that underscores the value of the Internet to online retailers.

AOL tops the list with 46.2 million unique user, each having a value to AOL of US\$378. However, overall purchasing is much higher with the average online transaction worth US\$4 600. Added together, the top ten sites can claim 204.2 million unique users!

Additionally:

- 53 per cent of US users have bought online
- 40 per cent of US car buyers shop online
- 64 per cent of net consumers shop for property

Microsoft was in second place with 32.4 million unique users and a per user value of US\$309. Yahoo followed in third position with 31.3 million unique users and the second highest per user value at US\$981.

Finally, the tenth ranked site, Amazon.com, with ten million unique users, had by far the highest per user value at US\$1751.

From: *Nua Internet Surveys*, 19 July 1999.

The valuations were calculated by analysts at Internet.com.

http://www.Internetnews.com/stocks/article/0,1087,11_160411,00.html

8.6 External dimensions

Transfer of value overseas is a danger for Australian retailers, particularly for non-perishable items, and for luxury or unusual items that are not readily available in Australia.

Many of the online shopping sites will not be based in Australia, which may increase the amount of goods and services purchased from overseas. It is estimated that Australia will have approximately 40 000 active Internet trading sites by mid-2000. While...

Fifty six per cent of US companies will sell their products online by 2000, up from 24 per cent in 1998, according to a survey by the Financial Executives Institute and Duke University. The report estimates that online business will account for an average of eight per cent of a company's total revenue. In 1998 online sales represented five per cent of overall revenue.

The study calculated that in 1998, high-tech firms generated 6.5 per cent of their total revenue from online sales. This is expected to increase to 11.1 per cent by next year. In contrast, communications and media companies will generate 6 per cent of their revenue from the Net in 2000, while businesses in the Pacific region will generate 7.5 per cent of their business from online sales.

The companies surveyed also expect to increase their online spending, with two thirds expecting to buy online in 2000, double the figure that purchased online in 1998. The survey found that, on average, executives expect their companies to make 7.9 per cent of their supply purchases online. High-tech companies expect to make 10.2 per cent of such purchases online.

The findings of the Financial Executives Institute/Duke University Corporate Outlook Survey are based on a survey of 371 US companies, taken from a base of 3 000 US companies. It was conducted during the week of March 15, 1999.

Nua Internet Surveys: April 12 1999
<http://www.duke.edu/~jgraham/fei.html>

Tax regimes can also affect the price of purchases, which may make an item cheaper to purchase offshore, even if the cost of transport is included.

While Australian retailing faces the challenge of keeping Australian consumers shopping locally, the also face the opportunity of attracting new customers from overseas. Sales to overseas customers could be made directly from the manufacturer, or via a retailer—whoever has the site and the delivery process.

Gary Jackson believes that Australia has the ability to encourage infrastructure development, and would like to see more encouragement for overseas organisations ordering Australian products directly (e.g. wine) and less worrying about Australians ordering products from overseas. Government could assist this by supporting promotional activities especially overseas, and perhaps in website establishment. There should be a drive to assist companies to develop their own Internet sales sites locally, instead of shipping to overseas distributors, that is to disintermediate the delivery process. The Internet can be the greatest enabler to overcoming the 'tyranny of distance' that Australia has experienced. Goods can be shipped worldwide cost effectively.

One example of such as site is www.portdouglas.com.au, which manages 18 properties in the Port Douglas area, but needs time and money to further develop the website and to promote it overseas. Sites such as this can assist tourism and drive online bookings. Real estate sites could make it easier to invest in Australian property. In addition to wine, Australian has many foods, such as wine and cheese which could be sold directly over the Internet.

Interview: Gary Jackson, Cisco,
IRG member, 20 July 1999

Key points

There are few other sectors where the change brought about by greater use of e-commerce would be as profound as in the retail sector. Traditional retail faces increased competition from online competitors with more effective product range and cost structures. It also risks being bypassed to varying degrees by consumers making online purchases directly with producers, obviating the need for any retailer, virtual or real.

When looking at quantitative analysis of the sector the following direct changes have been factored in based on the above review:

- retail and wholesale margin reductions factored in as direct changes in other sectors add up to a reduction in value added in the retail sector;
- firms in this sector will also obtain general savings in wholesale and retail margins through use of business-to-business e-commerce, although this saving corresponds to a loss of value for the sector itself; and
- for the moment it is assumed that this sector will not face greater international competition or experience a significant boost in exports from e-commerce.

Section Nine

Transport

9.1 Description of the sector

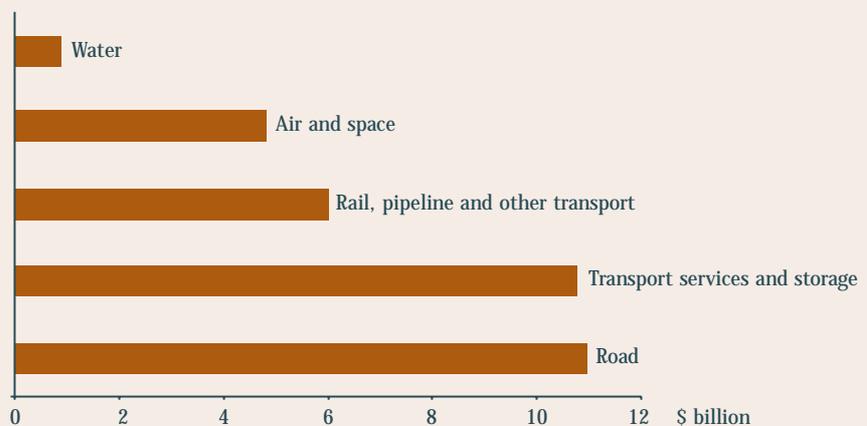
As well as providing passenger services, the transport sector plays a key role in supply chains by providing freight and delivery products. The full impact of e-commerce on the sector is yet to be seen, but despite the obvious threats to freight and courier services from electronic delivery, there will be many new challenges and opportunities in the delivery of Internet-purchased physical products.

Australia's transport sector is comprised of providers of the four major modes of transport, rail, road, water and air transport, as well as providers of associated services to transport. Associated services include port operations for water and air transport, stevedoring, freight forwarding, and customs agency services. By statistical classification, transport services also include pipeline transport, for example, of oil and gas, as well as storage services.

The transport and storage sector employed over 300 000 people as at May 1999. The sector contributed over \$33 billion, or around six per cent, of GDP in 1997–98. Figure 9.1 illustrates GDP contributions for the industry sectors.

Figure 9.1

Transport and storage sector, gross value added, chain volume measure ^a



^a Real Prices, base=1996–97

Source: ABS

Transport services can be either intermediary services, e.g. freight services, or final consumption in their own right e.g. passenger services. Understanding the role of a particular transport service in the supply chain, whether as intermediary or as final service, is important in understanding the impact that e-commerce will have on future costs and business models.

Also, transport (particularly road), is a highly fragmented industry relying on large exchanges of information. E-commerce provides the potential to consolidate the existing structure of the industry and result in effective information flows.

For passenger services, the Internet and e-commerce are facilitating direct supplier to customer sales by making them cheaper and quicker. In terms of transport that performs an intermediary role, such as freight,

e-commerce allows quicker order processing as well as allowing other services to clients such as freight tracking services. E-commerce is also likely to increase the demand for some freight services, particularly road freight as, increasingly, business to customer transactions are made that include a home delivery service.

9.2 Cost savings

Suppliers in each of the transport modes are taking advantage of e-commerce to reduce costs in internal processes in the same ways that are occurring in businesses right across the economy.

Savings are likely to accrue from more efficient labour and other administrative cost savings.

IRG Transport Working Group

Like many other industries, large organisations in the transport sector have implemented e-commerce, usually EDI, to streamline purchasing. EDI allows a reduction in inventory levels, staff effort and data errors and through smaller, more frequent and more accurate purchases. (Indeed, the trend towards 'smaller and more frequent' purchasing caused by EDI implementation throughout the economy will impact on the logistics of delivery in the transport sector).

However, the outcomes of the working group suggest there is not a consensus that e-commerce will result in significant cost savings in the industry.

The major inputs to the industry are; chemicals and petrol, machinery and equipment, and finance and insurance. The workgroup could not identify how e-commerce could reduce these costs, while noting that there are considerable intermediary costs for chemicals and machinery. Any savings in the machinery category may be masked by increased use of computers and other technologies, especially in-vehicle technologies. Communications input costs could also rise with increasing use of satellite telephony and GPS technology. Mobile telephony has a high penetration rate, but it could rise as coverage in remote and rural areas improves.

