58 GROWTH

COMPETING FROM AUSTRALIA

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CEDA
COMMITTEE FOR ECONOMIC DEVELOPMENT OF AUSTRALIA

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About this paper

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About CEDA

CEDA (the Committee for Economic Development of Australia) connects leaders of Australian organisations to promote Australia's economic development.

CEDA's activities: CEDA holds more than 250 events, seminars and chief executive roundtables each year, and publishes a range of research papers.

CEDA's mission: CEDA's research and forums identify and explore issues that influence the nation's long-term economic and social development.

CEDA's reach: CEDA draws its members, which number around 1000, from businesses, universities, governments and the not-for-profit sector. During 2006 CEDA's economic and business events attracted more than 21,000 people.

CEDA's independence: CEDA advocates policy in the national interest, rather than lobbying on behalf of special interest groups. It is staunchly non-partisan. CEDA's funding comes from membership, events, grants and sponsorship.

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Invest Victoria is responsible for attracting productive foreign direct investment into Victoria, and for promoting the state internationally as a world class investment location. It is a focus for the Victorian Government's investment attraction initiatives, providing quality services to investor clients in Australia and off-shore, as well as coordinating a range of investment and re-investment initiatives and processes within Government.

Research guidance

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- Professor Kenneth Wiltshire
- Professor Glenn Withers

foreword

This CEDA collection of papers is one of our most ambitious. Like several CEDA collections over our 47 years' existence, it seeks to plot out the economic frontiers for policymakers, businesspeople and citizens. It is the product of more than 18 months' work by CEDA's expert authors, staff and a number of CEDA trustees and advisors.

The authors come from a wide variety of institutions, businesses and government bodies. Yet their ideas mesh at many points. Competing From Australia unites a familiar theme in Australian economic history – the tyranny of distance – with a number of new ideas about global connectedness and innovation. It seeks to ensure Australia continues to engage more deeply with the rest of the world, and to stay at the leading edge of economic activity. It points to Australia's recent economic and policy successes, including some – such as our success in raising our foreign direct investment – that have gone largely unnoticed until now. But it also asserts that there remains room to improve our performance further.

This project once again underlines the strength CEDA gains from its membership and from many of Australia's leading public policy thinkers. It gained early focus and insight from a CEDA reference group which brought together a number of leading CEDA trustees and outside experts in late 2005. It was this group which first highlighted the rising significance of global supply chains. Many of our authors also collaborated at a Sydney Roundtable in 2006, and the project's themes emerged further there. As always, we owe a great debt to our authors for their generous contribution of time and ideas.

We are also indebted to CEDA's Research and Policy Committee and our Research Director, Professor Ian Marsh, for their work on the project. Professor Glenn Withers, head of our ACT advisory council and one of Australia's most distinguished economists, deserves a special mention both for his contribution as an author and for his intellectual guidance throughout the project.

The papers already released as part of Competing From Australia have been well received. A great many Australians clearly share CEDA's goal: to find ways, through debate and discussion, to continue and accelerate Australia's economic development.

Chief Executive Officer, CEDA

summary

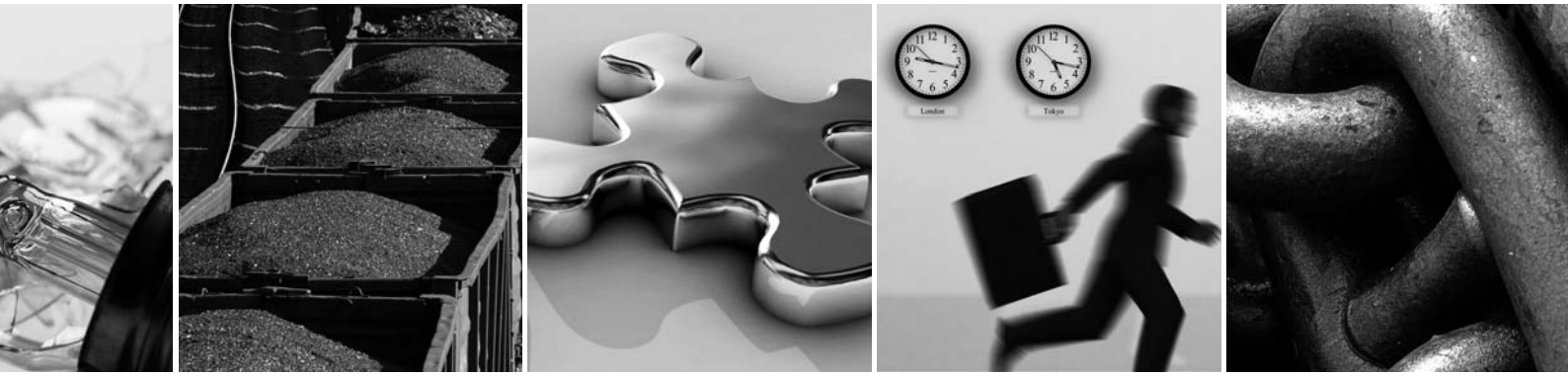



1

At the start of the 21st century, world economic production is yet again transforming. Several factors previously regarded as minor are becoming rapidly more important: cross-firm collaboration, world-scale production efficiency, integration into global supply chains dominated by multinational corporations, and direct communication between team members located in the same office, city or region. The common theme is increasing connectedness between different firms, between different locations, and between people.

These changes challenge Australia. Distance and scale, in particular, loom as issues for Australia.

It is often suggested that advances in telecommunications are making distance and scale less important and connectedness less of a challenge – that "distance is dead" and that, as one popular book has put it, the global economic playing field is now "flat" or at least flattening.



Australia cannot rely on technological advances alone to tie us more strongly into the world economy.

However, recent economic theory and data suggests the opposite – that "the tyranny of distance" has not abated and will continue into the future, and that Australia cannot rely on technological advances alone to tie us more strongly into the world economy.

Australia can, however, take advantage of industry and technological trends which minimise or avoid the effects of distance and scale. Australia already appears to be taking advantage of skills developed in response to Australia's small domestic market size and distance from markets - most notably its strongly developed business services sector and its "generalist" skills such as the ability to integrate existing components into systems.

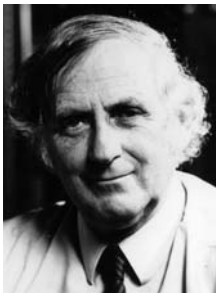
To engage more closely with the evolving world economy, Australia will also need to:

- maximise its ability to interact with world markets;
- excel at remote delivery, supply chain management and logistics;
- foster innovation, particularly in so-called "traditional" industries, including those industries that rely on the resources sector;
- minimise communications and transport costs;
- continue to emphasise economic openness and flexibility;
- continue to build human capital, both through immigration and through investment in education and skills; and
- continue to support inward and outward foreign direct investment as well as trade.

distance

A KEY TO AUSTRALIA'S economic dilemma

2



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From 1968 to 1988 **GEOFFREY BLAINEY** was first Professor of Economic History and then Ernest Scott Professor of History at the University of Melbourne; in 1982–83 he was Professor of Australian Studies at Harvard University. His 1966 book *The Tyranny of Distance* was a landmark account of Australia's economic evolution. His other books include *Triumph of the Nomads*, a prehistory of Aboriginal Australia; *The Rush That Never Ended: A History of Australian Mining and A Short History of the World*.

It is fascinating to read the essays here and to see that distance more often than not is deemed to be important as an economic factor. Some of these essays view the tyranny of distance as a continuing liability. Indeed, the Macro Dynamics Unit of the Australian Treasury – whose work on distance is cited by Glenn Withers in this volume – argues that it is "unlikely that the costs of distance can ever be completely overcome".

PHOTO: iSTOCK

When I coined the phrase "the tyranny of distance" for the name of a book in 1966, I did not foresee how the pithy phrase would travel. The phrase had a looseness, a slightly abstract air, and that looseness enabled it to be used widely, serving all kinds of purposes. On the other hand, the imprecision in the phrase led easily to misunderstanding, and sometimes the phrase or slogan was misused. For example, many commentators said that for a long period it was the "tyranny of distance" which retarded the flow of new ideas to Australia. But my view – I could be wrong – was that distance had far more effect on retarding the flow of commodities and people than of ideas. While observing and even apologising that the phrase gives rise to misunderstanding, it says – at least in my view – something important about Australia.

In its first 20 years, the book was reprinted on average once a year, and gave rise to intense debate among historians. Their interest was in chapter 2 and especially on my argument that distance as a factor threw strong light on why Australia was settled by the British in 1788. However, the book, did not have an impact on most economists, partly because it was not speaking their language. Admittedly, the transport economists, like the geographers, were pleased to annex the phrase "tyranny of distance", but my attempt to analyse the origins of the break of gauge in the railways, and that break's contrasting effects on the economy in the short term and long term, was not widely read. In hindsight, there was another valid reason why economists did not worry about the book itself. Most Australian industries and professions already knew in general whether distance was important or not to their well-being. Many knew far more about distance in their particular realm than I could possibly know.

> Some of these essays view the tyranny of distance as a continuing liability.

The general economists were less interested in distance as a concept. Even the book's latest updating in 2001, when I added more pages pointing out how distance was strongly affecting the increasingly prominent service

sector of Australia's economy, had little impact. To the best of my knowledge, it was hardly commented on publicly by anybody in the next couple of years. And yet somehow the phrase itself still lived on. I am not complaining: the book and its central idea has had a long innings.

An important part of the concept of *The Tyranny of Distance* is still relevant, as at least half of the essays in this collection maintain. Several vividly point to the scatter or dispersal of population within Australia, and to its adverse economic effects. Where else, they ask, will you find such a distance between the major cities? One might also ask the pertinent question: where else – except maybe Siberia and Canada – would you find such crucial national industries operating so far from a major city? Fortunately, as pointed out in this volume, Australia possesses one notable concentration or clustering of population, even if it is not an intensive cluster by European, North American or East Asian standards.

Michael Porter's book of 1990 *The Competitive Advantage of Nations*, placed innovative emphasis on the role of clusters in driving economic development. A version of "clustering" was one of the themes of *The Tyranny of Distance*, though the word and the intricacies of its economic mechanism were unknown to me. The book pointed out that in 1966 the core of Australia's economy and the heartland of its population extended around the coast and a narrow hinterland that ran all the way from Brisbane past Sydney and Melbourne and Adelaide to Port Pirie. I should have added Whyalla and, perhaps even then, the Sunshine Coast. I christened it the Boomerang Coast because of its shape, and pointed out that it held less than one-tenth of the nation's area and less than half of the nation's natural resources (which, in retrospect, was a very rough guess), and yet it held eight of every ten people. Chapter 6 concluded with the sentences:

Through the concentration of population on the Boomerang Coast, Australia spends much less of its energy in carrying goods and supplying services over vast distances. Its standard of living and its ability to support a larger population are much higher than if its main economic activities and its population had been scattered around the rim of the continent. The Boomerang Coast, and the dominant cities on that coast, were the simplest solution to the problem of distance.

Interestingly, in the last 40 years, with the proportionately faster growth of Western Australia and Queensland, the Boomerang coast is not quite so dominant.

Elsewhere, but not in *The Tyranny of Distance*, I coined the phrase "the mating of resources" in an attempt to describe how in certain areas the juxtaposition or clustering of very different resources, side by side, conferred benefits on each resource or economic activity. The Ballarat district was probably the most successful zone of inland development in the whole continent up to 1900, largely because of this mating and multiplying of resources. Much of that district's poorer, gold-bearing deposits might not have been extracted at a profit except for the fact that the cost of living and the general mining costs at Ballarat were relatively low. Thus, at Ballarat the timber for the mine props and the fuel for the steam boilers and their huge pumping engines came in massive quantities from nearby forests. As the forests were near, the firewood and timber were cheaper. In turn, the clearing of the forests laid open fertile land to small farms, which in turn helped to provide cheap food; the foodstuffs being the largest component of the cost of living and indirectly of the miners' wages. The ring of farms around Ballarat made it even more of a regional centre and service city than a mining city by the 1870s, and the aggregation of engineering skills required by the mines gave rise to foundries and other industries that served one of the first Australian cities to make steam locomotives. This is a highly simplified version of a complex process of interaction seen especially at Ballarat and Bendigo, but far less important at remote Broken Hill and Kalgoorlie, with their arid soils and remoteness from the coast.

> It is understandable that alert observers should argue that in the last ten years the world has shrunk, that distance is no longer decisive.

In contrast, a characteristic of today's huge mining industry is that it rarely gives rise to the mating of resources. The fly-in, fly-out workforce, and the small population of the actual mining fields, is the new trend. Fly-in is as much an effect as a cause of the economic insulation and the lack of clustering benefits of the latest generation of mining fields.

The service sector, now the employer of about 75 per cent of the labour in Australia, obviously depends on a mating process. Its resource endowment is not gold or pasture or arable soil. To some degree its resource is knowledge and information, both low grade and high grade, if you like to use mining terminology. Information is one of the new gold rushes, and presumably obeys several of the same economic laws, of which the price of transport is one. In other words, distance is one determinant of whether the new information technology will really flourish, creating jobs and wealth in one town or region rather than another, or in one nation rather than another.

Many go-ahead observers insist that … distance is dead. But Australia, a first-rating testing ground of this theory, seems to prove otherwise.

Is distance, once such an obstacle, now less important? It is understandable that alert observers should argue that in the last ten years the world has shrunk, that distance is no longer decisive. Thomas Friedman's book *The World is Flat* has won a vast audience for this proposition. Slightly earlier, Rupert Murdoch, with an almost unparalleled knowledge of the new and old media, announced that "the tyranny of distance" – this was the phrase he used – was dead. In 1997, in the UK, Frances Cairncross completed an illuminating book, *The Death of Distance*, which predicted that the decline of distance will "probably be the single most important force shaping society" in our time. Part of what these trans-Atlantic observers have predicted will probably occur. In these momentous times, numerous barriers are toppling. What the observers don't say, or say less emphatically, is that in nearly every momentous change there are losers as well as gainers, and that certain nations, industries and cities gain far more than others.

Is Australia a loser, relatively? The view of some distinguished economists writing in this volume is that Australia in recent years has suffered because of distance – and the relative weakness of its economic clustering inside the country. Perhaps because Australians have traditionally been conscious of distance they are quick to notice what their nation gains from the new communications technologies and their assault on distance. We think we are gaining, compared to rival nations, in most facets of the assault, but maybe we are not. Australia gains much from, say, the communications revolution – mobile phones are almost an infection – and rejoices in the visible effects. But its comparative economic gain from this network of allied industries, with their vast ramifications, is perhaps not as large as the gains made by some other countries with specific geographical advantages. According to Professor Houghton, "On many of the indicators of globalisation, Australia scores relatively low", and this applies especially to global production systems. One of the intriguing statistics cited in these essays is that between 1995 and 2003, Australia's share in the world's total export of services fell by 13 per cent. And yet that statistic is not easily analysed. Such major economies as Italy, France and Japan experienced even larger falls in their share of service exports.