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Road

Road freight forwarders who have created online booking services are making bookings easier and faster. Freight barcoding and tracking allows a greater percentage of correct deliveries, which is very valuable to customers. Forwarders staff productivity is increased, or staff reduced, by online booking and tracking systems, and also online Proof of Delivery imaging systems. Only a handful of the largest operators have implemented these systems so far, leaving more value to be realised as adoption progresses across the industry.

In-vehicle technology, such as onboard weighing and cubing, and specialisation of vehicle types allows more efficient loading of vehicles, increasing the value of the loads carried, and thus increasing productivity of staff and vehicles. GPS technology is also being implemented. The implementations of all of these technologies is still limited but growing. Further details on the impact of e-commerce in road transport can be found in *Trucks Online* (NOIE 1999) at <http://www.noie.gov.au/trucks>.

Air

Air transport operators are making online bookings available to customers. Online systems can save time and decrease effort for customers

in buying fares. The trend is slow as yet, and somewhat masked by improvements in the productivity of the airlines' call centres. The services are also available around the clock, which is an advantage over land-based travel agents. They also allow customers to investigate travel options at their own pace, rather than the agent's thus avoiding the potential for coercion by agents. On the other hand, customers do not have the expertise of agents to understand complex fare and ticketing rules, and are likely to require the advice of agents when booking complex multi-sector itineraries.

While historically air travellers were required to present a paper ticket before boarding, now those tickets exist in electronic form on airline systems and need not be collected by passengers. The impact on the carriers' bottom line is not immense, but the improvement in service quality and convenience to customers in not handling paper tickets is of value to customers.

Seventy per cent of Qantas ticket sales now take the form of e-tickets. This has reduced paper and printing costs, but is virtually unnoticeable against the major costs to the industry.

Carolyn Evans,
IRG member.

E-commerce can also assist by making air transport easier to buy, using websites and website supported call centres. This will tend to disintermediate the travel agents (who are not classed as part of the transport industry). Purchases from the websites are seen as additional, as there has been no lessening in telephone sales. A trend has been identified of increased transaction churn, that is smaller purchases, more often.

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Sea

The Australian Customs Service (ACS) has realised cost savings for itself and for customs agents with the implementation of the COMPILE service, allowing Customs Declarations to be lodged electronically. This has saved much paperwork, and trips to ACS offices to lodge the Declarations. This service has been operating for some time, and the benefits are now likely to be fully realised.

Other opportunities for electronic lodgement of information are being implemented, though can be at times restrained by technology and the capacity of lines and ports to receive information. Both these restraints should dissipate over time. For the port authorities, savings are realised from the reduction in time required for entering information and calculating charges. More accurate information improves the statistics supplied back to the industry, and reduces invoice queries and credit notes.

The Sydney Waterways Authority online renewal system is saving customers time and effort in license renewal. It could be expected that internal improvements in staff productivity could be realised, but this would depend on the percentage adoption of electronic renewals.

Vehicle booking services operated by container terminal operators have dramatically reduced the time trucks spend queuing for entry into terminals, to deliver or collect containers. Time is also saved within the terminal, by proper identification and correct information, allowing the operators to move cargo faster.

There has been a significant, though low gradient increase in leisure travel, while business travel remains steady. The industry has not experienced a lessening in demand due to the increased use of video conferencing.

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9.3 New costs

The demand for business services to expand e-commerce in the transport sector will grow as more transport services are booked, tracked, and regulatory declarations are made online. This can take the form of consultancy services in investigating and designing strategies and designing and operating or hosting services, and purchase of hardware to run booking engines.

For example, the high level of e-commerce implementation in the sea transport industry has included the purchase of significant IT products and services, and a reduction in staff levels or greater staff productivity.

Of course, many new costs are replacing traditional costs. For example, the use of in-vehicle technology by road transport operators is replacing skills and experience of driver and loading staff.

9.4 New business models

E-commerce is challenging traditional models for service delivery in the transport sector. A threat to the industry is the replacement of some 'physical' goods with 'digital' goods that can be transferred electronically. The increasing use of email to send messages and documents is already reducing the work available for document transfer companies. This trend is expected to continue. Another example is provided by Cisco, which used to distribute software on CD-ROM and documentation in paper form which required physical transport, and now a large percentage of these are downloaded from the Cisco website, or transmitted electronically with no need for transportation.

Other areas where value has been transferred, include that 80–85 per cent of software is now downloaded by customers, whereas it was distributed by CD-ROM. It used to cost \$125 to send a CD, downloads cost \$5. This has also eliminated the deliveries (and redelivery) of CDs.

One hundred per cent of product information, including technical information is available online. 80 per cent of technical information is now sourced online by customers. This has achieved the objective of increasing customer satisfaction, while saving on the cost of distributing physical documentation.

Gary Jackson, Cisco

E-commerce is changing the sector in other ways. In general, with more electronic forms of lodgement, for bookings and for regulatory matters, there is the opportunity for more and more transport to be organised from a head office, typically in a capital city, at the expense of firms working 'on the spot'. As one example, in the past Customs Declarations had to be physically taken to the Customs Office in the port of import or export. Now this information can be sent electronically, no presence in the port is required for lodgement. While this trend is currently small, as more administrative work is taken online, so will reduce the need for 'on the spot' services.

Road

Road freight forwarders, such as DHL, Fedex and UPS have created online booking services with the ability to track packages to delivery. Some also offer imaging of Proof of Delivery documents. Road transport operators are adopting in-vehicle technology, such as on-board weighing and cubing, though so far only in small numbers. The adoption of email and Internet access is slightly behind the industry average, but usage is growing. Road transport operators have a low participation in supply and customer oriented e-commerce, and that usually at the request of a major trading partner.

Passenger transport has implemented electronic ticketing for buses, and taxis are well quipped with in-vehicle technology, including mobile EFTPOS for payments. Possible applications include:

- electronic bookings by email, EDI or on a website;
- converting proof of delivery documents to an electronic form, either images or messages;
- transmitting information to remote drivers using the Internet or mobile technologies; and
- electronic payment systems.

Forwarders such as Fedex, DHL and UPS have online booking and tracking services for the freight they carry, but the takeup amongst other players has been low. Road transport operators are adopting technology, including in-vehicle technology, but participation with customers and suppliers remains somewhat low with signs of a possible increase in the rate of adoption.

Rail

Some rail operators have implemented electronic booking services, and also e-commerce for purchasing supplies.

Air

Air transport operators have implemented EDI for purchasing, and have created world wide web services for booking passenger fares, and other information services.

Rail and air transport have not seen the same level of industry wide participation in e-commerce. There has been activity in supply chain initiatives, and some rail operators accept freight bookings electronically. As mentioned earlier, Qantas and Ansett have recently created online booking services for passenger fares.

Box 9.1

Air travel tickets and e-commerce

The largest initial online travel business is the sale of airline tickets. web-based travel services offer the reservations engines that airline customer service representatives and travel agents use directly to leisure and business travellers. Customers enter point-to-point destinations, desired travel times and dates, preferred airlines, and other preferences into the reservation system. The system processes the information and delivers a choice of options, along with a secure transactions environment for customers who wish to purchase the ticket online.

In 1996, web users booked \$276 million worth of travel this way. For 1997, online travel sales are estimated to have reached \$816 million. By the year 2000, online travel sales could reach \$5 billion, or close to seven per cent of US airlines' revenues for passenger air travel. According to a survey released in November 1997 by the Travel Industry Association of America, 13.8 million Americans used the Internet to plan their trips and 6.3 million made reservations on the Internet. And, consumer acceptance is growing. In 1996, ten per cent of Internet users used the Internet to make travel plans and purchases. When polled in 1997, nearly 70 per cent of Internet users said they planned to use the Internet for travel in the upcoming year. Acceptance is high among the general population, as well. Thirty-eight per cent of all adults said they would consider using the Internet for [booking/researching] their travel in 1998.

Lower sales and marketing costs, and increased consumer choice and convenience are driving the Internet's increased use in travel planning and reservations.

How a ticket is sold, through an agent or by the airline directly, and whether the ticket is paper or electronic, can mean the difference between paying \$8.00 or \$1.00 to process a ticket:

\$8.00: Travel agent books, using computer reservation system

\$6.00: Travel agent books direct with airline

\$1.00: Customer books electronic ticket direct with airline.

Source: Henry D, Cooke S, Montes, 1998, *The Emerging Digital Economy*, US Department of Commerce 1998, p. A4-23.

Sea

The sea transport sector has been long active in e-commerce initiatives, many started by the ACS but involving significant industry participation. Examples include, COMPILE for customs agencies, EXIT2 and Sea Cargo Automation for shipping lines and terminals (see section 9.2). Shipping lines and agencies are now transmitting manifest information electronically to Port Authorities.

9.5 External dimension

With the increase in electronic booking and lodgement systems, including regulatory lodgements, an opportunity is created for some or all of the administrative work in organising transport to be moved overseas to the head office of the buying or organising company. Likewise, Australian companies could arrange some global transport services from Australia, using e-commerce to reduce the need for local agents in other parts of the world.

Air passengers can check schedules, flight availability and buy fares, without the need to contact an agent familiar with Australian services. This may increase the number of additional domestic fares (air or land) purchased by international travellers coming to Australia assuming those fares are made available by the transport companies to overseas customers).

Key points

While there are some obvious threats to freight services from electronic delivery, it seems more likely that there will be many offsetting opportunities in the delivery of Internet-purchased physical products and transport of people. Meanwhile, improvements in supply chains will generate further efficiencies in the sector that may lead to decreased demand for labour. Additional value may also be built into customer relationships.

When looking at quantitative analysis of the sector a number of direct changes have been factored in to the study:

- transport will obtain a small benefit in terms of reduction in wholesale and retail input margins disintermediated through business-to-business e-commerce;
- it is expected that greater use of e-commerce will stimulate direct labour saving efficiencies in the transport sector;
- sectors and households that deal with the transport sector will also obtain savings in terms of time (i.e. labour) saved through more efficient purchase and tracking of goods/people in transit; and
- at this time it is assumed that this sector will not face greater international competition or experience a significant boost in exports from e-commerce.

Section Ten

Education

10.1 Description of the sector

Education and training are significant in terms of the magnitude of economic activity in its own right and the role that the sector plays at large. These activities are particularly important as economic (and individual) opportunity shifts towards knowledge—based and other skill—intensive activities. This poses both challenges and opportunities and exposes providers to increased competitive pressures from both within and outside the sector. However, there are also great opportunities for service providers as there are increasing demands and needs to move to a knowledge—based economy, facilitated by rapid technological change.

Education expenditure in 1997/98 was \$25.6 billion, or around 4.9 per cent of Australia's GDP. As of May 1999, the industry employed 624 100 people.²⁵

The education sector can be broken down to three major categories.

- preschool and primary school;
- secondary school; and
- tertiary and other education.

The growth and widespread adoption of Internet technologies is expected to impact on all education resources and delivery. Access to computing resources is now a feature of education at all levels. At present, however, the use of e-commerce appears most likely to have the greatest impact on tertiary education and training, which is comprised of three major elements:

- universities;
- vocational education and training; and
- postgraduate professional development.

10.2 Practical application of e-commerce

Universities and academic staff were early innovators regarding the potential of the Internet. Most universities supplied the backbone infrastructure for the Internet for years before it became a commercial arena. In an activity where ideas and communication are central many quickly grasped the significance and convenience of email.

Almost all universities in Australia have a site on the Internet that they use to showcase their capabilities to potential students in Australia and abroad. This is a major part of their positioning and the way that they are viewed by many students is influenced by the usefulness of these sites.

Some universities are more proactive in their use of the potential of the Internet as an educational and communications tool. The smaller universities seem to be particularly innovative in this activity.

The Internet (and all virtual learning) has distinctive powers to complement, reinforce, and enhance some of our most effective traditional approaches. We must not undervalue the continued need for books and other tangible documents, or neglect the irreducible importance of sustained face to face contact in learning. But neither should we mistake what is happening for a mere fad or mirage and fail to realise the transformation possibilities of the new technologies.

*Neil L. Rudenstine, President,
Harvard University*

25 ABS Special Collections, 1999.

Box 10.1

Case study: E-commerce and the University of Central Queensland

Central Queensland University (CQU) is an example where a medium sized educational institution is able to expand and compete in an increasingly competitive national and international market place by placing greater reliance on e-commerce and other network systems.

More than half of the University's students study via distance learning techniques, with 12 per cent on an international basis. CQU had the highest growth rate of all 38 Australian universities over the 1995–1997 period. CQU also exceeded the national growth rate in overseas onshore students during the same period.

Similarly to many other universities, CQU has offered distance learning for some time. With affordable widespread access to the Internet the university offers a much more flexible educational experience. CQU's distance education facility gives students the choice of mixing their study modes to suit individual needs. In addition to study guides and information packages, distance education units may be supported in a variety of ways including teletutorials, video conferencing, residential schools and tuition via e-mail and the World Wide Web.

Use of open access networks is now a central part of the way that the University functions and provides educational services:

- Many of CQU's 15 000 internal and external students use the Internet to access library resources and support services, make inquiries, and gain staff feedback. Some subjects use student project chat groups and allow online submission of assignments.
- CQU is in the early stages of developing a distance education student mentoring service, based on the Internet.
- CQU offers courses in e-journalism and e-commerce, as well as the broader areas of IT, information systems, health informatics and multimedia.
- CQU relies heavily on the Internet to help operate and administer its complex operations, including an overseas campus (Fiji), overseas operations (Singapore, Hong Kong), capital city campuses (Sydney, Melbourne, Brisbane), regional campuses (Emerald, Rockhampton, Bundaberg, Mackay and Gladstone), and distance education.

CQU already uses the Internet to distribute information to staff and students. However, CQU is now investing heavily in a project to fully integrate its student, staff and finance systems, with new software, hardware and human processes. Over the next two years, the Internet will become even more integral to provide access to these new systems throughout the University's regional, national and international footprints. For the first time, CQU will be able to use one integrated administration system.

The system incorporates finance, human resources, payroll and student administration components. Students will find it easier to enrol, change subjects, check results, choose study options, and move between campuses in the CQU network, providing students with greater flexibility in managing their education. Staff will spend less time on systematic tasks, and will become focused on strategy, value adding and delivery of learning opportunities. The University will also gain a significant competitive advantage over education providers who fail to take advantage of Information technology capabilities.

Source: Marc Barnbaum, CQU.

10.3 Potential for cost savings

The use of the Internet as a means of reducing costs in educational activities is just beginning to be explored.

Use of the Internet may permit the delivery of education services with lower capital costs or to allow capital costs to be spread over a larger number of students. Bricks and mortar costs per student could fall. Educators can more easily circulate lectures, notes and other materials.

Of course, distance learning has been a feature of education provision for some time. The new dimension brought by affordable access to the Internet is lower costs and much higher quality, enhancing the potential for interactive distance learning. The needs of students are also changing, and are likely to be a better fit with Internet education.

The cost in transmission is negligible, the cost is in the human time in interactions. One of the cost myths of distance education is that it is more expensive than on campus education, but this fails to recognise the capital consumption of a campus, e.g. real estate, buildings, etc. The re-evaluation of the campus 'ambience' is important. This need is decreasing as more students are mature age or working adults.

Interview: Lachlan Chipman, Central Queensland University, 3 August 1999

Similar to other service delivery activities, the education sector will also gain productivity improvements through improved administration and information management.

The price of access to higher education will collapse, as has been seen with the price of all knowledge intensive products, storage and communications. In universities, the impact will be greatest on the back office functions—there is no need for administration at all.

Interview: Lachlan Chipman, Central Queensland University, 3 August 1999

10.4 Industry structure/business models

The use of online courses and distance education is allowing more people to access education, particularly the time-poor or those in remote areas not serviced by traditional universities. It is also allowing people access to greater choice in education service through reducing the need to attend campuses.

The lines between distance education and face-to-face teaching will blur, as even on campus students are supported by online material, chat rooms and email lists. This would also allow students to undertake courses at universities where the numbers of students for a course are too low to support a tutor. These ventures will be determined by the students needs and the university's ability to accommodate them.

The technology will also facilitate the development of specific and tailor made short course, and their delivery in a workplace or home. This may increase the number of students, particularly amongst the 'time poor', even if fees remain the same.

Interview: Stewart Marshall, Central Queensland University,
IRG member, 21 July 1999

This does not imply that traditional forms of education services will disappear. Face to-face-contact is likely to remain a key feature of education for some time. What is likely is that educational institutions will experiment with different business models. It will take some time to see what modes work best.

10.5 Jobs and skills

A strong unmet demand for workers with IT skills already exists both internationally and within Australia. When coupled with the anticipated growth in e-commerce, the demand for relevant courses has increased substantially.

As a result there has been a proliferation of postgraduate, university and vocational education courses in this area.

New opportunities will occur to provide e-commerce education and training in higher education and TAFE's, and primary and secondary teachers will also need training in IT and e-commerce.