Many go-ahead observers insist that, in the era of the Internet and satellite, distance is dead. But Australia, a first-rate testing ground of this theory, seems to prove otherwise.

A NEW generation OF policy questions

3

PROFESSOR IAN MARSH is CEDA's research director and holds the ANZSOG Chair of Public Management at the University of Sydney. Former appoint-ments included the Research School of Social Sciences, ANU and the Australian Graduate School of Management. He has also worked as research director for the Liberal Party Federal Secretariat and as a consultant with McKinsey & Company. His recent books include: *Globalisation and the People* (2007); *Into the Future: The Neglect of the Long term in Australian Politics* (2006), and *Democracy Governance and Regionalism in East and South East Asia* (2006).

Australia's recent economic performance has been, on most measures, outstanding. After such a protracted period of exceptional results it may seem churlish to begin searching for new ways to speed up growth. But it is arguably best to search for new policy improvements before medium-term economic growth slows. Seasoned observers, notably the Governor of the Reserve Bank, have wondered out loud if there is not the need for a new impetus.[1] Saul Eslake, Chief Economist of the ANZ Bank, has been more explicit. He has charged the government with wasting the windfall revenue gains from the resources boom. *The Economist* recently concluded: "Without further policy reform, the Australian kangaroo risks turning into a sleepy koala" (*31 March 2007, p. 74*).

PHOTO: iSTOCK

This year's *World Competitiveness Yearbook 2007* also emphasised Australia's long-term economic development challenge. Out of 55 countries, Australia scored poorly on a number of economic infrastructure measures, including Internet costs (42nd), mobile telephone costs (38th) and availability of various types of skilled labour, such as qualified engineers (40th). It ranked only 12th for education, 20th for scientific infrastructure and 21st for technological infrastructure. Overall, Australia ranked 16th on economic infrastructure, just up from 2006's 17th position.

The need to renew Australia's economic reform program was emphasised in CEDA's earlier studies of *Innovating Australia* (*Growth* 53) and *Infrastructure – Getting on with the job* (*Growth 54*). These reviews suggested that the current microeconomic reform agenda has realised the majority of its potential gains. Most of the policy changes associated with deregulation have been implemented – indeed, our recent performance testifies to their cumulative impact. But different, or additional, policy frameworks have been adopted in other relatively small, resource-intensive and open economies, such as Denmark, Sweden and Finland, and their economic performance has equalled and, more recently, surpassed, that of Australia. To the extent that policy influences outcomes, it is hard to argue that Australia's current strategy is the only or the best approach – or that it exhausts what might be done.

This consideration is reinforced by the papers in this current collection. Save for one contributor, they all advocate a renewal of policy reform. However, their recommendations vary. They approach the need for a fresh policy effort from three overlapping (and potentially complementary) perspectives: one perspective draws on the features of our general economic circumstances, including new interpretations of the "tyranny of distance" and the recent deterioration in our export performance; a second approaches the need for new policy effort from the perspective of innovation; and a third is taken from the perspective of the role of MNCs in global trade and R&D.

Deregulation and micro-economic reform involve what might now be seen as the first wave in the internationalisation of the Australian economy. But they do not end the story. This first phase was powerfully based on

paradigms drawn from neo-classical economic theory. The basic idea was that domestic and international economic arrangements should, as much as possible, use unfettered markets. In this perspective, exchange and coordination are best achieved through arm's length price mediated transactions. Some also argue that this is the best path to growth and dynamic efficiency. And some argue that, even in cases of market failure, interventions by governments are likely to produce third-best or worse outcomes. This is because of the risk of relevant programs being captured by favoured interests. Australia's recent success in rolling back protectionist and other regulatory frameworks would seem to call this latter argument into question, at least as an unqualified generalisation.

More generally, in a neo-classical perspective, market forces will drive down costs to an economically efficient level and market exchanges will allocate resources and people to their most productive uses. In Australia's case, the elimination of tariffs, the floating of the exchange rate, the introduction of a vigorous competition regime and, most recently, labour market reform, have all drawn on this theoretical tradition. Of course, the idea that market signals could carry the entire policy load was acknowledged as a gross simplification even by the market-oriented reformers of the 1980s and 1990s. In practice, market failure was widely acknowledged. In response, a variety of subsidies and incentive payments have been maintained. On some issues, coordination of activity or allocation of scarce resources has been orchestrated through governance rather than markets.

Transaction costs were also recognised as a critical determinant of performance, costs that are often no less important than direct production costs. Hence widespread programs of privatisation and commercialisation were introduced, particularly involving public utilities. In general, Australia's transformation in the post-1983 period was a remarkable episode of national policy change. In just over a decade, policies, frameworks and approaches that had guided national economic development broadly since 1909, were completely jettisoned.

Unfettered markets remain critical in efficient resource allocation and ensuring that competitiveness is not hobbled by transaction costs. But other approaches merit assessment at this point in the reform process. Concern over Australia's level of global engagement is just one factor driving a fresh look at policy. Another factor is the potential shift in industry structure that will result from an extended period of high commodity prices, a shift explored in a notable recent speech by Treasury Secretary Ken Henry[2].

In addition, theoretical perspectives that complement, and in important respects qualify, the neo-classical approach to "best" strategies for building performance have also emerged in recent years. They offer grounds for thinking about policy needs, instruments and settings that encompass, but extend beyond, market failure. Because some grounding assumptions cut across those in the neo-classical framing, these newer paradigms present particularly acute problems of assessment and evaluation. One perspective involves the international economy – and argues for the importance of multinational corporations (MNCs) as primary gatekeepers in the international trading system. This analysis, based in political economy, notes that some two-thirds of world trade passes through MNCs, either directly or via supply chains. These transactions are far from the textbook model of arm's length, price mediated exchanges. Further, approximately one-third of private R&D is conducted by MNCs. States can seek to create infrastructures and capabilities to attract this activity in the same way as they now seek to entice MNC investment.

Concern over Australia's level of global engagement is just one factor driving a fresh look at policy.

The second more recent theoretical paradigm concerns innovation – and recognises the role of collaboration and linkage in driving superior performance at the firm level. This framing holds the potential to change a number of current approaches to economic management (see e.g. Lipsey, Carlaw & Bekar, 2005). Innovation strategy in Australia is currently primarily based on a linear, science-push conception of the process.[3] This continues to be relevant. But science-based industries account for a tiny proportion of overall economic activity, generating proportionately very little employment or investment. They remain small proportions even of economies such as the United States, where high-tech sectors are largest and most robust. In fact, most innovation occurs in established manufacturing and service industries.

The most challenging aspects of innovation theory concern the role of the state in facilitating upgrading and continuous knowledge development in these established areas of activity. There is at least one classic and home-grown example of this approach, involving the Australian wine industry. As its performance illustrates, collaboration around knowledge development can yield outcomes superior to those available from the operation of market forces alone, with the important proviso that this needs to work with the grain of markets. But the very success of this industry invites attention to the unique capabilities and knowledge infrastructures it has developed, and to the contribution of federal and state governments to these outcomes.

All three segments in this collection of papers raise fresh questions about the strategic and catalytic role of governments in facilitating economic activity. As already

noted, those in the first part propose a new salience for communications, transport and educational strategies and for export development. Meantime the papers concerned with innovation and MNCs present, if anything, deeper challenges to current policy settings. All these issues are currently being considered by Australia's federal and state governments – with, it must be said, conspicuously variable energy. This collection asks if their significance and/or implications are being adequately recognised.

The first part of this collection looks at the implications of the recent deterioration in aspects of our economic performance. In particular, the impact of geographic location on trade performance and the implications of recent developments affecting the external account are explored. A recent Treasury review suggests that, allowing for the impact of distance, Australia's export performance in manufactures and services is actually above what might have been expected from a country of our economic size and geographic location. Glenn Withers endorses this approach and cites work that suggests the impact of distance, far from diminishing, is actually rising. This licenses fresh attention to policy settings. In deciding what strategies are appropriate, Withers suggests we need look no further than those which framed the very high levels of prosperity that marked the latter part of the nineteenth century:

> … Australia has done poorly at lifting its export performance since 2000, but Australian companies have done very well at integrating themselves into the global economy through foreign direct investment.

It is little known and little understood that Australia's earlier achievement as world's best practice by 1890 sprang not just from the luck of possession of natural resources. It was also the result of having the most skilled, educated and urbanised work force in the world and the most innovative populace. Australia spent more on education across more of its people than any other country; it chose its migrants carefully for their skills and it had the highest per capita patents of any country.

The need now is to augment the policy framework. Withers suggests a wide-ranging agenda aimed at augmenting human and knowledge capital. Attention to communications technologies and transport corridors is also an imperative. More generally, domestic fertility and skilled migration both need to be emphasised. Family-friendly policies that allow women (or men) to link career and family development need to be instituted.

In the second paper, John Edwards presents both a comprehensive assessment of recent developments affecting Australia's trade and investment and an evaluation of their longer-term policy implications. In a nutshell, Australia has done poorly at lifting its export performance since 2000, but Australian companies have done very well at integrating themselves into the global economy through foreign direct investment. His assessment of recent developments involves a detailed analysis of trends in the various categories of goods and services exports.

Export volumes grew by 56 per cent in the six years to 2000. Since 2000, they have grown by just 9 per cent – a remarkable and unexpected slowdown. Most of the slowdown in export volume growth is due to the downturn in the rate of growth of rural exports, oil, metals, gold, and services, including higher education and overseas tourism. Roughly half the decline in the rate of growth is attributable to a decline in the rate of growth of minerals, metals and energy exports, a decline disguised by rising prices for key commodities, notably iron ore and coal.

How can Australia improve its export performance again? While overseas demand for education and tourism has had some impact, Australia's challenge in areas such as metals, energy and minerals is to improve its ability to supply. While the mining investment boom in the three years to 2006 will likely result in higher export volumes in coming years, supply constraints are a relatively new challenge for Australia. We need concentrated effort to remove infrastructure bottlenecks; to build additional infrastructure to meet expected demand; to educate, train and retrain Australians so as to increase the supply of skilled workers; and to support innovation.

While export volume growth has flattened, exactly the opposite has happened to Australia's outward direct investment. Australian foreign direct investment (FDI) abroad has almost caught up with FDI in Australia.

Why has this happened? The typical Australian firm investing offshore is one that has been successful in Australia but outgrown the relatively small home market. Offshore investment reflects specialisation rather than size. The typical successful business has intellectual property, marketing and management skills and a business concept that has been successful in Australia and can be replicated elsewhere.

The second part of this collection explores the meaning and policy implications of innovation. This part consists of three papers. Roy Green introduces the discussion. He provides an overview of this activity, which essentially entails the application of knowledge and creativity to add value to products and processes. Higher

resources income, such as that delivered to Australia by the rise of China, can be dissipated in sustaining current prosperity – or used to enhance longer term economic sustainability. Green suggests that Norway and Finland have adopted approaches that do the latter, and he proposes that Australia learn from their experience. At the most general level, this requires much more investment in human knowledge and infrastructure – both of which have declined in recent years in Australia.

In categorising the scope of innovations, Green distinguishes between "sustaining" (or incremental) and "disruptive" change. In each of these major categories, innovation could involve one or a combination of three elements: technological change, organisational change and institutional change. Meantime, much current policy in Australia is concentrated on disruptive change (via science-based conceptions of innovation) and aimed only at its technological dimension. This remains important, but it is far from the whole story. Australia's relatively low spending on business R&D is often attributed to the high proportion of low-tech industries in our industry structure. Green disagrees, arguing that "… this justification ignores the importance of R&D in mining and agriculture, and of innovation more broadly in 'low-tech' activities and services, where 'absorptive capacity' for externally sourced technologies and skills may be the driver of competitive advantage …". He notes that on the broadest possible definition only 35 per cent of Australian firms acknowledged making an innovation in the 2001–03 survey period.

Drawing on a global survey, Green explores the less widely recognised role of organisational and institutional innovations. The importance of institutional stimuli to innovation is emphasised in a recent IBM survey: "Extensive collaborators outperformed the competition in terms of both revenue growth and average operating margin." Green concludes with a detailed review of Australia's innovation system. He emphasises that innovation is naturally not a task for governments alone. But he notes the lamentable decline in public spending on higher and vocational education, despite political rhetoric vaunting individual skills and capabilities. More broadly, and at a strategic level, he laments the absence in Australia of any overarching commitment, conceptualisation or vision. Government has failed to lead the development of public or stakeholder opinion. Because implementation requires extensive new linkages and engagements between public and private sector actors, he argues, government has an unavoidable and quite novel leadership role in the innovation field.

At the most general level, this requires much more investment in human knowledge and infrastructure – both of which have declined in recent years in Australia.

In the second paper in this group, Keith Smith outlines the framework for a comparative study of approaches to innovation in a number of resource-intensive economies. These are countries which all resemble Australia in the importance of their resources sector, but which all have a high resource dependence associated with strong manufacturing and/or services activity. Indeed, some of the richest and/or fastest growing economies are resource-based – Norway, Sweden, Finland, New Zealand, Canada, Australia and the Netherlands. This is in contrast to an influential strand of economic theory that argues natural resource endowments can be a "curse".

This "resource curse" is said to arise as a result of impacts on the exchange rate, precluding the development of other activities. However, Sweden, Finland and the Netherlands, all resource-intensive economies, have also all developed high-tech sectors that have supplemented their much more extensive engagement in low- and medium-technology activities, allowing them to remain high-productivity nations.

In explaining this achievement, Smith focuses on how impacts from initial resource developments ramified serially through three broad phases: initially, there was significant investment in knowledge upgrading in resources-based industries, followed by other flow-on consequences as resource activities leveraged the development of downstream industry and services. In a third phase, a further round of opportunities developed from the extensive and deliberate use of knowledge infrastructures to drive knowledge creation in other sectors. Smith refers to the development of "vertical clusters" extending up out of the resources sectors into manufacturing and services. Smith concludes that if the detailed path by which the cited resource-rich countries progressively transformed their natural endowments into vibrant secondary and tertiary sectors remains obscure, so too is the path by which these outcomes might be preserved and magnified. These questions – and processes – have special salience for Australia.

The third paper in the segment on innovation is by Thomas Barlow. He reviews recent changes in policy frameworks designed to aid innovation. To highlight their impacts, he also reviews data about relative changes in Australia's business structure. This emphasises the growing importance of services in the Australian

economy with property and business, finance and insurance and communications services all growing at much faster rates than manufacturing. This also partly reflects the very substantial new linkages between manufacturing and services. Barlow then turns to consider the patterns of innovation actually occurring in Australia. He argues that our characteristic approach (and strength) involves what he terms "systems integration". This involves "a style of innovation that is relatively high level, that is typically generalist rather than specialist, that is focused on systems rather than products, and that involves combination and modification of existing technologies rather than the creation of new technology."

Evidence for the predominance of this approach is to be found in fields as diverse as mining, construction and event management. A practical example in yet another area is Westfield's success in shopping malls. In all of these cases the "product" is different in each version, but a creative solution, based on systems integration, is the common element everywhere. Barlow points to the growing place of software expenditure in Australia's total business R&D spend as further evidence of this shift in Australia's characteristic approach. Indeed, information and communications technology (ICT) developments provide a particularly strong reinforcement of the thesis. Between 1985 and 2003, only Finland and Korea showed a greater increase in ICT as a proportion of gross fixed capital formation. The beneficiaries of this investment in Australia have been wholesale and retail trade, finance insurance and the business services sectors. System integration also characterises the approach of companies in fields such as Australia's growing biotechnology sector.

… our characteristic approach (and strength) involves what he terms "systems integration". This involves a style of innovation that is relatively high level, that is typically generalist rather than specialist …

Barlow argues at more length elsewhere that he sees this as the characteristic strength of Australians in their approach to innovation.[4] And, contrary to other contributors in this collection, he concludes that where innovation is concerned, current policy settings are about right and further effort is best left wholly to decisions made in the marketplace.

The final group of two papers considers the role of MNCs, both as integrators of international production systems and as the predominant patrons of R&D. Andrew McCredie introduces the discussion by reflecting on their global role, as well as on the engagement in trade by Australian firms. MNCs undertake two-thirds of world trade. The top 1,000 MNCs direct 90 per cent of FDI and they undertake the bulk of world business expenditure on R&D. They have adopted new business models which need to be factored into policy thinking. According to Marc Singer (a Principal in McKinsey's Silicon Valley office):

In the industrial age companies were built on the principle: "Do more and do it cheaper." The means were vast scale and scope as well as rapid internal control. In the information age the watchwords are "fewer, faster, less" – fewer assets, faster growth, and less activity managed under one roof. These are the features of the networked organisation, a business model that may forever change the way companies compete … Brought into existence by declining transaction costs, tightly linked supply chains, and Internet-based ordering platforms, these companies have devised a mode of interaction among themselves, their business partners and their customers that promotes … collective learning in the organisation, especially how to coordinate diverse production skills and to integrate multiple streams of technologies.[5]

These linkages, while geared to cost reduction as in the Toyota "learning by doing" buyer–supplier model, are nevertheless far from the arm's length, price mediated exchanges of the international trade textbooks.[6]

McCredie illustrates the new patterns of outsourcing with examples from the vehicle and constructions sectors. He argues that, for a country of our economic size, relatively few companies are engaged in trade. For example, only just over 4,000 companies exported more than $1 million of goods or services in 2005–06. He further suggests that Australia's distance from major global centres is no ground for complacency. In deciding how to develop trade, policy needs to focus on the role of MNCs in both global trade and R&D. The structure of Australian industry is also a pertinent fact: Australian industry is dominated by SMEs, which may lack the ability to respond as needed to MNC demands.

In relation to R&D, he notes that major MNCs are establishing research nodes where they find complementary research or other capabilities, or where these can contribute to longer term market access and development. According to a 2005 UNCTAD survey, Australia is ranked 16th out of 26 countries as a location for MNC R&D activity. As a *prospective* location its ranking has fallen a further two places to 18th. Such perceptions are largely socially constructed. Others are deliberately targeting R&D. This does not currently figure in Australia's policy repertoire.

McCredie also explores the significance of Australia's increasing offshore FDI. He notes that were the income from these investments to count as an export, it would be third only to coal and iron ore. He concludes with a series of policy recommendations, starting with an effort to build understanding and overcome information deficiencies among MNCs. The large number of MNCs already located in Australia provide a primary potential source of intelligence about the requirements for connecting local firms to their international parent supply chains. A similar intelligence opportunity exists in relation to attracting R&D. Similarly, Australian firms need to be encouraged to see supply to global chains as a path for business growth. Programs may be needed to develop capabilities for and reduce the risks of these engagements. Finally, Asia may present special opportunities. The number of regional MNCs is multiplying and there would appear to be many potential complementarities between Australian capabilities and their needs. But once again, more intelligence and a deliberate strategy may be required.

The final paper, by John Houghton, also explores the changing role of supply chains in the global economy and the requirements for enhancing the participation of Australian firms. His analysis reinforces that of Andrew McCredie. MNCs now dominate trade and their global outsourcing creates a new context for firms seeking to grow through international engagement. Houghton reviews trade data that not only illustrates Australia's relatively poor trading performance but also suggests the scale of the disconnection between local manufactures and services and global supply chains. The metrics include trends in our share of IT-enabled services exports, intra-industry trade as a share of total manufacturing trade, Australia's share of foreign R&D locations, and trends in export market shares for both goods and services. In all these cases we rank in the lowest deciles. Echoing the judgements of other contributors to this collection, Houghton concludes that our potential as a goods and services exporter depends above all on the development of education and skills, ICT infrastructure and on the ability of local suppliers to link into global production systems and offer appropriate cost-effective solutions.

In general, the contributors to this collection urge the further development of government policies aimed at increasing the international engagement of Australian firms. The policies they variously propose pose challenges of varying degrees of difficulty. The proposals to build education and training investment, lift communications linkages and emphasise export development, important and far-reaching though they are, present the fewest difficulties. All these recommendations are consistent with current policy frameworks and approaches. They would represent a realignment of priorities and involve more spending, but they do not present any fundamental challenge to overarching orientations.

Proposals to deliberately foster the links between Australian firms, particularly SMEs, and MNCs involve a higher order of policy difficulty. This would represent a considerable extension of present approaches.

However, innovation as discussed here represents the most challenging of all these proposed fresh approaches. Currently national government strategies are largely focused on a science push view of this activity. The challenge of adding a substantial demand-driven component that is focused on established services and manufacturing sectors is far from trivial, and far from a simple extension of current approaches. It could involve such higher order activities as formulating a general vision that is ambitious, plausible and capable of inspiring effort. It could involve a variety of sectoral activities that might be stimulated by governments but realised through relevant industry associations and/or groups of firms. For example, clusters of firms might be encouraged to set goals and targets, but in a frame that allows revision and adaptation as experience accumulates and contingencies unfold. In other words, it would involve engagements at a sectoral level that cuts across present hostility to selective interventions and discriminatory approaches. But the forms of engagement would also be novel – based on information and incentives to identify opportunities and to set ambitious goals and targets and reward designated achievements rather than non-discriminatory regulatory or financial inducements.

Such activities pose considerable challenges both to the state and to business. For business, collaboration can be very complex and demanding to establish. For the public sector, the risks of capture would need to be deliberately countered. Fortunately there are abundant examples of successful approaches in other states. Perhaps the biggest challenge concerns the degree to which such approaches cut across current orthodoxies about the role of the state and the relationship between public and private sectors which are championed by Australia's political and bureaucratic elites. Concepts of partnership and collaborative engagement are currently generally discounted. They are the exception. Similarly, while ministers gesture to "joined up" approaches, practice shows only a few examples of effective concerted effort. Evolved forms of innovation strategy explicitly take account of the linkages between industry policy and education, migration, communications, infrastructure and social policy. Such holistic approaches are barely evident in the Australian policy system and, particularly where there is overlap between federal and state governments, often thwarted by make-believe political combat.

In other words, the adoption of innovation policies as envisaged by some of the contributors to this volume would represent at its furthest not just the evolution of current approaches, but a major shift towards a more active industry policy. As noted in the earlier papers, appropriate approaches are well developed in other coun-

tries, notably the Nordic block. However, policy transfer is never merely straight copying and is always problematic – local conditions and circumstances, including political factors, necessarily obtrude. This is as it should be.

In sum, the challenge in re-crafting Australia's policy frameworks to lift international economic engagement to a new level could be unpacked in several different ways. The possibilities extend from shifting to new priorities within present broad orientations to the adoption of new policy approaches, instruments and settings. The achievements of the past couple of decades show what determined and focused leadership can accomplish. The next phase, whatever its components, requires a renewal of motive and energy, and a fresh engagement with goals, means and purposes.

ENDNOTES

1 Evidence, 21 February 2007, House of Representatives Committee on Economics, Finance and Public Administration.

2 Managing Prosperity, Speech to the *National Economic and Social Outlook Conference*, 2 November 2006.

3 Marsh & Edwards (2006) review the Innovation Summit as an exercise nominally positioned as an assessment of alternative conceptions of ways to promote innovation. They conclude this was ultimately an elaborate exercise in outreach, basically designed to legitimise largely pre-determined positions. This has since locked Australia's innovation strategy into a linear, science-push view of the process.

4 Barlow, 2006.

5 Singer, M., 2001.

6 See also Charles Sabel, 1994, Learning by monitoring: the institutions of economic development, in N Smeltser & R Swedborg (eds) *Handbook of Economic Sociology*, Princeton University Press, New Jersey.

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can distance BE defeated?

4

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Introduction

Two well-known books encapsulate much that is particular to the challenges facing Australia today: Donald Horne's *The Lucky Country* and Geoffrey Blainey's *The Tyranny of Distance*. Both titles have become part of the Australian lexicon and are keys to our sense of self as a nation.

Horne's phrase evokes in the minds of many the bounty of Australia possessing a continent rich in natural resources, some of which comprise a large share indeed of the global resource endowment.

The continent has over 20 per cent and, in some cases, much more of the world's known stock of recoverable uranium, iron ore, bauxite, diamonds and mineral sands. Proven black coal resources have centuries of life at current extraction rates and millennia for brown coal. The land currently occupied by mining is 0.01 per cent of the land area.

PHOTO: iSTOCK

Australia's relatively small population means that this bounty can be shared and can support a good living, thanks to the fortune provided by nature and by isolation. Recognition of such a sentiment was reflected in the Prime Minister's recent comment on dealing with climate change, that "we have to make sure that we do it in a way that preserves our natural advantages because future generations will not thank us for squandering a natural advantage providence has given us".[1]

Isolation is Blainey's theme. The continent is geographically separated from the historic centres of major human population or, as Paul Keating once put it more colourfully, "Australia is at the arse end of the universe". (Some might say Keating's comment neglects New Zealand and Tierra Del Fuego, but the point is clear.) Isolation is not just literal physical geography but also a matter of economic mass – and the most prosperous and populous are elsewhere. Canberra is 16,500 kms from Bonn, 16,000 kms from Washington, and 6,000 kms from Tokyo, even in our own Asia Pacific region.

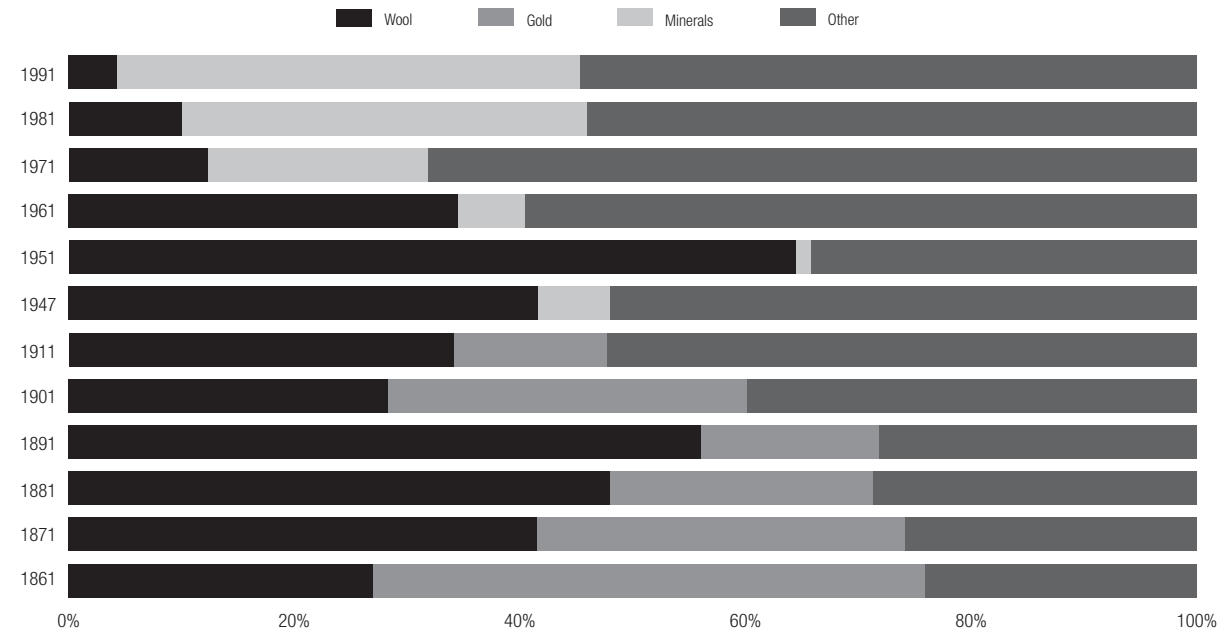
According to some historians, Australia may have had an indigenous population of half a million before white settlement. Noel Butlin 1983) suggested this was a massive underestimate; in his view the number was more like one million. However, disease (and not the frontier violence that has so occupied the culture war historians) decimated this native population, leaving only 250,000 indigenous Australians by 1815 supplemented by 15,000 Europeans; a tiny population for a continent of 3 million square miles. Almost 200 years later the indigenous population has risen back to half a million and the total population has passed 20 million.

Global integration

One consequence of nature's bounty has been a long historical reliance upon natural, resource-based exports as a major component of Australian trade, as shown in Figure 1. Wool, gold and other minerals alone have never been less than 30 per cent of total Australian exports, putting aside the years of war and depression.[2] The reliance has varied over time and manufacturing and service exports (including sectors such as tourism and education) have expanded. But the natural resource base has remained crucially important and, in circumstances, such as the recent period of commodity price boom in response to China's fast growth, has accelerated to assume renewed prominence. And we have used our resources most efficiently, showing much higher labour productivity in these areas than comparable countries such as the United States.

The implications of bounty and distance for Australia's growth, structure and stability are profound. How we respond to this bounty determines whether we continue

FIGURE 1 AUSTRALIA'S EXPORT COMPOSITION, 1861–1991



Source: McLean & Taylor (2001)

as one of the group of countries to escape the "Resource Curse" (Smith 2007). So many countries rich in natural, resource-based products have not used their bounty well and have suffered restricted growth. But countries such as Canada, Australia, and Norway have developed as affluent and stable democratic societies. Whether we should have done even better is open for debate, but the need to ensure that resource wealth flows are not wasted in the manner of the Spains and Portugals of centuries ago or some of the mid-East, African and South American oil countries of modern times remains a policy priority.

The priority is recognised somewhat in Australia through the structural impacts associated with what local economists call the "Gregory Thesis" or, as it is called elsewhere, "The Dutch Disease". The exchange rate effects of bountiful natural exports inhibit competitive manufacturing and service exports and raise import costs, so placing pressure on urban living standards and employment.