Interview: Stewart Marshall, Central Queensland University,
IRG member, 21 July 1999

The education and training sector has an additional challenge raised as a consequence of greater reliance on e-commerce. That is to produce people with the set of skills and abilities that will be needed in the future economy. The greater challenges and opportunity were summarised by Professor Alan Gilbert of the University of Melbourne:

‘...modern internationalised economies will need the support of advanced educational and training institutions [as] demand for the advanced human skills, operating more and more in an international marketplace, greatly outstrips the supply. In a knowledge—based economy, ‘knowledge workers’ are the most valuable resource, and nations unable to produce and re-produce them are ipso facto resource poor.’

Professor Alan D. Gilbert, 1997
R J White Services Lecture, p. 6

10.6 External dimensions

The impact of e-commerce to the Australian education sector will depend on how successfully it can compete in this increasingly global arena.

As distance education goes online, massive changes will occur in the education sector. This will be a refinement of existing services and improved provision of these services, with all the world as a market. The international implications are both positive and negative. On the plus side, more overseas students will be able to study with Australian institutions, but more Australians will be able to study with overseas institutions.

Interview: Stewart Marshall, Central Queensland University,
IRG member, 21 July 1999

Australia has been a significant exporter of education in recent years (i.e. an importer of foreign students). To date, Australia has not suffered significant loss of revenue offshore. As the risk has increased of that revenue being competed away by other countries (including the students’ countries of origin), universities in particular have adapted their strategies by establishing strategic relationships in key overseas markets, and acquiring or building offshore campuses.

For some degree programs, high-prestige institutions could use their reputation to attract students who would otherwise attend a local facility. However, fears that information technologies may adversely affect education date back to the radio and surfaced again with the advent of television and video cassette recorders. Such fears were groundless, and the same may be true for the Internet growth of e-commerce.²⁶

Instead, owing to the Internet’s ease of access and convenience for distance learning, overall demand will probably expand, leading to growth in this segment of e-commerce but little displacement of existing programs. Nevertheless, competition should increase as geographical constraints subside. Once the domain of somewhat unconventional educational institutions, distance learning is now offered by a wide number of prestigious institutions.

26 OECD 1999, p. 46.

Key points

Greater use of e-commerce and the Internet in the education sector is expected to reduce service and administration costs. This change should reduce many barriers to entry into the sector, increasing the number of institutions involved and expanding the range of offerings. This should also change the model of education delivery, Geography in particular will become less of a constraint.

It would also enhance benefits for students by increasing the choice in the number and nature of institutions available. Overall, by reducing costs and barriers to information and knowledge the quality of education should increase. This is particularly so for students involved in distance learning.

It has not been practical to include many of these impacts into the modelling undertaken in this pilot study. Many of the identified effects were not easily quantified. The model will pick out effects where input costs change for this sector.

Section Eleven

Manufacturing

11.1 Description of the sector

E-commerce raises questions for the Australian manufacturing sector as to how to take advantage of the possibilities for more market-responsive production processes and leaner inventory levels and whether to use the Internet to sell directly to customers or develop new distribution relationships with wholesalers and retailers.

In Australia, the major manufactured goods are machinery and electrical equipment products; food, beverages and tobacco; and metal products. The manufacturing sector contributed \$69 billion to GDP in 1997–98, or 13.2 per cent. It is Australia's largest industry sector.

Figure 11.1

Manufacturing industry gross value added, 1997–98



Source: *National Income, Expenditure and Product, ABS 5206.0*, December Quarter 1998.

In total, manufacturing industries employed over 945 000 people as at the end of June 1997.

Table 11.1

Employment in manufacturing industries in Australia, as at June 1997

Industry classification	No. of employees '000
Food, beverage and tobacco	164.0
Textile, clothing, footwear and leather	77.0
Wood and paper product	61.5
Printing, publishing and recorded media	96.7
Petroleum, coal, chemical and associated product	93.4
Non-metallic mineral product	37.1
Metal product	150.2
Machinery and equipment	207.5
Other manufacturing	57.9
Total	945.3

Source: *Manufacturing Industry, ABS 8221.0*, 1996–97.

11.2 Production

Manufacturing businesses are using e-commerce to improve business efficiency, primarily by reducing processing costs. Historically cost savings have been sought from reducing inventory levels and speeding the ordering and delivery process. Reduced inventory levels directly result in capital savings, as well as a reduction in the need for real estate, warehousing services and changes in delivery schedules.

Rather than changing the nature of manufacturing processes, e-commerce is likely to help to speed up traditional manufacturing processes. The manufacturing sector has long been involved in e-commerce initiatives, primarily EDI, in the supply chain. Manufacturers and their retail customers have striven to reduce inventory levels, using Just-In-Time and Quick-Response systems. This has prompted the implementation of electronic ordering, advance ship notices, and forecasts and schedules.

Companies using EDI commonly save 5–10 per cent in procurement costs.

Henry D, Cooke S, Montes, 1998, *The Emerging Digital Economy*,
US Department of Commerce 1998, p. 13

Changes to business structures may also eventuate from e-commerce opportunities. Enabled by e-commerce, some manufacturers may become more virtual, that is outsourcing the physical manufacture of goods while retaining control over product design and brands on the one hand and the business relationships with the other.

Cisco is also working on supply chain management, aiming and succeeding in being a 'virtual organisation'. Suppliers provide components, such as chips and boards, and well as paper. Cisco demands that suppliers be online. This has eliminated complex processes, and made a tighter link to manufacturers with no middlemen. Effectively, 50 per cent of the physical boxes are delivered to the customer direct from Cisco's supplier.

Interview: Gary Jackson, Cisco Systems,
IRG member, 20 July 1999

New costs associated with e-commerce will be incurred as re-intermediation occurs, that is, the entry of additional suppliers in the supply chain. A fundamental reason is the need to employ information specialists who can provide solutions to problems raised by the complexities of e-commerce. Examples of services that may be needed include systems development and electronic equipment installation and maintenance and other business services. Other intermediaries that may develop new products in the e-commerce environment include financial institutions to facilitate payment over the Internet.

11.3 Distribution

Further opportunities for cost savings may be obtainable for the manufacturing sector through disintermediation in the distribution chain, that is by dealing with end consumers directly and improving service quality.

Business cases for direct selling

An example of the potential for direct dealings with customers that remove retailers and other intermediaries from the supply chain will be the introduction of web enabled appliances, such as refrigerators and microwave ovens.

New value could be created as consumers seek more convenience and their habits evolve becoming more accustomed to ordering online, for example greengrocer.com.au, and so changes will occur in the grocery industry and its manufacturing suppliers. The industry is considering how to respond to these changes. This opportunity will need to be assessed, captured and addressed by the industry. E-commerce will enable manufacturers to offer value added services for their products through web-enabled devices, including in the future web-enabled refrigerators or microwaves ovens. The aim will be to enhance the consumer's total experience.

Interview: Rick Vosila, Unilever,
IRG member, 27 July 1999

Manufacturers may be in a position to offer lower prices by delivering directly to the consumer, circumventing intermediary warehouses.

There is a lot of inefficiency in the trips from source to customers adding cost (including insurance), complexity and the danger of damage. The industry can create more value for customers by reducing handling. There are also opportunities for new services, such as removing old items and the packaging of the new, agreeing to delivery times and keeping to them.

In the stationery industry, where there are three or four major players and many, many outlets, improvements could be made by avoiding warehousing and delivering direct to the outlet, and also by the generation of invoices and payments.

Interview: Paul Orton, ABOL,
IRG member, 9 July 1999

Another initiative in grocery is Efficient Consumer Response (ECR). This will change the way trade is conducted with customers. E-commerce will facilitate this as the industry changes. More frequent deliveries of smaller lots are envisaged, perhaps straight to supermarkets rather than grocery distribution centres.

Value could also transfer due to ECR supported by e-commerce. ECR will reduce the amount of stock in the supply chain, though some will necessarily remain. Direct sales to the consumer from the warehouse may occur, bypassing the physical supermarket—either by current retailers or new entrants or new entrants to the industry.

Interview: Rick Vosila, Unilever,
IRG member, 27 July 1999

A significant cost of sales is after sales service. For business-to-customer transactions in particular, it is expected that savings in the cost of after sales service will be achieved by placing manuals and databases at the reach of customers on the Internet, thereby enabling customers to help themselves. Naturally, there will continue to be some cases that will require human assistance, so automation should result in a reduction rather than elimination of staff employed to handle customer queries (e.g. in call centres).

Costs of direct selling

However, the cost of direct selling on the Internet may be the souring of traditional distribution lines. The choice to undertake direct selling may therefore involve some commercial risk.