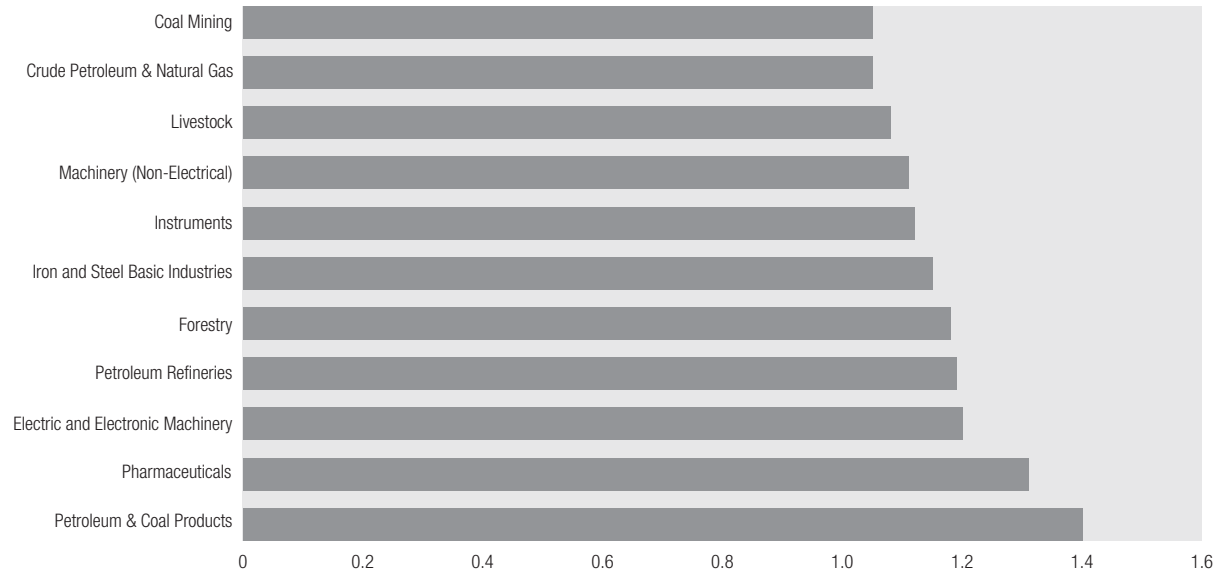
Australia was the world's first post-industrial society. Most industrial countries went through a major period of transition from land-based production for domestic consumption, though a manufacturing revolution and the growth of urbanisation, to emerge as service societies. In this process, cheaper manufactures elsewhere undercut basic domestic manufacturing, which then remained with specialised high-value-added niches. Australia was really born modern; a society that never possessed a landed peasantry, thoroughly urban from foundation, with well-constructed institutions of modern liberal democracy, the rule of law and efficient administration.

Its distance from markets meant that its natural resource advantages dominated its global trade and not basic manufacturing, which only really grew when force-fed by artificial protection. There is clear evidence that apart from the costs of transport, which for Australia are large, there are also considerable advantages to scale in manufacturing compared to most natural resource industries. Figure 2 shows this clearly from recent international research (Antweiler & Trefler 2002) on scale advantages in global trade. And Blum and Leamer (2000) have further estimated that exporting a good to a country 1,500 kms away is, on average, equivalent to an import tariff of between 7 and 17 per cent, depending on the type of good. Or, to put the problem differently, if Australia was as close to other economies as is the UK, its trade would be 50 per cent higher (Battersby & Ewing 2005).

The result is a relatively low global integration for Australia. The sum of exports and imports as a ratio to GDP puts Australia at the lower end of the OECD spectrum, as seen in Figure 3.

But at least historically for Australia a relatively efficient domestic construction and service sector was able to flourish, and economic achievement could also embrace urban utilities and construction – as these were largely non-traded – and both could benefit from a healthy, educated, enterprising and growing population. With efficient land and capital-intensive mining and agriculture, and with human-capital-intensive service production, embedded in a rich foundation of institutional capital, Australia still could prosper and grow a high living standard. As Ed Leamer (2006) has shown,

FIGURE 2 ECONOMIES OF SCALE IN GLOBAL TRADE



Source: Antweiler & Trefler (2002).

Australia and New Zealand were long the world's champions in challenging the tyranny of distance, as is seen in Figures 4 and 5. These show how both 30 years ago and in 1990, the two countries did "punch above their weight", though they have now been joined by some newer success stories.

Redding and Venables (2000) found that market and supplier access explain up to a third of variation in per capita income differences –as signalled in Figures 5 and 6. Similarly, Australian Treasury (Battersby & Ewing 2005) has calculated that Australia's low global trade integration is above what would be predicted, given our isolation.

Moreover, this was achieved with our own domestic market itself internally fractured by distance. The Australian pattern of settlement is a dispersed one. Its strength for economic activity is its concentration in large cities, more so than the Canadian case, for example. This does generate a range of urban scale economies at least, plus the more recently recognised spillovers in urban density in the form of knowledge synergies and thick markets.

Scale economies in urban areas come from the reduced cost of connection to high overhead infrastructure provision, such as in electricity distribution or suburban road provision. Additional benefits relate to how large conglomerate population areas allow specialised skills and markets to emerge and be viable, ranging from high-level health provision, such as specialised diagnostic and surgical capabilities, to financial, accounting and legal services and education provision. On top of this, the new areas of recognition relate to how such people interact and exchange ideas, often serendipitously through interpersonal exchange and often in social as well as in work situations.

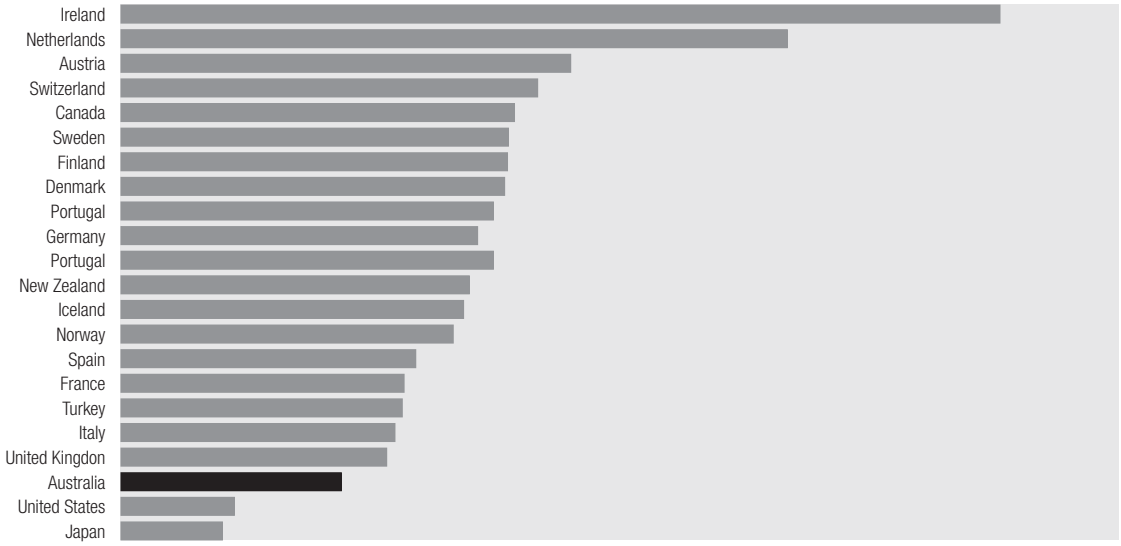
The evidence is that these benefits strongly outweigh the congestion costs that also occur with urban concentration and scale. Indeed, across US cities a doubling of density increases labour productivity overall by 6 per cent on average (Quigley 1998). These notions have been popularised in recent times through Richard Florida's books, especially *The Rise of the Creative Class*, which is a paen of praise to cosmopolitanism.

But Australia's cities are far apart. McLean and Taylor (2001) have pointed out that no two Australian cities with a population of over a million are within 600 kms of each other. In California 34 million people live between San Diego and Sacramento, a distance of 800 kms.

But surely all this is history? Has not distance been defeated? The world's economic mass is moving more in Australia's favour, transport costs are coming down and modern communications are increasing Australia's ability to interact with the world and tap its knowledge base. This is certainly happening and can be documented. For example, in the second half of the twentieth century, the proportion of the world's GDP within 12,000 kms of Sydney increased from 26 per cent to almost 38 per cent (Battersby & Ewing 2005)[3] (see Figure 6).

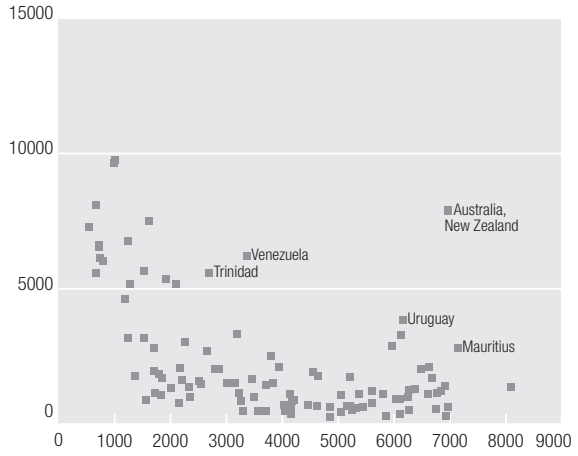
So some things have improved. But perhaps not as much as is popularly believed. In particular, the common assumption that modern communications technology has eradicated distance is not at all clear-cut. This is

FIGURE 3 TRADE INTENSITIES, 2001



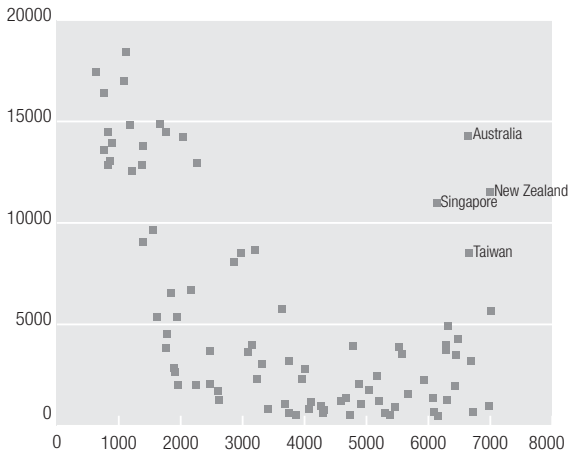
Source: Battersby & Ewing (2005).

FIGURE 4 GDP PER CAPITA AND DISTANCE TO WORLD GDP, 1960



Source: Leamer (2006)

FIGURE 5 GDP PER CAPITA AND DISTANCE TO WORLD GDP, 1990



Source: Leamer (2006)

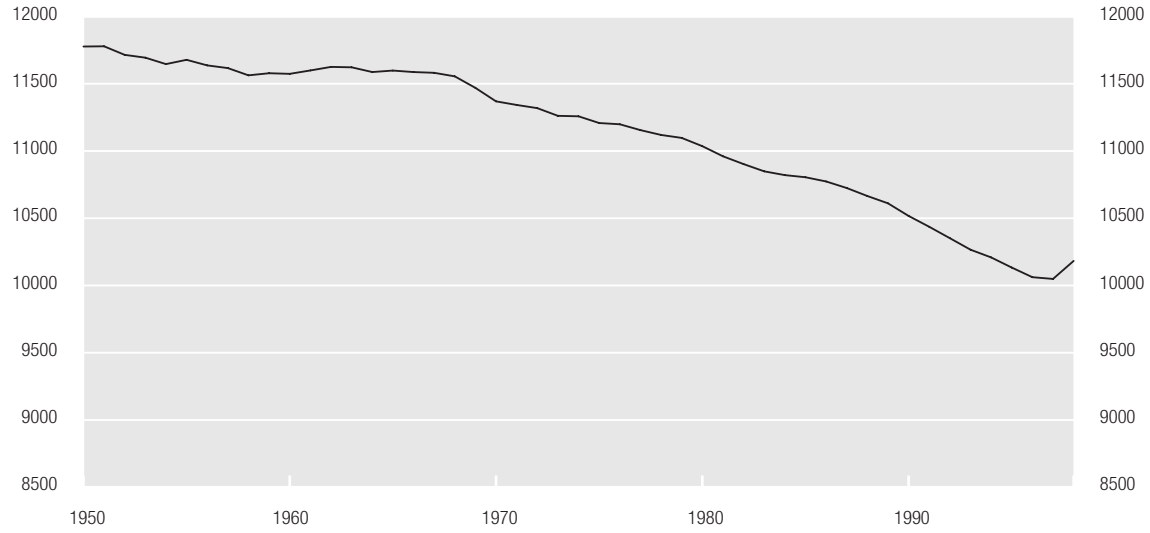
because as the world moves increasingly to become a global knowledge economy, much of the creative, high-level knowledge is tacit, not codified in formal communication, and serendipitous, conveyed in direct personal interaction that is a function of co-location (Levy & Murnane 2004).

Indeed, there is evidence to suggest that the impact of distance is rising and not declining with time. Redding and Schott (2003) have found that comparing 1990 with 1970, a one per cent distance that previously reduced bilateral exports by 1.2 per cent in 1970 did so by 1.5 per cent 20 years later.

In the world of ideas, which underpins value-added economic activity, Keller (2002) has calculated how technology is itself substantially local in use and not global, despite the communications revolution. What he means is that the benefits from spillovers in using knowledge decline dramatically with distance. The amount of spillovers, meaning use of knowledge beyond formally contracted parties to the technology development, declines by half on average for every 1,200 kms.

If we use Keller's calculations to look at the average benefit to small industrial countries from the R&D in the G-5 nations of the US, UK, Japan, France and Germany, it is all too abundantly clear how proximity pays great dividends in access to technology, as is shown in Figure 7.

FIGURE 6 AUSTRALIA'S REMOTENESS: DISTANCE TO THE REST OF THE WORLD'S GDP



Source: Battersby & Ewing (2005)

National positioning

What does this add up to? Should Australia fear globalisation and turn inwards? The historical record shows countries that do this severely limit their growth potential and performance. In the extreme case, the people of nations such as Cuba, North Korea and Myanmar are paying a heavy price for national isolation. And Australia acted out its own more modest version of this tendency in its reaction to the Depression of the 1890s – a reaction that led to the building of a security-seeking state that was in the end incompatible with sustained achievement and prosperity. The twentieth century saw the erection of the apparatus of tariff walls, reduced skilled migration, foreign investment controls and fixed exchange rates at our border, alongside a domestic system of protection through extensive minimum wage fixation, state ownership of utilities and growing, high progressive personal income taxation over time to support a growing array of welfare provision (Kelly 1994).

It might have been difficult to do otherwise in times conditioned by two Great Depressions and two World Wars in a span of under 60 years. Indeed, Australia's distance may have been a most welcome advantage for those times. It meant that we were a nation whose soil was not rent by wars and where the global transmission of depression was more muted than it might have been, serious as it was.