Furthermore there are additional costs to direct selling that may make direct selling (as opposed to selling through traditional distribution agreements) unprofitable.

If companies decide to expand their presence on the Internet, the costs to companies will be in the hiring of skilled personnel to run these sites and business services and programming costs of development, etc.

Opportunities for **re-intermediation** exist, perhaps by providing a site to allow potential customers to search for the used vehicle they are looking for, and then providing the dealer location and contact information.

Vehicle information sites (new and used) can also create value for the customer, by allowing them to make better decisions faster, and taking any perceived 'threat' out of the process, i.e. removing the possibility of coercion.

[...] One opportunity for re-intermediation or **new mediation** would be an information service listing obsolete spares held by manufacturers, possibly across not related industries.

Interview: Stephen Waldmeyer and Silvio Bonabello, Ford,
IRG member, 9 July 1999

Transportation of goods is expected to increase as business to customer e-commerce increases, primarily driven by consumers no longer transporting the good to their home from the retail store. This represents a new cost to manufacturing industries of e-commerce, and will place pressure on the need for supply chain improvements in the area of streamlining transportation.

Australian Business On-line has considered the attributes of supply chains for the application of e-commerce, and believe the best opportunities are where the chains are long and involve lots of logistics and therefore freight documentation. ABOL has a list of 30 industries with these attributes.

One example is the whitegoods industry with manufacturers or importers, warehousing, retailer outlets and end customers.

Interview: Paul Orton, ABOL,
IRG member, 9 July 1999

Ultimately, traditional supply chain structures may be replicated on the Internet. While e-commerce creates opportunities for manufacturers to deal more directly with consumers, it also creates the opportunity for retailers to establish themselves more firmly in the relationship between manufacturers and consumers, by providing product information directly. This can include information and services on their websites which also enable immediate purchasing, such as by aggregating information from various manufacturers and adding additional value, for example menu and meal planning services in the food sector.

Value in the industry could be created or **eliminated** if grocery channels and manufacturers take over or replace value current gained from other providers.

Interview: Rick Vosila, Unilever,
IRG member, 27 July 1999

So far direct selling has been limited in Australia, one reason being the Australian public's reticence to purchase products remotely.

One issue for Australia is the cultural affinity, or lack of, to purchasing without seeing the goods. There is greater cultural affinity for this type of purchase in the US, from experiences with catalogue sales and TV shopping.

Interview: Stephen Waldmeyer and Silvio Bonabello, Ford,
IRG member, 9 July 1999

Furthermore, the physical nature of manufactured goods, and therefore the unavoidable need for transport and logistics services in the supply chain, is a major difference between manufactured goods and products and services which can be delivered digitally. This may limit the initiatives and benefits of e-commerce for physically manufactured goods.

The manufacturing sector creates physical products, and so will change less than other sectors that have a product or service that can be digitised.

Interview: Rick Vosila, Unilever,
IRG member, 27 July 1999

Opportunities for new distributor relationships

Opportunities for new service to distributors within the industry are also possible. Used cars (or other products) could be placed on a purpose built website allowing consumers to search for and identify the dealer with the vehicle of the type they wish to purchase. Spare parts that are obsolete or redundant to one manufacturer could also be advertised within the sector.

One form of new value from the web is as a substitute for other promotional activities and especially in providing a direct channel for feedback from the ultimate customer. [...] Manufacturers have information, intellectual property, and knowledge of the product which they can't make effective use of through traditional channels.

There is not seen to be a need to standardise for dealers, as multi-franchise dealers are not preferred by manufacturers. There is currently a lot of data transfer to dealers in proprietary form, to add value to these relationships, and this may move to intranet or extranet models in future. Ford have been providing dealers for a long time with the ability to electronically check the status of a vehicle, to order parts, and to submit and be paid for warranty claims.

[...] E-commerce is bringing new opportunities and challenges including the need to re-engineer processes, as the new ones need not be like the manual processes. This challenge may really be in how to re-engineer more than just identifying the need to re-engineer. However, care also needs to be taken that new terms do not necessarily mean new roles.

Interview: Stephen Waldmeyer and Silvio Bonabello, Ford,
IRG member, 9 July 1999

Manufacturers relationships with distributors are likely to improve by providing more targeted information more quickly using web and email channels. Providing product information on the web can also assist distributors, by enabling the consumer to be better informed when they approach a retail outlet. This can remove the information gathering role from the consumer-distributor relationship, and for complex products a training role for the distributor. Consumers will also be more aware of optional extras, without perceived 'sales pressure' from the retailer.

The distribution of information to the sales channels (dealerships) may also change, with brochures posted on websites for downloading, and other information sent by email. This would reduce the current postage volumes and the use of couriers.

Additional Interview: Rob Panizzon, Ford Motor Company,
IRG member, 19 July 1999

As mentioned previously, e-commerce in the form of EDI is well established between manufacturers and larger players in the retail sector. There is still opportunity to extend the benefits to the smaller retailers, enabled by the lower costs and skill required of web services against EDI systems.

The main sales channel for Unilever's sector is the grocery channel. They also provide products to the food service sector (hotels and restaurants), and to trade routes for icecream delivery to service stations, small stores, etc.

The sector has been building efficiency into the food service and trade routes, which has more customers than the grocery sales channel. The grocery channel has a well established EDI system for bulk ordering.

Interview: Rick Vosila, Unilever,
IRG member, 27 July 1999

11.4 New business models

The changes brought about by e-commerce may lead organisations to discover they have value to add that is outside their core business which can be sold to other manufacturers.

Value could transfer within the sector as organisations find they have core competencies, which are not part of the core business. They may leverage these internal competencies by offering services to other industry players or other industries generating a new revenue stream. One example of this type of competency recognition, is the operation of BHP IT.

Interview: Rick Vosila, Unilever,
IRG member, 27 July 1999

E-commerce may facilitate the manufacturing industry performing other business-to-business services traditionally performed by intermediators, ultimately to achieve cost savings. An example of disintermediation below discusses the opportunities for spare parts manufacturers to also distribute their product.

The automotive industry may see changes in the channel for spare parts distribution. These channels can be lengthy, with suppliers, a national warehouse, regional warehouses and retail outlets. Disintermediation could occur as e-commerce gives a better view down the supply channel, and enables the more complex logistics for transportation. Parts may even be distributed direct from the suppliers.

Additional Interview: Rob Panizzon, Ford Motor Company,
IRG member, 19 July 1999

However, also referring to the automotive industry, one stakeholder raised the caution that disintermediation may not be possible in business to customer relationships.

One issue preventing disintermediation in car manufacturing is the need for trade-in valuations on the vehicle being replaced. This is not such a problem for other product manufacturers. [Though ABOL noted that whitegoods manufacturers are considering offering new services including old product removal as part of the purchase process. Refer ABOL interview.]

Interview: Stephen Waldmeyer and Silvio Bonabello, Ford,
IRG member, 9 July 1999

11.5 External dimensions

The transfer of value to overseas organisations is not perceived as a major threat to the Australian manufacturing industry, due largely to the 'tyranny of distance' which remains for physical product movements. However, this should be evaluated closely by different industries within the sector, and even for different products. Also, the immediacy of the need for the product and cost of transportation should be considered. While we may never order bread from France for delivery to Australian homes, products with longer 'shelf lives' may be endangered by ease of ordering and lack of immediacy of need (e.g. French wine) or forward planning by the consumer (e.g. canned gourmet goods).

While it is recognised that the Internet removes boundaries transfers overseas are not seen to be likely in considerable amounts. The physical product still has to be delivered and there are costs associated with this. Consumers want cheap and fresh products and these are likely to be locally manufactured, especially in the products that Unilever supplies. Even in the 'luxury' products freshness is still important, for example the time between grinding coffee beans and consumption. Consumers may import products that are not available locally.

However, information services to consumers could be operated offshore.

Interview: Rick Vosila, Unilever,
IRG member, 27 July 1999

Just as e-commerce technologies endanger Australian manufacturers by allowing Australian consumers to purchase quickly, easily and cheaply from suppliers abroad, so to does the technology open the world's markets to Australian manufacturers. The level to which they take advantage of this will depend, at least partially, on their decision to sell or

not sell directly. While selling directly within Australia may conflict with established channels, selling overseas may not. The dilemma for the industry is that it is difficult to limit a website to non-Australians only, and may disaffect the Australian consumers. Direct overseas sales can add value to Australian industry by removing overseas intermediators and there varying priorities, and establishing a more direct relationship with the consumer.