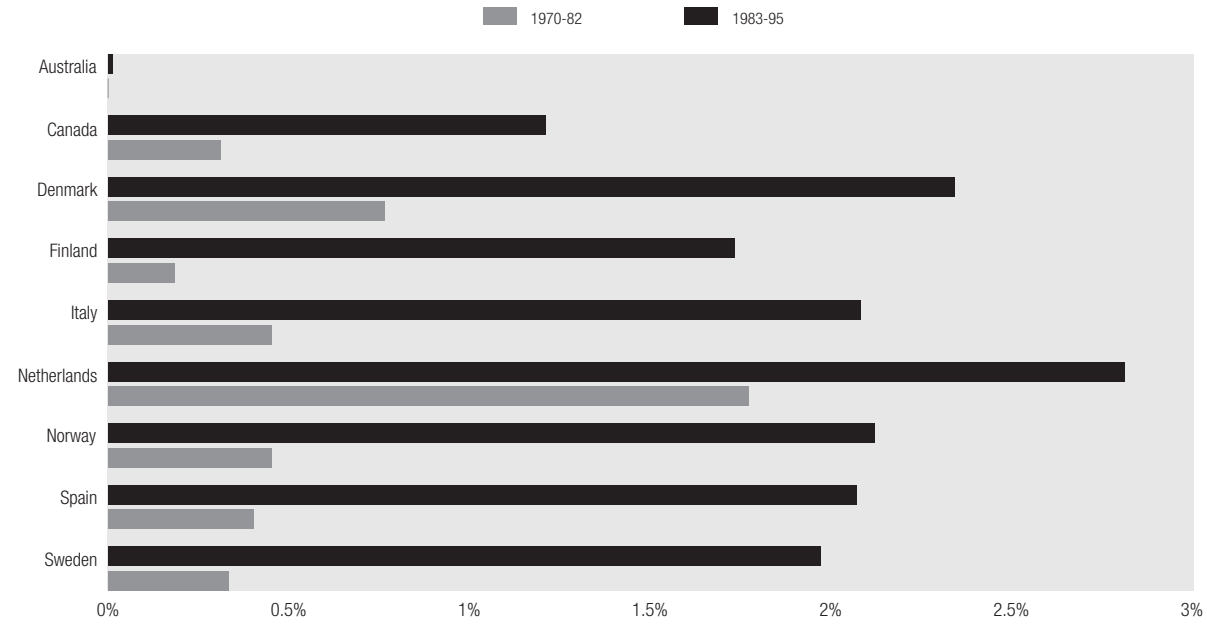
But in a post Second World War era characterised by a long period of economic expansion without depression and global war, Australia was slow in reintegrating itself internationally, even given its location. That slow reintegration was a result of tardiness in freeing up the national impediments of high tariffs and rigid wage structures that could allow both traded productivity and internal non-traded productivity to improve. Europe, by comparison, grew strongly in the earlier post-war period, particularly pursuing aggressive tariff reduction in the run-up to greater effective and formal integration.

The country that had boasted the world's highest per capita income in 1890 (Australia) had fallen to less august status by 1980. Only the period of liberalisation that arose from the mid-1980s to the present, in response to warnings of becoming the "Poor White Trash of Asia" or a "Banana Republic", has allowed Australia to regain something of its former standing and cease its otherwise ongoing gradual decline into faded gentility.

In the process, our policy settings have improved sufficiently to have made the transition to a more liberalised and open economy while protecting the least advantaged in the population better than almost any other OECD economy. In this sense, we have shown that national policy in a globalised world can indeed make a difference. The idea that globalisation totally debilitates national autonomy is shown to be false. If anything, it turns a nation towards more creative directions in policy for building national capability, rather than simple adoption of self-defeating protectionism.

Australia has benefited mightily from the period of micro-economic reform, national competition policy, adoption of new global technologies and good macro-management. But more is now needed if the country is to continue to defy the tyranny of distance and "punch above its weight" (Davis & Rahman 2006). The reforms to date were necessary but not sufficient conditions for continued success. To them must be added the reforms needed for rebuilding human and knowledge capital and infrastructure, not just to average OECD performance, but to world's best standards. Ongoing care for natural,

FIGURE 7 G-5 R&D SPILLOVER IMPACT ON OTHER COUNTRIES



Source: Keller (2002)

social and institutional capital is needed to complement this. Only if we do this across these many fronts and get the balance right can we defy distance as we did in the nineteenth century. Because of distance, the policy task is even more important for Australia.

It is little known and little understood that Australia's earlier achievement as world's best practice by 1890 sprang not just from the luck of possession of natural resources. It was also the result of having the most skilled, educated and urbanised workforce in the world and the most innovative populace. Australia spent more on education across more of its people than any other country; it chose its migrants carefully for their skills and it had the highest per capita patents of any country (Pope & Withers 1989, 1996: Magee 2000). It was dynamic, flexible, open and free.

But there were some co-conditions for this success. One was good governance. While a democratic pioneer, Australia's polity had degenerated into "crony capitalism" by the 1890s and the public and private investment processes had spread into increasingly unsustainable activities not subject to serious business testing (Butlin 1964). The resultant collapse was predominantly internally generated, though it was precipitated by a sudden loss of confidence by foreign investors and migrants, who caused a rapid drying up of global lubrication of an economy with serious domestic structural flaws that had not been recognised in time. The resultant shocks from that Depression of the 1890s led to decades of introversion.

Future policies

There are lessons here. They are that openness and flexibility are essential; investment in national capability in business, human and knowledge capital is also essential; and good governance must underpin the corporate and political processes and ensure a fair social safety net.

Policies directly related to distance should be specified as the core of such a far-sighted package. Two particular requirements are for Australia to ensure it has telecommunications and transport provision at best practice and people movements correct. These are Australia's essential links to the global community. In the nineteenth century, Australia's achievement of world-leading productivity was underpinned by massive investment in steam shipping, railroads and the telegraph and in accepting overseas immigration. In the modern global knowledge economy, the two contemporary equivalents are investment in the best telecommunications and transport arrangements that we can devise, and ensuring again that a dynamic immigration and visitor entry program is in place.

Telecommunications and transport

In relation to telecommunications and transport, the principal focus required is broadband. This is the defining technology of the globalised economy and crucial to reducing the disadvantage of our distance from the world's knowledge centres. Regrettably, past policy from government of both persuasions has positioned Australia poorly among industrial countries in terms of the timely introduction of, and access to, new tech-

nology. This extends back to the introduction of colour television and through to pay television, mobile phones and broadband today. In each case Australia has been a laggard in permitting introduction of these advances in communications. Yet, in each case once change is permitted, Australia's take-up rate of these technologies is typically very rapid and the pay-off from information and communications technology (ICT) has contributed mightily to sustaining our growth (Parham 2004). This is called "catch-up".

In the case of broadband, according to OECD Communications Outlook 2005, Australia ranks 23rd out of 32 OECD countries in terms of broadband access rates. At the same time, Australia is the only OECD country where half the broadband users download at 512 kilobytes a second or less. It is, of course, easier for geographically smaller countries such as Korea or Japan to provide such infrastructure, but we also fall well behind similarly placed countries to Australia such as Canada. Such have been the national logjams in this area that state and territory governments have been seeking to compensate for the national problems in policy and regulation in this sphere.[4] And local possibilities for a decentralised policy have been recently defined for Australia (Gans 2006).

Two particular requirements are for Australia to ensure it has telecommunications and transport provision at best practice and people movements correct.

Indeed, in order to keep information transaction costs down and to allow the "new economy" industries to flourish (including "virtual" supply chains for export), and to contribute better to economic growth and social benefit (Economides 1996; Skilling & Boven 2007)), it may be that such a move away from a national solution to a more decentralised strategy is opportune. In particular, on a global basis, broadband Internet access is peaking and the next phase of global internet usage is likely to be a move from "wired" (DSL, optical fibre and cable modem) to "wireless". This is being driven by growing notebook take-up and handheld mobile internet use, and many developing country markets are moving straight to this technology, leapfrogging the tethered connections (Ipsos 2007).

Australia could anticipate this. What is needed is a new broadband strategy premised on opening up and facilitating decentralisation. Opening up access to Telstra exchange interconnection and street conduits ("the last mile") on a local basis for conventional broadband, and removing major regulatory obstacles to new wireless broadband are the core new steps needed for Australia itself to "leapfrog" in provision, competition and procurement in broadband instead of being a perennial bridesmaid in telecommunications.

Greater progress is also needed on rationalisation of transport infrastructure arrangements. Public transport and storage is about 4.5 per cent of GDP and total share of GDP going to freight logistics is at least double this,[5] and personal transport arrangements should also be added. Yet international and national transport needs are arguably under-appreciated in the policy domain. Climate change, environment and energy policies are bringing a new focus, but underlying economic dimensions in terms of personal and business costs, quality and effectiveness remain crucial for competing from a distance. Ongoing emphasis on sustained improvement is therefore essential.

The main challenges are actually domestic, especially land transport and its relationship with ports. Particular attention must be paid to upgrading infrastructure in key transport corridors, to be facilitated by new technology and improved co-ordination across governments and modes.

The major test of advance here will be the next round of AusLink funding and it is important that this proceed on a systematic basis and not be undermined by more immediate electoral opportunism, whereby projects proceed in isolation and without proper evaluation. The process should be informed by supply and logistics chain frameworks (CEDA 2004).

On the international transport front, we must continue progress in expanding international air route access and travel options for passengers in particular. Dedicated air freight is already a more open market subject only to airport capacity issues.

Immigration movements

Regarding people movements, more progress has been made than in telecommunications and transport. Indeed, in many respects, Australia's immigration arrangements perform well by the benchmark of the national interest. Other countries have begun to emulate the points system by which we manage the immigration inflow, and our post-arrival and support services overall have produced more successful integration of settlers than in most comparable countries.

The actual levels of immigration are close to what is required to maximise per capita income growth, and comprise a reasonable balance of economic, family and humanitarian entry. A figure of 1.25 per cent annual increase of population should remain a target for policy for net migration and natural increase. Much more than this runs into absorption problems and much less undermines investor certainty and confidence.

Short-term entry for business, study and tourism and visits has been liberal, though subject to essential security requirements in visa management, and cross-border flows have risen steadily. Australia offers on-shore conversion from temporary to permanent settlement for those meeting settlement standards, and the system has built in a welcome capacity to distribute settlement to regional priority areas around Australia. Attention to the "global diaspora" of Australians overseas, has also been added to the armoury of migration policy.

There have been past problems with matters of restrictions on aged parent entry, but this has evolved to strike a better if not perfect balance between family reunion entitlements and minimising taxpayer burdens. Humanitarian entry arguably lost sight of true refugees most in need for some time, focusing instead on Australia-linked humanitarian entry, but this too has been somewhat redressed. However, concerns do still remain over denial of family reunion for valid refugees on bridging visas and on the mandatory offshore detention policies adopted.

One other issue, and one more directly relevant to the economic effects of distance, is the recent expansion of guest-worker visas (such as section 457 visas) to help meet labour shortages. These programs have been sensible in restricting their ambit to professional, managerial and skilled workers, but they do carry big risks for individual worker exploitation and worker over-stay and removal, for creating a segmented group of workers and because of ongoing pressure to expand to less skilled areas. These features may begin to undermine public support for broader permanent immigration. Such support is always fragile and easily led by populism.

At the same time, it is a myth anyway that this guest-worker process solves worker shortages. A small, highly targeted program can help, where local training takes too long to fill the gap or the need is transitional, but a large-scale program soon creates as many jobs as it fills. As such programs grow, spending by and on behalf of the guest workers merely creates new job needs and new shortages elsewhere. The policy becomes one of "a dog chasing its tail", even though individual employers think they are finding solutions to their problems and governments can claim they are assisting business in meeting its requirements. The bigger picture and much research (Castles et al 1998) says otherwise and the policy ultimately becomes self-defeating.

Reasonable quotas for high priority areas with long skill formation characteristics are a better way forward, rather than an open-ended, demand-driven guest-worker program. The program should be capped at present levels until a comprehensive, thorough, independent and expert review with balanced terms of reference is completed.

In sum, Australia has developed a strong and dynamic immigration program. But its sustainability depends upon maintaining the legitimacy of that program, and present refugee and guest-worker policies may need reform to support this.

Third and Fourth Wave reform policies

Of course, beyond the directly distance-linked priorities, many other polices directed at enhancing value-adding in any production sphere, irrespective of distance, can also kick in and, by encouraging or enabling us to be smarter in all and any spheres, help Australia stand out as the nation that is most competitive from afar.

The complementary policies that are needed include especially:

- sustained progress on the so-called "Third Wave" reforms directed at human capital, business regulation and energy, and also health, but with primary focus on human capital as the source of sustainable advantage. This must cover all levels of education, but especially early childhood education, more delegation in government school systems, and reduced regulation of universities; and new initiatives in innovation with this notion being defined broadly and as much directed at business culture and practice in knowledge management as at R&D production itself (Green 2007); and
- anticipation of "Fourth Wave" reforms directed at the institutions of public governance themselves, whereby we need to fix up the structures of federation and the policy capacities of the bureaucracy.[6] If international competition is muted by distance for Australia, we should seek to get domestic competition right. Much has been done to achieve this under micro-economic reform, but this process has left the core government structures themselves relatively untouched. Yet the fact is that while Australia has the advantage of federal arrangements that permit more cross-government competition than in a unitary state, we have the most centralised federal system of the major developed economies. The highest priority should be given to reducing overlapping roles and responsibilities in government and improving incentives for co-operation when overlap is inevitable. Australia is well out of step with international best practice in these areas, and recent estimates suggest that there is a reform bonus of some $4,188 per head for pursuing best practice fiscal decentralisation (Twomey & Withers 2007).

Conclusion

Currently Australia is ranked third in the UNDP Human Development Index after Norway and Iceland. It is world number 15 in GDP and 14 in GDP per capita, but it is falling down the competitiveness scale once again, with the 2006 World Economic Forum rankings having the country slip to number 19 and especially our innovation ranking down to 24. We have a strong base in macro-economic environment with which to recover some ground, which requires both progress from government and private companies, especially in telecommunications and knowledge acquisition. And we must maintain, but carefully manage, our immigration momentum.

Progress by government on the New Reform Agenda of COAG in areas such as human capital, infrastructure and water and energy is essential, as is some substantial bootstrapping by private companies in the acquisition, development, and management of knowledge and innovation. A centrepiece of the reforms must be to enhance the policies that help us defeat distance in areas of transport and communications and international population movement.

If this is done, "smart growth" can offset the otherwise increasingly evident prospect of gradual long-term productivity decline and the fate of being only a Quarry Economy.

AUTHOR'S NOTE

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ENDNOTES

1 Prime Minister, Transcript of address, 2 November 2006.

2 See Mclean & Taylor (2001).

3 Also see updates in Battersby (2006) and Dolman, Parham & Zhang (2007).

4 See, for example, New South Wales, 'People First: the NSW Government ICT Strategic Plan' (July 2006); Queensland, 'Communication and Information Strategic Plan' (2006); South Australia, 'South Australia's Broadband Strategy' (October 2006); and Victoria, 'Broadband Framework: Pathway to the Future' (April 2005).