Gary Jackson, Cisco Systems believes that Australia has the ability to encourage infrastructure development, and would like to see more encouragement for overseas organisations ordering Australian products directly (e.g. wine) and less worrying about Australians ordering products from overseas. Government could assist this by supporting promotional activities especially overseas, and perhaps in website establishment. There should be a drive to assist companies to develop their own Internet sales sites locally, instead of shipping to overseas distributors, that is to disintermediate the delivery process. The Internet can be the greatest enabler to overcoming the 'tyranny of distance' that Australia has experienced. Goods can be shipped worldwide cost effectively.

Interview: Gary Jackson, Cisco,
IRG member, 20 July 1999

Key points

The manufacturing sector has long been involved in e-commerce initiatives, primarily EDI, in the supply chain. Manufacturing businesses are using e-commerce to improve business efficiency, primarily by reducing processing costs. Changes to business structures may also eventuate from e-commerce opportunities such as companies outsourcing elements of the physical manufacture of goods while maintaining design and brand control, or engaging in direct selling to the customers, removing retailers and other intermediaries from the supply chain.

When looking at quantitative analysis of the sector it seems reasonable to factor in:

- modest savings in retail and wholesale margins in the sector (i.e. reduced costs through greater disintermediation);
- some direct labour savings as a result of more efficient processes; and
- the sector probably already has made considerable expenditure on e-commerce inputs already factored into the base case forecasts. Nevertheless it is prudent to make an allowance for additional investment reflecting assumptions about greater use of e-commerce in manufacturing.

Section Twelve

Agriculture

12.1 Description of the sector

The Australian agriculture, forestry and fishing sector contributed \$16.7 billion in 1997–98, about three per cent of GDP. The sector employed over 430 000 people in 1997–98, or 5.1 per cent of the workforce.²⁷

Though e-commerce may not have been taken up with same enthusiasm as other industry sectors, the characteristics of the sector such as a high reliance on accurate information (stock prices, weather reports, etc.) and large distances between producers and customers (both intermediate and final) makes the sector conducive to the benefits of e-commerce. Moreover, some commentators believe the take up of e-commerce by rural industries is essential to the survival of rural communities themselves. As one commentator stated recently,

Internet technology and e-commerce has the potential to make or break many regional centres, so we have to ensure that we give regional businesses an opportunity to become established with the technology.

Professor Paul Swatman, Deakin University, in 'Warning on e-commerce',
The Age, Monday 6 December 1999

This Section broadly discusses current initiatives and the potential uses of e-commerce to reduce costs, improve productivity and open access to markets for Australia's agriculture sector.

Expected future usage and opportunities

So far, the limited use of e-commerce in agriculture is likely to be due to either:

- the high costs of access to telecommunications or poor telecommunications infrastructure (resulting in time consuming data extraction or unreliable connections, etc.); or
- an unwillingness or fear to adopt to new technologies which break with traditional methods of doing business .

Nevertheless, there is evidence that some Australian farmers are taking up the Internet with a similar speed to businesses in cities. For example, although these figures are sure to have been surpassed, a recent ABS survey showed that in 1997–98, 11.6 per cent of farms used the Internet, compared to 13.5 per cent of total Australian households.²⁸ Another survey of farms by the Kondinin Group, a leading independent agricultural research group and publishing organisation, recorded Internet usage by some of its members in 1997 at 22 per cent, compared with a level of only one per cent in 1995.²⁹

In a report by the Rural Industries Research and Development Corporation, *Buying and Selling Online*, the authors apply Australian Tax Office projections of future Internet usage to estimate that e-commerce by farmers could reach \$280 million in year 2000, and \$5 billion in ten

27 ABS, Australian Economic Indicators, ABS 1350.0, June 1999.

28 Australian Bureau of Statistics, *Use of Information technology and Telecommunications in Australia*, 1998, quoted in Simpson, R., *Farmers, Computers and the Internet*, Farmwide, available at www.farmwide.com.au/projects/farmersit.asp.

29 Figures for the Kondinin Study were quoted in *Farmers, Computers and the Internet*.

years' time.³⁰ This reflects an average of nearly \$7 000 of online purchases per farm household in year 2000 and \$40 000 per farm in ten years time. And a survey by the National Farmers Federation subsidiary, Farmwide, also found that farms are expecting to increase their use of e-commerce (Box 12.1).

Box 12.1

The farmwide online services pilot program

Farmwide, a subsidiary of the National Farmers' Federation, conducted a two year pilot program to analyse usage of the Internet by farm families. Under the program, 1,000 farm families were provided with a 28.8kbps modem, installation of an extra telephone line, training and telephone support and were asked to use the Internet regularly throughout the period and then respond to several surveys to help assess usage patterns.

Some of the findings of potential benefits to farm families were:

- forty six per cent said using online services had changed the way they did business (24 per cent were unsure);
- only two per cent did not see online services as worthwhile to their business;
- per cent claimed they could access previously unavailable goods and services;
- per cent said using online services had not saved them money given the technical problems they experienced throughout the project;
- many said the main advantage for their business was in getting quotes online and then comparing prices, rather than marketing their business online;
- nine per cent regularly used discussion groups and 3 per cent used chat groups; and
- thirty eight per cent of farmers said they would purchase online, 28 per cent said they would sell online (also high levels of uncertainty, 28 per cent and 22 per cent respectively).

Some of the findings of potential barriers to farms families were:

- costs of access were exacerbated by the lack of local call access and relatively high hourly access charges; and
- a small number of people complained about poor quality connections and modem drop-out;

Some of the future identified uses of e-commerce for farms families were:

- government transactions (e.g. completing forms for excise rebates and tax returns);
- education and training for both children and adults; and
- online banking.

Source: Simpson, R, *The Farmwide Online Services Pilot Project*, Farmwide, May 1999.

12.2 Cost savings

No major studies have been identified that estimate the cost savings or productivity gains from e-commerce for agriculture. However, there is reason to believe that anticipated efficiencies and opportunities in other industries are also available to the agriculture industry.

In *Buying and Selling Online*, an assumption is made that Internet usage will reduce farm costs by ten per cent, based on reductions in selling costs and gains in productivity resulting from:

- lower transport requirements through disintermediation (also may prove product quality by less stress on product, maximise freshness, etc.);
- lower direct marketing costs; and

³⁰ Groves, J. and Da Rin, J., *Buying and Selling Online*, Rural Industries Research and Development Corporation, January 1999.

- increased access to markets (particularly for some niche industries such as horticulture).

In reaching these conclusions, the authors caution that Internet take up is more likely on the more profitable or larger farms, which may give those users a further competitive advantage. For e-commerce to be used to its potential, the overriding need in rural Australia is therefore an adequate regional telecommunications infrastructure.

Overall, cost savings and productivity improvements are likely to arise from quicker access to more accurate information, such as price and weather information. The lower cost, ease and speed of transferring information between rural users will also benefit agriculture producers. For example, chat rooms and discussion groups are creating virtual communities for dispersed people that facilitate the spread of important information among users. Examples of sites include Farmwide's online discussion group and the Koninin Group's forum site.

E-commerce will also increase competitive pressures and thereby reduce costs in the farm services sector, as the Chairman of the Australian Wheat Board noted recently:

The emergence of electronic commerce is to set to fuel profound change within the [farm services] industry within the next five years. There is insufficient profit in the sector for everyone to survive and the development of the Internet will further erode margins.

That pressure is going to get worse as more and more people come on the Internet, as more and more people get the communications systems in place on their farms, which they are doing at a fairly rapid rate.

We are going to see more and more competition on the traditional way of doing business.

Cathy Bolt, 'Impact of e-commerce to change rural Australia',
The Australian Financial Review, Friday 14 January 2000.

As is the case for other sectors, cost savings should arise from new online marketing channels that reduces marketing costs. So far, this has been confined largely to highly processed consumer goods such as flowers and wine. However, e-commerce also opens possibilities for reducing costs in sales between wholesalers and retailers, as discussed in the box below.

Box 12.2

GreenNet

Traditionally, plant wholesalers sell products at markets or through trucks laden with samples that do the rounds of retailers. However, GreenNet, a new web-based e-commerce service for horticultural businesses, intends to make the ordering and delivery of plants faster and more cost-effective.

The website catalogues each wholesaler's products and price list. Retailers paying an access fee can then decide what, and from whom, they want to buy and order electronically. Searches for plants can use either common or botanical names, a particular wholesaler or a state. A photograph of the plant is displayed showing price, pot size and grower.

GreenNet claims it can reduce costs associated with running trucks, which for some businesses can be \$60 000 to \$100 000 a year. In addition, wholesalers can reach a much wider range of retailers without the traditional associated costs.

Source: Kate de Clerq, 'A Business blooms on the net', *Business Review Weekly*, November 5, 1999, p. 111.