5 Industry Steering Committee (2002).

6 L. McIntosh (2007).

export weakness investment strength

The changing pattern of Australia's integration into the global economy

5

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The downturn in export growth

Though the global economy has experienced the strongest growth in human history and the prices of commodities produced by Australia have risen to stellar heights, the growth of Australian exports since the beginning of this decade has been persistently disappointing. At first assumed to be temporary, the downturn in export growth from 2000 has defied official forecasts and industry expectations. In the six years to the September quarter 2006, the volume of exports increased by only 9 per cent. In the previous six-year period, by contrast, it had increased 56 per cent. Because commodity prices rose by half as much again in the six years to the September

PHOTO: iSTOCK

quarter 2006, and were little changed in the previous six years, the value of exports increased much faster than the volume. Even so, the 42 per cent increase in the value of exports in the six years to the September quarter 2006 was less than the increase of 56 per cent in the six years to the September quarter 2000.

The decline in Australian export performance in the years since 2000 has been quite unexpected. For the financial year 2001–02 the Commonwealth Treasury forecast export volumes would increase 5 per cent. They fell by 1 per cent. The following year it forecast an increase of 6 per cent. They again fell, this time by 0.5 per cent. In 2003–04 it forecast an increase of 6 per cent. This turned out to be three times the actual rate of increase. Undaunted, Treasury forecast an 8 per cent increase in 2004–05. This was more than twice the actual increase of 3 per cent. In 2005–06 it forecast an increase of 7 per cent, which was again more than three times the actual increase of 2.2 per cent. If Treasury has been consistently correct, the volume of exports in 2005–06 would have been well over one-third higher than it had been in 2000–01. In fact, it was just one-sixteenth higher.

More recent data demonstrates only a marginal improvement in Australia's export performance. Through 2006 the volume of exports increased 4.1 per cent, better than the average of the past five years but well below the average of the two decades prior to 2000. The value of exports increased 11.3 per cent over 2006, a little better than the average of the two decades to 2000. Nearly two thirds of the gain in value was due to higher prices rather than higher volumes of exports.

Treasury was certainly not alone in mispredicting Australian exports. Most private forecasts of export growth were similar to Treasury's. All these forecasts were consistent with expected global growth and past trends in Australian exports. Australian export growth since 2000 has been very much less than global growth and past trends led the forecasters to expect. It is a trend which invites examination.

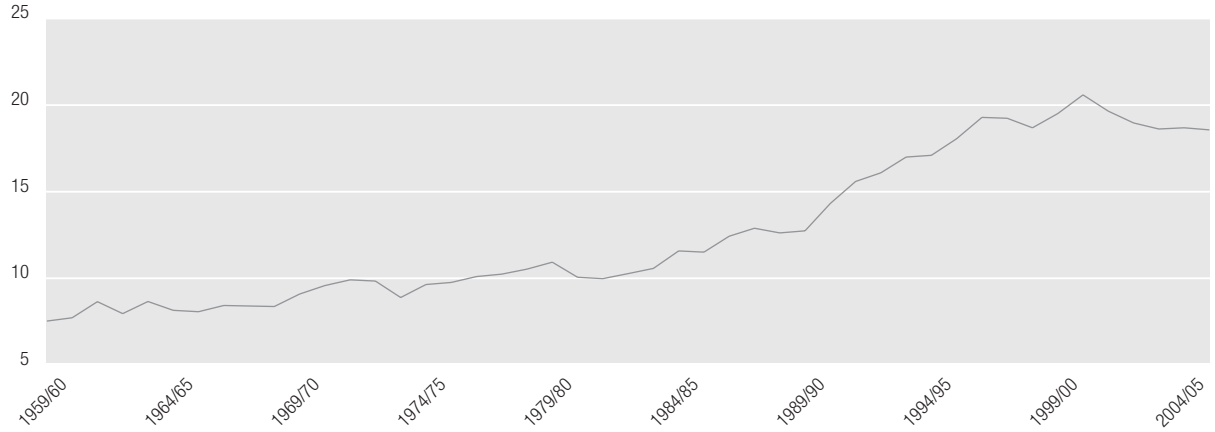
The downturn in export growth contrasts sharply with another measure of Australia's increasing integration into the global economy. The rapid increase in Australian direct investment abroad, which we examine later, demonstrates that in this dimension at least Australian industry has not lost the will or the ability to successfully compete in foreign markets.

This paper looks at the deterioration in Australia's export performance in the new decade, and the contrast between the slowdown in export growth and the acceleration in outward direct investment.

The successes of the past

The deterioration in export performance is all the more disturbing because one of the most prominent changes in the Australian economy in the 1980s and 1990s was a remarkable acceleration in the growth of exports. It was

FIGURE 1 EXPORTS, AS PERCENTAGE OF GDP, 1959–60 TO 2005–06



Source: ABS, HSBC

the most widely cited symbol of Australia's economic renaissance after several decades of faltering growth and economic difficulty.

Though exports accounted for a large share of GDP in 19th-century Australia, two World Wars and the Great Depression in the first half of the 20th century, together with the growth of the services sector, construction, utilities and of a significant protected import substitution manufacturing sector after 1945, saw export growth slowing. At around 8 per cent, export volumes barely changed as a share of GDP in the 20 years from 1961 to 1981.

From the early 1980s, however, exports as a share of GDP began to rapidly increase. Mineral and energy discoveries, the resurgence of Japan and then the rapid development of Korea and other Asian tigers helped exports to grow faster than GDP. By 1991 exports were a little over 14 per cent of GDP. Export growth was checked by the Asian financial crisis in 1997 and 1998 but then resumed. By 2001 export volumes reached 19 per cent of GDP.

Not only had exports as a whole grown faster than GDP over those two decades, but the composition had dramatically changed. In 1980 manufactures[1] were 8 per cent of all exports. By 2000 they were just short of 20 per cent of all exports. The volume of manufactured exports over the 20 years had increased sevenfold. Though less spectacular service exports also rapidly increased from 16 per cent of all exports in 1980 to 22 per cent in 2000.

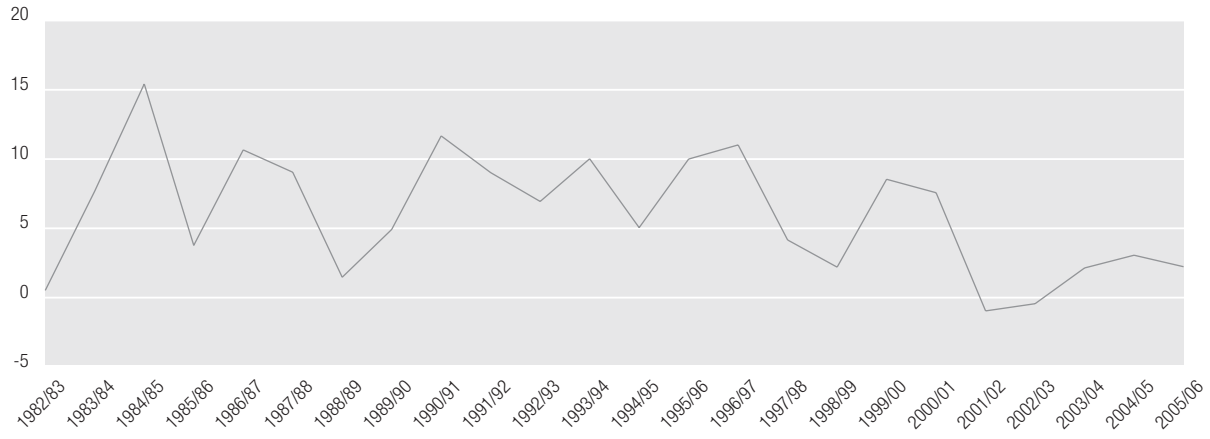
This prolonged export boom changed Australia. It brought thousands of domestic Australian businesses into competition in global markets. The sustained boom in exports stimulated and demanded changes in management and labour practices, efficiency, supply chain development and logistics, in transport and marketing, to meet the global standards to which businesses successfully aspired. It was accompanied by and depended upon a lower and more flexible exchange rate, lower import costs and lower labour costs, changed workplace regulations, and increased productivity.

Mining and farming have been export industries since the beginning of European settlement in Australia. In the 1980s and 1990s other sectors also began exporting an increasing share of their output. Australian services and manufacturing industries transformed themselves into major exporters. In 1981 exports were less than one-tenth of manufacturing sales. Twenty years later, the export share of sales had doubled, even while total sales of manufacturing output had increased by nearly half as much again. The motor vehicle industry, which had been highly protected and focused on the Australian market since inception, exported one-third of its output by the end of the 20th century. In manufactured products too numerous to catalogue, but including pharmaceuticals, precision instruments, metal fabrication and auto parts, Australian firms found and won export markets.

Inward-bound foreign travel grew so rapidly that by the end of the century tourism was one of Australia's major export industries. Education became an export industry, with Australian institutions attracting a disproportionately large share of foreign students compared to the traditional destinations of the United States and the United Kingdom. Wine became a $1 billion export industry, and then a $2 billion export industry.

What caused the export surge? On the demand side the continued rapid growth of East Asia was certainly one factor, with Australian exports to the region growing faster than those to Europe and North America. Over the 20 years to 2000, Japanese output nearly doubled, while the output of Korea, Taiwan and Singapore quadrupled. From well under half of all exports in 1980, exports to the major Asian markets accounted for well over half in

FIGURE 2 EXPORT VOLUME GROWTH, PERCENTAGE CHANGE, 1982–83 TO 2005–06



Source: ABS, HSBC

2000 – even though the share had dropped in the aftermath of the Asia financial crisis.

The growth of new export products, such as tourism and education, reflected the changing demand of foreign customers. It is significant too, that the most rapidly growing markets for Australia's elaborately transformed manufactures were the tiger economies of East Asia.

On the supply side, new supplies of minerals and energy added to Australia's export base over the period.

But while new products and new markets were important, so was the renovation of Australia's economic framework. Tariff cuts initiated in 1988 and again in 1991 reduced costs for Australian exporters, and forced manufacturers to either meet import competition or cease business. If they could meet the competition of foreign producers at home, they could meet it elsewhere. Australian manufacturing began exporting.

Export supply and demand were both encouraged by an important long-term result of the 1983 float of the Australian dollar. The result was that the average exchange rate after the float was much lower than the average exchange rate before the float. Between 1984 and 1986 the trade-weighted value of the currency fell 50 per cent. Over the 20 years from 1986 to 2006 the average trade-weighted value of the Australian dollar was 40 per cent less than its value in the 15 years from 1970 to 1986[2].

The slowdown

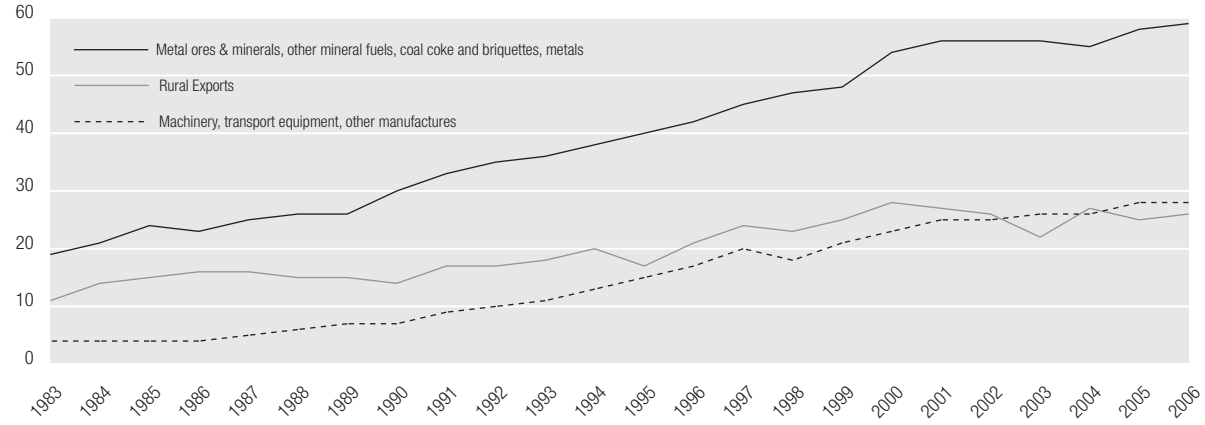
At the beginning of the new century, however, this solid growth abruptly slowed. The year 2001 proved to be the peak of the 20-year export boom. By 2005 export volumes had fallen to just over 17 per cent of GDP, from 19 per cent in 2001. It was the biggest and most sustained fall in export volumes as a share of GDP in 45 years of data.

Exports accounted for nearly one-third of the entire growth of output or GDP over the 20 years from 1980–81 to 2000–01. In the five financial years to 2005–06, they accounted for only a little more than one-sixteenth of output growth.

The value of exports has increased at roughly the same rate as nominal GDP, but three-quarters of that growth in export value in the new decade was accounted for by increases in prices – principally mining commodities, and especially iron ore and coal. This strength in commodity prices disguises the deterioration in Australia's underlying export performance. The cumulative trade deficit, or gap between exports and imports, has been markedly wider as a share of GDP in the five years to 2005–06 than in the previous five years. Without commodity price increases, however, it would have been very much worse. Had export prices remained the same in 2005–2006 as in 2000–2001, for example, and had nothing else changed, the trade deficit in 2005–06 would have been twice as high as it was. It would have been 3.6 per cent of GDP instead of 1.8 per cent of GDP[3], or $35 billion instead of $17 billion.

There was considerable concern too, that the composition of export growth also appeared to change in the new decade. In terms of values (though as we shall see, the story is quite different for volumes), export composition began reverting towards an earlier pattern. Rather than growing faster than exports as a whole, the value of services and manufacturing exports increased much more slowly in the six years to 2005–06 than in the previous six years. The value of manufactured exports increased only 9 per cent over the six years, compared to over 60 per cent in the previous six years. The value of service exports increased only 21 per cent over the period, compared to an increase of nearly 60 per cent in the previous six years – even disregarding the spike in service exports due to the sale of TV rights in the 2000 Olympic Games.

FIGURE 3 THE MAKE-UP OF EXPORTS BY VALUE, SEASONALLY ADJUSTED $ BILLION,1983–2006



Source: ABS, HSBC

Australia's poor export performance contributed to the size of trade deficits during the first half of this decade, and thus to the current account deficit and the addition to Australia's net foreign liabilities over the period. By 2006 net foreign liabilities had increased to 60 per cent of GDP. The ratio will continue to increase faster than GDP, and the servicing costs of foreign debt faster than national income, unless and until Australia can run a permanent trade surplus – a circumstance uncommon in its whole history. Improving exports is a necessary part of the adjustment Australia must eventually make if it is to retain control of its own economic destiny.

Before examining the downturn in more detail, we should note that most of the general supply and demand factors that encouraged the higher rate of growth of exports in the 20 years to 2000 continued into the new decade. East Asian growth was checked by the 1997 financial crisis, but has since picked up. China has become a much more important market to Australia. There has been no lack of demand for Australian commodity exports. The currency has been up and down, but on average has remained cheaper than it was in the years before 1983. So too, the change in Australia's economic framework and in the intensity of competition remain as they were a decade ago.