Governments have also identified a role for themselves in assisting a wide range of agribusinesses to market their products online. An initiative of the Federal Government is the FoodConnect Australia program which

seeks to provide a point of reference for customers, both domestic and overseas, looking to purchase Australian food and beverage products over the Internet.

Box 12.3

FoodConnect Australia³¹

The Federal Government's 'Supermarket to Asia' Council in collaboration with Telstra and the food industry have recently piloted an e-commerce initiative called 'FoodConnect Australia'. FoodConnect aims to be Australia's prime online channel through which food and beverage products are to be exported.

The potential benefits to participating businesses include:

- access to customers in Australia and overseas;
- communication with customers in Australia and overseas;
- at a later stage, a facility for clearing bureaucratic clearances, as well as arranging transport and payment;
- fast and secure information transfer; and
- a comprehensive online catalogue.

Source: See the FoodConnect Australia website at www.foodconnect.com.au

State Government's are also assisting the agricultural industry by providing websites showcasing each State's industry with the objective to improve each industry's international competitiveness. South Australia's *Food Online*, Victoria's *Food Victoria*, and Queensland's *Food Manufacturing* websites provide directories of food producers as well advice and information for food producers. Even some regional municipalities have shown an interest in establishing websites to help promote local businesses.

Other organisations such as Farmwide are providing online services, such as chat rooms, discussion groups and facilities to create home pages, as well as regular provision of information such as stock prices and weather reports.

Cost savings are likely to arise from the more efficient operation of markets, for example, the provision of online customs clearance and other bureaucratic requirements, electronic payment options, online ordering, and the provision of other information. Also, greater access to markets through e-commerce increases the potential for competitive producers to sell to a wider audience.

It remains to be seen to what extent this will apply for the selling of high volume commodities. In the case of the sale of the wheat, currently marketed and sold by the Australian Wheat Board, it is difficult to see the Internet opening access to new markets. The main benefits may be in services to growers (e.g. providing quick and accurate price information), and in facilitating cooperation between growers through transfer of information and communication. Once again the main issue appears to be giving growers access to telecommunications networks and IT hardware.

In the case of wool, the Australian Wool Exchange recently commissioned an electronic selling trial of wool, to determine the most appropriate sale method. Several different auction arrangements are being trialed, including a sequential auction process, Tender (Private and Public) auction, Offer Board, semi sequential and simultaneous auctions. The current trial is based on a Local Area Network, with an expansion to a Wide Area Network further down the track.

31 See the FoodConnect Australia website at www.foodconnect.com.au

12.3 New costs

As noted in *Buying and Selling Online*, the cost of access to telecommunications networks is relatively higher in rural areas and this is proving to be one of the limitations on the take up of e-commerce in those areas. The Federal Government has recognised this and is implementing the Networking the Nation initiative, administered by the Department of Communications, Information Technology and the Arts. The Government plans to invest almost \$500 million in projects which 'assist the economic and social development of rural Australia' by funding projects which:

- enhance telecommunications infrastructure and services;
- increase access to, and promote use of, services available through telecommunications networks; and
- reduce disparities in access to such services and facilities.

Projects include funding for local governments, additional mobile phone coverage, and funding Internet access for remote communities, for which approximately \$36 million is allocated. The aim is to provide access at a reasonable cost and bandwidth, therefore stimulating Internet service delivery. The major priority is to offer untimed local call Internet access.

Farmwide is currently engaged in trials to improve Internet service delivery to remote areas by increasing the volume of data throughput. Initiatives being trialed include one way satellite delivery and the 'woomera modem' which uses Australian technology to improve the throughput on copper wire.

The other major limitation to Internet usage has been identified by some as an unfamiliarity or fear of new technology, which may be overcome by engaging training or management consultancies. These would be new costs to traditional farming businesses.

For businesses using e-commerce to sell, additional costs include designing websites (including arranging for security of payment), monitoring electronic orders, and providing product support services. This cost may be measured in the time required to perform these tasks which may or may not be incongruous with the time requirements of operating the particular agricultural business.

A potential commercial risk, rather than a cost, of e-commerce is the danger that traditional stockists may see direct online selling as a threat to their business, and react by refusing to continue to stock the product.

12.4 New business models

With the greater use of e-commerce, changes to the actual operation of farms is unlikely to be dramatic, although in future there will undoubtedly be a greater range of smart farm machinery that will challenge traditional labour intensive agricultural practices.

In the short to medium term, while developments so far have focussed on business-to-consumer opportunities, changes to business-to-business supplier arrangements are also likely to occur. Presently, there appears to be a lack of understanding on the whole as to the opportunities for business-to-business opportunities of e-commerce. More efficient relationships with suppliers rather than customers offers many potential changes to the way agribusiness is conducted.

To a small extent, direct selling to farms and other agribusinesses, or business-to-business transactions, is occurring as there are now several websites selling:

- fertiliser, seed, livestock and other farm inputs;
- machinery and tools;
- financial and management consulting services; and
- information such as weather reports, up to date market prices, news updates.

At this stage, some sites are at a limited stage of design. For example, often sites only provide product information and contact details (e.g. email links), rather than offering online sales facilities that offer ordering and payment options. This reflects the degree of immaturity in the use of e-commerce to date and the large potential for innovation and change.

In terms of business to customer selling using e-commerce, the practice of direct selling by farms or other agribusinesses may occur, but is not yet as prevalent as producers selling either through existing online retailers or through regional websites, websites of industry organisations, or even websites established by cooperatives. Examples of goods being sold online include:

- wine, e.g. the Margaret River Wine Centre;
- cheese and dairy products, e.g. King Island Dairy;
- flowers, e.g. through Florists Australia website;
- olives, e.g. through Olives Australia website;
- herbs and some vegetables; and
- coffee, e.g. ozcoffee.com.au sells some Australian grown coffee.

In some cases, these sites offer to sell more than just the food or beverage product, but also books and videos, training information for new producers, tools and equipment and other related products. Some farms are branching into providing accommodation and participation for guests in the daily farm routine, known as 'agritourism'. The use of the Internet to market their properties for agritourism may piggy-back marketing of farm produce, and vice versa.

12.5 Potential changes to employment

In the short term, there are unlikely to be any major changes to the practice of some agricultural business *per se*, although some businesses may choose to employ IT educated people either directly or on a retainer basis. In small communities, the development of changes to the sale of farm inputs may create new opportunities for intermediaries, particularly delivery businesses. However, one effect may also be that there is a negative impact on small communities if small bricks-and-mortar retailers are replaced by online retailers.

12.6 External dimensions

As mentioned, e-commerce offers access to overseas markets and quicker methods of ordering and payment. In particular, this creates opportunities for small niche agribusinesses to sell to customers overseas, either through an individually maintained website or as part of a multiseller website such as the FoodConnect site.

E-commerce also provides opportunities for agribusinesses to purchase some farm inputs from overseas, which increases the range of services available and allows a better consideration of prices. In some cases, though, companies may prefer to purchase face-to-face, or at least have a firm guarantee of the product quality.

To a large extent, opportunities to purchase or sell overseas will be limited by the adoption of e-commerce by buyers and sellers in other countries.

Key points

Characteristics of the agriculture sector such as a high reliance on accurate information and large distances between producers and customers makes the sector conducive to the benefits of e-commerce. E-commerce provides additional opportunities to generate operational efficiencies such as obtaining better weather and stock information or bypassing intermediaries and locating cheaper inputs. It also allows agribusinesses to market products more effectively to wider audiences.

Despite expectations of generally beneficial impacts there was limited information to factor in direct impacts of e-commerce on the agriculture sector suitable to include in the modelling work for this report. This was due mainly to the relatively small size (compared with say banking and finance, or communications) of agricultural e-commerce. It seems likely that much of the savings experienced by the agriculture sector will be due to efficiencies in other sectors from which it buys its inputs. It seems reasonable to factor in modest savings in retail and wholesale margins in the sector (i.e. reduced costs through some disintermediation) due to this factor.

Section Thirteen

Mining

13.1 Description of the sector

The Australian mining sector contributed \$23.7 billion to GDP in 1997–98, about 4.3 per cent of total GDP. The sector employed over 80 000 people in 1997–98, or less than one per cent of the workforce.³² However, minerals and metals are a major source of export revenue to Australia. It is projected that the production and trade of coal and uranium will dominate the mining industry over the next ten to fifteen years (Table 13.1).

Table 13.1

Projected increase in Australian energy production and trade from 1997–98 to 2014–15—selected Items³³

	Production		Trade	
	PetaJoules in 2014–15	% change on 1997–98	PetaJoules in 2014–15	% change on 1997–98
Black coal and by-products	8066.1	1.9	6700.8	2.2
Uranium	5640.0	4.4	5640.0	3.8
Crude oil	1180.3	-0.4	963.0	3.4
Natural gas	3038.2	5.3	1278.4	6.9
Petroleum products	NA	NA	256.3	-0.1

13.2 Use of e-commerce

Evidence about the use of e-commerce in this sector is somewhat mixed.

ABS data reported in Chapter Two of Part 1 shows that the mining sector is a leader in terms of use of IT. Nearly half of businesses in the sector have Internet access, a key prerequisite for e-commerce.

Industry sources estimate that over 80 per cent of purchases in the mining industry are already made using electronic ordering, invoicing and payment to purchase mining inputs. Furthermore, electronic technology is used to monitor relationships with subcontractors, such as monitoring truck movements and mining output say of iron ore.

On the other hand, a 1998 survey of Australian e-commerce sites indicated that mining was under-represented in '.com.au' website numbers, with only 0.6 per cent of surveyed websites being for mining related activities.

Searches undertaken by the authors of this report found that there were relatively few websites that were equipped to undertake e-commerce.

Nevertheless, there is clear evidence that some mining companies are using the Internet for commercial purposes. One mining site is showcased in the Box following.

³² ABS, Australian Economic Indicators, ABS 1350.0, June 1999.

³³ Bush, S., Dickson, A., Harman, J., and Anderson J., *Australian Energy: Market Developments and Projections to 2014–15*, ABARE Research Report 99.4, Canberra, 1999, p. 61–62.

Box 13.1

Austmine—a window for the mining industry suppliers

Austmine is an industry export group comprising about 130 members supplying mining equipment, technology and services to mining and mineral processing operations worldwide. The Austmine website at www.austmine.com.au offers members information services such as a bulletin board, and provides links to members websites. Austmine members offer a range of goods and services including products associated with:

- Consumable supplies and fittings.
- Fine coal beneficiation and process control.
- Strata reinforcement technology.
- Environmental management and rehabilitation.
- Hazardous mining environment technology.
- Mining systems software.
- Mineral exploration.
- Gold mining and processing technology.
- Alluvial mining and mineral sands operations.
- Minerals handling systems.
- Education and training.
- Contract mining.
- Quarrying and aggregate processing.
- Mining and processing research and development.
- Mining maintenance technology.

Source: Austmine.

13.3 Cost savings

One of the key areas that e-commerce will continue to be effective will be in the operation of commodity markets, specifically short term clearing markets such as the London Metal Exchange (aluminium, copper, etc.), the London Bullion Market (gold and silver) and other forums for exchange. Indeed, this is already the case, as disintermediation has taken place in the operation of spot markets, the trading of metals is already automated. The Minerals Council of Australia made the following observation:

The mining and minerals processing industry is a leader in applying innovation and new technology. Australia has developed this world-class industry by applying innovation and technology to all aspects of its operations, including widespread adoption of e-commerce in the industry.

As an example, a large Australian minerals company has recently introduced online trading for nickel and cobalt, a world first for the industry. This initiative is changing the way in which these commodities are traded internationally. In the future, North American customers may only purchase these metals online.

The industry can only continue to develop in Australia, in the face of challenging market conditions, by continuing this process of innovation and the widespread adoption of leading edge technology. The continued uptake of e-commerce opportunities will be an integral part of this process.

R C Wells, Executive Director, Minerals Council of Australia,
22 December 1999

The benefits of efficient trading markets, in addition to lower transactions costs and better informed decision making, should flow through to better stock control. Improved matching between production and demand can help reduce stockpiles. While commodity price cycles are not expected to disappear altogether, the continuing existence of stockpiles in spite of a

better informed market ensures that the prices will continue to fluctuate. More efficient markets are likely to reduce the size of fluctuations rather than remove them.

Use of new technology, such as satellite technology, is already being used may help to lower exploration costs. E-commerce presents a platform for relaying that information and perhaps reducing costs through information sharing.

Opportunities for lower billing; payment costs, cost of information transfer, etc. from using online payment mechanisms is already occurring in the industry.

On the whole, considering the main business of mining and delivery of mining products, disintermediation is simply not possible for some intermediary functions in the supply of minerals to processors such as drilling and digging tasks and shipping. Although e-commerce may help facilitate these actions, they are not likely to change in nature.

13.4 New costs

New costs of e-commerce will be due to re-intermediation in the supply chain, likely to be in the form of technology requirements to link in with global trading forums, establishing or altering existing trading systems, changing information systems, employment of IT personnel, education and training and retraining. These costs are not likely to be large and are likely to be accommodated within the existing medium to long term capital expenditure plans for the sector.

13.5 New business models

It is likely that the core of wealth creation in mining is information and making the best use of the information at hand. Finding mineral deposits, identifying when and how to extract them commercially, assessing market conditions and opportunities and managing costs are all information intensive activities.

Similar to other industries techniques which enhance knowledge management, including many e-commerce approaches, could assist in boosting the competitiveness of firms in this sector. It will also be a factor separating those that thrive and those that don't. That said, it is not clear that the greater use of e-commerce in this sector will introduce as profound a change as is expected in other sectors.

Largely in response to declining commodity prices and oversupply in global commodity markets, some listed smaller mining companies are undergoing a structural change to reshape themselves into Internet stocks. In a trend known as 'Backdoor Listing', these companies are using existing listings to purchase IT start up companies and then relisting as IT companies on the ASX. Two other drivers for this activity are the desire to acquire a slice of the new business and to attract new shareholder funds i.e. issue new shares. Share prices as a result of backdoor listing have increased significantly, in some cases tripled. (See Box 13.2)

While there is the expectation that the cyclical nature of the market will make resource stocks profitable again, in the mean time there are returns to be made in technology stocks, and some Australian miners are diverting their activities as they wait for the rebound.

Box 13.2

Leaving mining sites for websites

Several companies have recently successfully transformed themselves from mining companies to mining and Internet companies. The companies below were once exclusively exploration companies:

- Min Tech 8 purchased an interest in an online messaging services Jfax, and saw its share price rise from a 52-week low of six cents to about 13 cents.
- Mogul Mining has become a diversified wine distributor through plans to purchase online Internet wine service Wine Planet. Mogul's share price has doubled over the past year.
- Ramsgate Resources will acquire Internet Solutions Australia, an electronic-commerce company specialising in website design. Ramsgate is trading around 36 cents, triple its low for the year.
- Border Gold has bought HOTS E-Commerce, a group that offers industry-specific electronic-commerce networks based on new developments in the software industry. Despite its move into e-commerce technology, a recent report from Border Gold managing director Neil Biddle says: 'Existing Border Gold management will continue to focus on its core gold projects.'
- Walhalla Mining now renamed Walhalla.com, in the six months from 1 January, the company's share price increased 400 per cent from a level of 12 cents. The company acquired Kidz.net, a closed website through which children can access 500 000 sites suitable for children. To acquire Kidz.net, the Walhalla group issued 30 million shares and agreed to provide \$2 million in working capital to Kidz.net. At the time of the Walhalla takeover, Kidz.net had total sales of only \$28 000 for the eight months to February 1999.

Source: 'Sharemarket: Miners See Light in the Internet', *Business Review Weekly* Friday June 4 1999.

13.6 Potential changes to employment

Mining tasks are not likely to change significantly with the spread of e-commerce. In future, smart machinery may be used instead of labour for highly dangerous drilling and mining work, e.g. the mining robot, however the expense of using such machinery will be high.

Rather than the industry taking on more IT professionals, it is probably more accurate to predict that existing traders and other employees will be trained to work with e-commerce in the few areas in the sector where it is used.

13.7 External dimensions

It is not clear that e-commerce will have any significant impact on global trade of mining products except, as mentioned, in making clearing markets more efficient. This would actually appear as a reduction in costs in other sectors of economic activity (e.g. finance) in the national accounts framework.

Some suppliers of inputs to the mining process, such as training and software, may find they can expand market access to other mining countries using e-commerce. Naturally, this will depend on the access of those other countries to the Internet, considering some of those countries are not as advanced in the use of e-commerce as Australia.

Key points

Despite conducting a large proportion of transactions in the industry electronically, it is not clear that there will be as profound a change in this sector as there will be in others. Nonetheless, general opportunities for disintermediation (cost saving) and re-intermediation (new costs) are still expected to occur as use of e-commerce expands throughout the economy.

When looking at the modelling of these impacts it seems reasonable to factor in modest savings in retail and wholesale margins in the sector (i.e. reduced costs through some disintermediation) in the purchase of inputs.