In examining the downturn in more detail, we will look first at export volumes and then at export values. In each case we will look at minerals and energy commodities, farm commodities, manufactured exports, and services. The results of this enquiry are unexpected.

Export volumes

Compared to the previous 20 years, the rate of growth of exports volumes has plummeted during this decade. Over the financial years 2000–2001 to 2005–2006 the increase in the volume of goods exports averaged 2.1 per cent, less than a third of the average growth of 7.3 per cent from 1982–1983 to 2000–2001.

It is no surprise that rural exports have fallen, given back-to-back droughts. The volume of rural exports fell by an average of 0.7 per cent a year in the new decade, compared to an increase of 4 per cent on average in the years of rapid export expansion from 1982–83 to 2000–01.

It is also no surprise that the volume of metal ores and minerals exports has been growing quite well in the new decade. This category includes iron ore. The average annual increase in the volume of metal ores and minerals exports from 2000–2001 to 2005–06 was 6 per cent, compared to a 4 per cent average annual increase from 1982–83 to 2000–2001. However, given the strength of global demand and the incentive of a sharp increase in prices, the volume increase on the previous decade is somewhat less than might have been expected.

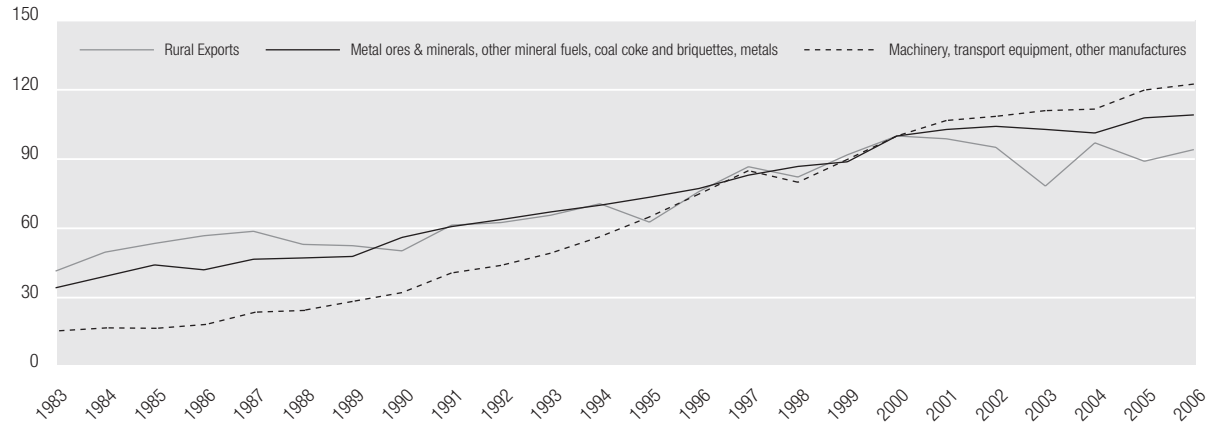
Rural exports are down and metals ores exports are up, but in many other respects the pattern of export growth is surprising.

Though widely thought to be a high growth performer, for example, the rate of growth of the volume of exports of coal, coke and briquettes fell to an average of 5 per cent from 2000–2001 to 2005–06, compared to a 7 per cent average in the years from 1982–83 to 2000–01. This reflects both constraints in mine and transport capacity, and also China's ability to increase its own production of coal.

Metals exports (excluding non-monetary gold) fell by an average of 1.6 per cent a year from 2000–01 to 2005–06, compared to an average increase of 6.4 per cent from 1982–83 to 2000–01. This is probably due not to falling global demand but to the closing down of some metals production in the late 1990s and early in the 2000s.

Reflecting declining oil production, the volume of exports of "other mineral fuels" have fallen on average 2.7 per cent a year this decade, compared to a gain of 12 per cent a year in the earlier period.

FIGURE 4 THE MAKE-UP OF EXPORTS BY VOLUME, INDEX, 1983–2006



Source: ABS, HSBC

The volume of gold exports is well down. Gold exports rose an average of 26 per cent a year between 1982–83 and 2000–2001, and have on average fallen by 1.8 per cent a year since. Falling gold production is the main cause, though the earlier numbers were also inflated by large gold sales by the Reserve Bank of Australia.

Summing the major minerals, metals and energy exports categories (metal ores and minerals, coal coke and briquettes, other minerals fuels, and metals excluding gold) shows that the rate of growth of the total volume of these exports (measured in 2004–05 dollars) fell to 2 per cent in the years from 2000–01, less than one-third of the average growth rate of 6.6 per cent from 1982–83 to 2000–01.

After making up more than half of all goods exports through the 1970s and 1980s, exports of these metals minerals and energy as a share of all goods exports have declined to around 45 per cent in recent years. (Including non-monetary gold, the change in minerals, metals and energy is even more dramatic. Adding gold brings the total of these exports up to half of all goods exports. The average rate of growth from 1982–83 to 2000–01 climbs to 7 per cent, and falls to an average of 1 per cent in the new decade. The calculation is, however, influenced by 1997 gold sales by the Reserve Bank.)

Roughly half of the decline in the growth of Australian export volumes in the new decade is attributable to a decline in the rate of growth of minerals, metals and energy exports, widely believed to be growing exceptionally quickly.

This is remarkable enough. But what is equally remarkable is that even though growing much more slowly than in the earlier period, the volume of manufacturing exports has on average increased *faster* than the volume of all goods exports in the period 2000–01 to 2005–06. The volume of manufactured exports has been rising at roughly the same rate as the volume of coal exports. While exports of oil, metals excluding gold and gold itself have all declined in the 2000s, the volume of manufactured exports has increased.

The sum of the ABS categories of exports of machinery, transport equipment and "other manufactures" rose at an annual average rate of 4 per cent over the years from 2000–01 to 2005–06, compared to 11 per cent from the years 1982–83 to 2000–01. This group corresponds to elaborately transformed manufactures. Of its components, machinery exports slowed from an average of 14.4 per cent to 4.7 per cent, transport equipment from 13 per cent to 2 per cent, and other manufactures from 10 per cent to 4.5 per cent. These three categories of manufactured exports have doubled in importance in the last 20 years. In the mid-1980s they accounted for 10 per cent of goods exports. Today they account for 20 per cent.

Services export growth also slowed, from an annual average of 8 per cent – slightly above the average of goods exports in the earlier period – to an annual average of 2 per cent, or slightly below the average of goods exports in the later period. This calculation is distorted by the sale of media rights to the Sydney Olympics, which were booked in 2000. Even so, the level of services exports has been flat for most of this decade. Travel services increased a little, but there was a gentle decline in "other services". There are measurement issues here that need to be borne in mind. The volume of overseas tourist services is not directly included, but it is separately estimated and shows steady growth over the last decade or more. It has also proved difficult to measure the value of education services exports. But as a share of export volumes overall, services accounted for around one-quarter, so the slowdown in services credits contributed to the slow growth of exports overall.

It is apparent that the slowdown in the growth of volumes of exports is quite widely based, but taking into account the change in growth and their relative importance in the export mix, *most of the slowdown is due to rural exports, oil, metals, gold, and services*.

The story is not much changed if we take a more recent period. It is again the case that the real weakness is in some commodity exports (see Appendix 2).

Export values

The story with export values is different, but not quite as different as one might expect.

The difference between values and volumes is the influence of price changes. These changes may be in the foreign currency or international prices of the goods and services. They may be changes in Australian dollar prices independent of currency changes, though it is unusual to have major exports priced in Australian dollars. The recorded value of the exports may also change because of changes in the value of the Australian dollar, independently of a change in foreign currency price.

The foreign exchange value of the Australian dollar is volatile, and over longer periods its influence may not be important. But from the end of 1996 to the first quarter of 2001 the Australian dollar depreciated, from peak of nearly $US0.80 to a low of a little under $US0.50. This huge move had the effect of increasing the Australian dollar value of exports priced (as most commodities are) in US dollars. The subsequent appreciation from under $US0.50 to around $US0.75 had the opposite effect.

> ... most of the (export growth) slowdown is due to rural exports, oil, metals, gold, and services.

Quite apart from the effect it may or may not have had in increasing the competitiveness of Australian exports or encouraging capital and labour into producing exports, the currency depreciation thus had the mechanical effect of increasing export values in the second half of the 1990s, and diminishing them in the new decade. Since volume growth was also declining, the effect would have been to reinforce a slowdown in value growth. As we shall see, however, it was offset by increases in the US dollar prices of some commodities, especially metals, in the new decade.

Though less marked than with volumes, there is still a marked slowdown in export values growth in the past 5 years compared with the previous 18 years. The value of goods exports increased at an average rate of 10.2 per cent in the earlier period, and 5.6 per cent in the most recent period.

The decline in rural exports is again an important part of the story, with an average increase of 7.8 per cent in the earlier period and an average fall of 2.6 per cent in the latter. The improvement in metal ores and minerals exports is more marked, with an 8.2 per cent average annual increase in the first period and 15 per cent in the second. In terms of volumes, the growth of coal exports slowed in the second period. In terms of values, it accelerated quite markedly, from an average 9 per cent in the first period to a 21 per cent increase in the second. The growth of oil exports slowed markedly from 20 per cent average growth in the first period to 1.3 per cent average growth in the second. Metals fared better in values than volumes, though the growth rate declined. It was 11 per cent in the first period and 3 per cent in the second.

Probably because of the exchange rate appreciation in the past five years, along with stiff global competition, the value of more elaborately transformed manufactured exports did not increase as fast as volumes in this period, whereas the reverse was true of the earlier 18-year period. Machinery exports fell 1.4 per cent on average in the second period after rising 5 per cent on average in the first period; transport equipment rose only 1.5 per cent after rising 13.4 per cent on average in the earlier period, and other manufactures rose only 2 per cent a year on average compared to 13.4 per cent on average in the earlier period.

The growth of gold exports was well down, but values were better than volumes.

Corresponding to the change in volumes the annual average growth in the value of services exports slowed to 3 per cent this decade, compared to a 12 per cent average in the previous 18 years.

It is evident from these results that the main contributions to the marked decline in the rate of growth of export values came from rural exports, services, elaborately transformed manufactures and oil. These were only partly offset by sharp increases in the values of exports of metals ores and coal.

In the two major periods we have been looking at, export growth slowed in the second period compared to the first, but it slowed more for volumes than values. It was also true that commodity exports were by and large responsible for the decline in volumes growth, while the decline in value growth was more broadly based and the performance of manufactures and services in particular showed more deterioration.

Volumes versus values

Movement in volumes and values are both important, for different reasons. It is the change in values of exports and imports which is recorded in the trade balance, which is

part of the current account balance. Even with no change in the volume of exports, a change in the value of exports will change the trade balance and therefore the current account balance. Since a current account deficit must be matched by an equal addition of liabilities to foreigners (whether as additional investment inflow, or additional foreign borrowing), the size of the current account balance is important.

The value of exports is also important in changing dollar incomes of Australians. Even without higher volumes, a higher value of exports will increase profits for exporters and see labour and capital attracted towards that industry.

The standard calculation of "real" GDP or after inflation output and income will eliminate the independent influence of price changes. The percentage increase in the value of exports will be reduced by the percentage increase in the price of exports, and the result is the percentage change in the volume of exports. The bigger the price increase, the more will be taken off export values growth to reach export volumes growth. The same will apply to imports. When the value is adjusted for price changes in this way to arrive at the underlying volume change, it is said to be "deflated".

The ABS also publishes a GDP measure intended to show an effect on real incomes of a change in Australia's terms of trade, or the ratio of export prices to import prices. The technique it uses here is essentially to deflate exports by the change in import prices and imports by the change in export prices. If export prices are rising faster than import prices (which has been true in Australia most of this decade), then the effect of this calculation is to increase apparent export volumes and decrease apparent import volumes. Since export volumes are added to the calculation of GDP and imports are subtracted from it, the overall result is to increase real GDP (and real incomes) compared to the normal method of calculation.

Price is also important, of course, because sooner or later changes in relative prices cause change in volumes. Higher relative prices ought to cause more production, lower relative prices less.

In these respects the value of exports is significant, even if there is no change in volumes. But the change in volumes is also important. While price changes may guide changes in production, the average price of an export will stabilise over time (other than for a general inflation trend) and the returns to exporters will be determined by changes in volume. It is also true that it is the volume of exports that shows actual production of tonnes of iron or coal, and that is therefore most closely tied to the number of employees in the industry, the number of mines, factories and facilities. It is volumes that are counted in the normal calculation of GDP.

The differences in trends between volumes and values is instructive. It guides us to what is better than it appears, and what it worse than it appears. Because the volume of manufactured exports is rising while the value is falling, for example, we can conclude that this export category has not become uncompetitive. It is doing better than it seems. Because the volume of coal exports is falling while values are rising, we can conclude that increases in supply are constrained. There is clearly a problem with coal exports.

Explaining the downturn

It is apparent from the detailed examination of export categories that no single reason explains Australia's poor performance since 2000. It does seem clear that demand influences have played an important role for manufacturing and for services.

For manufacturers, the high real effective exchange rate and the appreciation of the Australian dollar against the US dollar from the bottom of its range to the upper part of its range in the years from 2000 to 2006 would certainly have cut profit margins and discouraged sales.

Even so, the fact that the volume of manufacturing exports rose faster than the volume of commodity exports over the period suggests the price effect on either demand or supply was less than might have been expected. The mechanical effect of currency appreciation in lowering the Australian dollar returns from sales invoiced in foreign currency is unavoidable, and would show up as reduced value of exports. But the increase in volumes indicates that Australian manufactures produced more, despite lower Australian dollar prices.

It is also true that the value of some elaborately transformed manufactures has been growing quickly. This is true of the ABS export categories of inorganic chemicals, pharmaceuticals, fertilisers, plastics, chemicals, metals manufactures, power-generating equipment, general industrial machinery and equipment, electrical equipment, and professional, scientific and controlling instruments.

Wine is another high value-added product, not included in the manufacturing totals, that has done well. The rate of growth has slowed, but the value of beverage exports nonetheless increased by over one-third to just short of $3 billion in the five years to 2006.

The area of greatest disappointment in Australian manufacturing exports has been motor vehicles. The level of exports has held up quite well, with exports in 2006 at $3.8 billion, only a little below the level of $4.3 billion in 2000 when the currency was much cheaper. However, in the previous six years motor vehicle exports had more than doubled.

Metals may be thought of as simply (as opposed to elaborately) transformed manufactures. By value, some

FIGURE 5 AUSTRALIA'S CURRENT ACCOUNT DEFICIT AS PERCENTAGE OF GDP, 1960–2006

Source: ABS, HSBC

have done well. Not surprisingly, the biggest increase by value was for non-ferrous metals, which include copper and aluminium. By contrast, iron and steel exports have fallen due to rationalisation of the Australian industry, offshore production, and the manufacturers' discovery that domestic sales were far more profitable than export sales.

The decline in services sector export growth has been due to slower demand growth. This is true of tourism, which has been hit hard by the fall in long-distance travel after September 11 2001. Australian dollar appreciation, higher aviation fuel prices and higher fares may also have contributed to slower growth. It took three years for visitor arrivals to return to where they were in June 2001. Numbers subsequently increased, but at the end of 2006 tourist arrivals were not much higher than they had been two years before. After very rapid growth in the 1990s, the growth of foreign student numbers at Australian institutions slowed in the new decade. This reflected the higher exchange rate as well as the expansion of China's own education institutions.

For Australian commodities, supply constraints rather than falling demand explain most of the weakness since the turn of the decade. This is certainly true of rural exports, which were cut by drought earlier in the decade and again in 2006. It is also true of oil and gold exports. The volume of oil exports in 2006 was half the volume at its peak in 2000, and the value was also a little less than it had been when it peaked in 2000 despite the increase in price. The value of gold exports nearly doubled in 2006 compared to the previous year, but there had not been much increase over the previous five years. While exports of coal have increased, they have not increased as much as in the past two decades – despite markedly higher prices. Constraints in coal exports are quite apparent in the shipping delays in the major coal ports of Newcastle and Dalrymple Bay in Queensland. Iron ore exports have increased faster this decade than in earlier decades, but there too the industry reports difficulty in meeting demand and considerable investment has been undertaken to increase future production.

Why exports matter

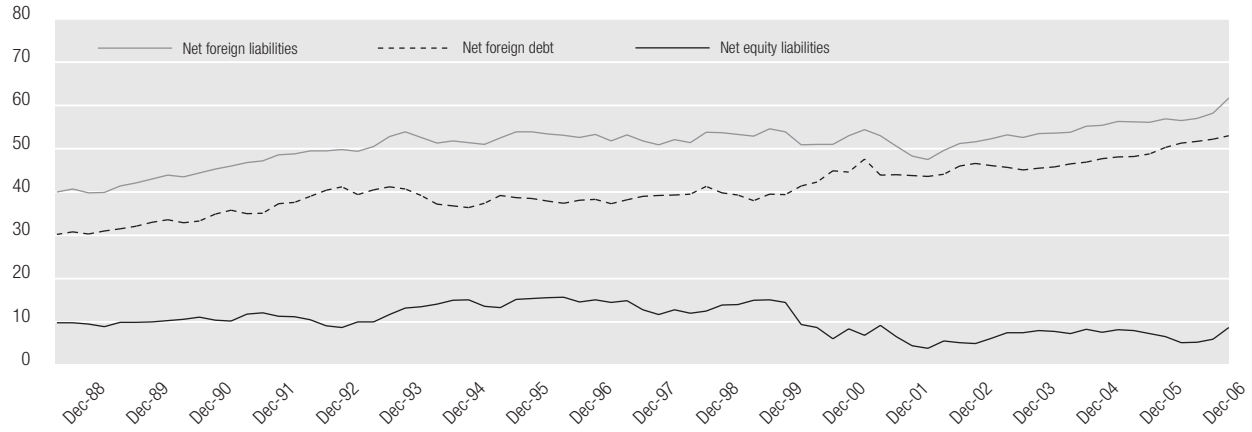
Because export growth has fallen, Australia's trade deficit has been higher than it would have been had exports continued to increase at the trend rate prior to 2000. This in turn means that the current account deficit has been higher than it would have been otherwise, and Australia has had to borrow more offshore to match the deficit. The decline in export performance coincides with the sharp increase in net foreign liabilities compared to GDP (see figures 5 and 6).

Net foreign liabilities are now 60 per cent of GDP. It can be shown that if Australia wants to stabilise net foreign liabilities at say 100 per cent of GDP, it must at that point permanently limit the current account deficit to a maximum of 5 per cent of GDP, and it must do so by running a trade surplus of 1 per cent of GDP (See Appendix 1). If it wished to limit foreign liabilities to 60 per cent of GDP, the required trade surplus would be lower, but it would still have to be permanent.

How hard is for Australia to move to a persistent surplus of exports over imports?

The required surplus is not big, but Australia has not run a consistent trade surplus for over 30 years – and then not for very long. In recent years the trade deficit has been 3 per cent of GDP. The move to a surplus of 1 per cent of GDP means exports have to be increased by 4 per cent of GDP or imports cut by 4 per cent of GDP, or some mix of the two. The current account surplus is also equal to the gap between domestic savings and

FIGURE 6 AUSTRALIA'S FOREIGN LIABILITIES, PERCENTAGE OF GDP, 1988–2006



NOTE: NEGATIVE NUMBERS ARE SURPLUSES

Source: ABS, HSBC

domestic investment. Looking at the requirement for stabilisation of foreign liabilities to GDP from this point of view, it means Australia has to save 4 per cent of GDP more than it does, or invest 4 per cent of GDP less, or some mix of the two.

Australia experienced a business investment boom in the three years to 2006, much of it in mining. No doubt, that investment will result in higher export production in coming years. It would take several years of growth at the rate achieved towards the end of 2006 to restore export volumes to the same share of GDP they had reached at the beginning of the decade.

The unexpected and disappointing export performance of the new decade caught Australia by surprise. The experience contains an important lesson. Almost all trade policy emphasis for the last several decades has been on measures to increase the foreign demand for Australian goods and services. This policy objective motivates Australia's leading participation in the World Trade Organisation and its search for regional trade agreements. It rationalises government support for export marketing through Austrade and export financing through EFIC and AusAid.

But the lesson of the new decade is that failures of supply can be as damaging as failures of demand. Accordingly, restoring Australia's export success and, in doing so, stabilising the rate of growth of foreign liabilities compared to GDP requires policies that influence supply. These include the removal of infrastructure bottlenecks, the provision of additional infrastructure to meet expected demand, programs in education, training and retraining that increase the supply of skilled workers, and programs that support the basic science, engineering and research and development that no single business can make commercially viable.

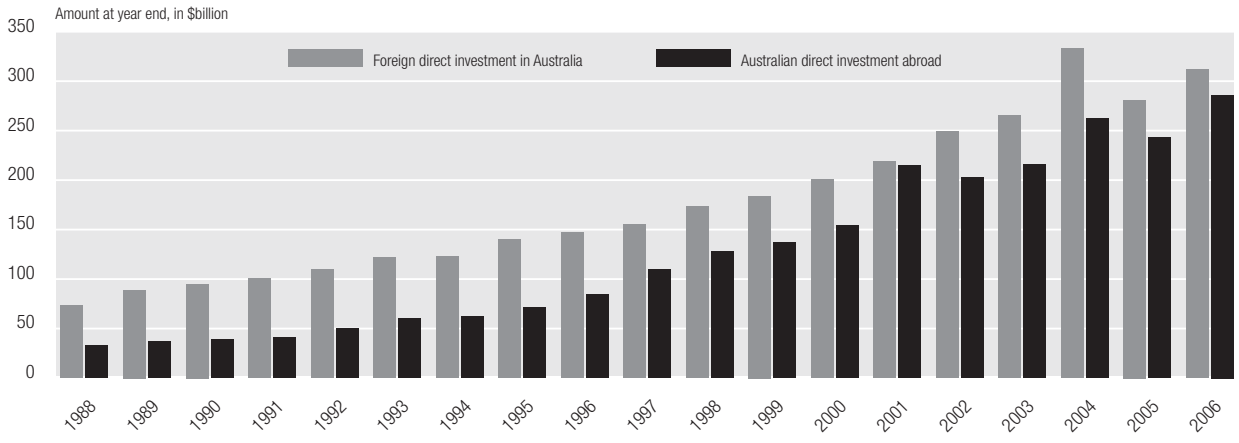
The investment revolution

Though the deterioration of export performance might suggest Australian business is less interested in seeking success in the global economy, the acceleration of direct offshore investment shows otherwise. Far from retreating from the global economy, Australian businesses integration into it has accelerated (see figure 7).

A quarter of a century ago the stock of Australian direct investment abroad was only one-fifth of the stock of foreign direct investment in Australia. (As distinct from portfolio investment, direct investment is where the investor owns ten per cent or more of the business). Even by the beginning of the 1990s, Australian investment abroad was less than half of foreign direct investment in Australia. Over the last two decades the stock of foreign direct investment in Australia has trebled, while the stock of Australian direct investment abroad has increased seven-fold. Australian direct investment abroad now rivals foreign direct investment in Australia. By the end of 2006 the stock of direct Australian investment abroad (AIA) was $286 billion, compared to the stock of foreign direct investment (FDI) in Australia at $312 billion. In just 20 years the stock of Australian direct investment abroad increased from 32 per cent to 92 per cent of the stock of foreign direct investment in Australia.

Given these trends, it will not be long before Australian business assets abroad exceed foreign business assets in Australia. It is already the case, for example, that the value of Australian direct investment in the US very considerably exceeds the value of US direct investment in Australia. Were it not for the change in the domicile of News Corporation, a transaction that reduced the stock of Australian investment abroad and at the same time increased the stock of foreign investment in Australia, Australian ownership of foreign businesses worldwide would already exceed foreign ownership of Australian businesses.

FIGURE 7 AUSTRALIAN DIRECT INVESTMENT ABROAD COMPARED WITH FOREIGN DIRECT INVESTMENT INTO AUSTRALIA, AMOUNT AT YEAR END IN $ BILLION, 1988–2006



Source: ABS, HSBC

Australia does not have a single international flagship such as a Nokia or a Sony or a Phillips, but it does have plenty of successful businesses that have turned their experience of the Australian market to global advantage. Australian firms dominate parts of the US buildings materials business. They are expanding in insurance, medical technology, real estate, investment banking, mining and mining services, rural products, software – all sectors in which Australia developed world-class domestic firms which then expanded offshore.

In just ten years the value of Australian direct investment abroad has increased by a solid $200 billion. This massive offshore expansion is not without risk. Many offshore expansions succeed, but as we have seen over the years, some do not. And the big push into offshore equity investment has also changed the structure of Australian net foreign liabilities. As a country we borrow abroad both to finance our current account deficit and to acquire foreign businesses. The result is that we borrow more than we otherwise would, and while our net equity liabilities have fallen, our net debt liabilities have dramatically increased. Net foreign debt is now ten times the size of net equity liabilities. This creates a potential vulnerability, but over the long haul the returns on equity will be higher than the returns on debt and we will be better off tomorrow for the energetic global expansion of Australian business today.

By 2005, many of the iconic corporations of Australia's earlier development were wholly or partly owned offshore. Mount Isa Mines had been purchased outright, and CRA absorbed wholly into Rio Tinto. BHP Billiton was still largely managed from Australia, but nearly two-thirds of its ownership was offshore. The international media company News Limited, which began its life in Adelaide, had changed its domicile to the US.

But the wave of offshore investment by Australian businesses created a new generation of Australian-owned and operated businesses earning an increasing share of their revenue offshore and becoming global leaders in their fields. The two major retailers, the four big banks and Telstra remain very largely domestic businesses, but a great many of the rest of Australia's top 100 public corporations had internationalised by 2005. They included Westfield, Macquarie Bank, CSL, Resmed, Cochlear, Rinker, Boral, Brambles, QBE, James Hardie and many, many others.

Explaining the globalisation of Australian business

One common motive of investment abroad is the pursuit of lower labour costs in less developed economies. This motive explains some but not much of the boom in Australian direct investment abroad. Of the total of Australian direct investment offshore at the end of 2005, just under 90 per cent was located in OECD countries. The US economy, which on average has higher labour costs than Australia, accounted for a little less than half of the total stock of Australian investment abroad. The UK accounted for 17 per cent and New Zealand for 16 per cent.

Australian businesses owned smaller but significant assets in Canada, Germany and the Netherlands. The two biggest investment destinations in Asia were Singapore and Hong Kong, both economies with labour costs that match or exceed Australia's (though some investment in Hong Kong may be through Hong Kong into China).

The stock of Australian investment in China was still under $1 billion at the end of 2005; in Indonesia it was only $0.8 billion.

These shares in the stock of direct investment abroad have not much changed in recent years. Most investment continues to go into the US, the UK and New Zealand. Investment in China is growing, but remains quite small.

The forces driving this change are readily apparent. Businesses that succeed in Australia often do so against international competition, and in a market that has many of the same characteristics as other developed country markets. More effective competition law in Australia in the last two decades has forced successful Australian businesses to look offshore for expansion, rather than absorbing the domestic competition.

... Globalisation encourages midsized specialists against national heavyweights.

The destination of foreign investment reveals a great deal about the motives and drivers of Australian investment abroad. Partly because of its small population, relatively high labour costs and the past decades of tariff protection, Australia has developed very few mass market manufacturing industries. It is typically these industries that have relocated their labour-intensive processes into East Asia over recent decades. Japan, Korea, and Taiwan, for example, have moved much of their manufacturing into China. Australia did not have much labour-intensive mass market manufacturing to move[4].

A 2002 survey by the Productivity Commission asked companies why they invested offshore. Not surprisingly, it found that "improved access to overseas markets is by far the most important commercial factor influencing decisions by Australian firms to move offshore". In some cases and especially for manufacturers, lower labour costs were important. Other motives included closer proximity to shareholders, deeper capital markets, more congenial tax regimes, and a wider spread of market and production risks.

The typical Australian globaliser is a business that has been successful in Australia but has outgrown the relatively small home market. Stronger competition laws in Australia over the last few decades have discouraged domination of the home market by a single business, increasing the pressure to look offshore.

Economic globalisation increases the opportunities for differentiation and specialisation by vastly increasing the market size. One implication is that successful globalisers are not necessarily big businesses, though they will often be dominant within their market segment in Australia. Offshore investment reflects specialisation rather than size. In the last decade or so the typical successful business has intellectual property, marketing and management skills and a business concept that have been successful in Australia and can be replicated elsewhere. Globalisation encourages midsized specialists against national heavyweights.

Australia is a wealthy OECD country, with similar characteristics to other wealthy OECD countries – especially the US, UK, Canada and New Zealand. For example, the Australian economy has a very large service sector that utilises world-class management, marketing and technology. Because of its characteristics and preferences it has developed particular skills in transport and logistics, medicine, real estate and residential development, funds management and finance generally, sport, gambling, farm technologies, mining and mining services.

Boral, Rinker and James Hardie dominate sectors of the US building materials market. The global businesses of medical technology firms CSL, Resmed and Cochlear are now much more important than their Australian businesses. In logistics, Brambles dominates the global market for shipping pallets. In finance, Macquarie Bank is important in infrastructure funds management, QBE in insurance, Westfield in shopping mall development and management, Lend Lease in construction, BHP and Woodside in mining, WorleyParsons in mining services, Foster's in alcohol, PBL in gambling and Amcor in packaging. These are just a few of hundreds of Australian businesses, large and small, public and private, which have substantial businesses offshore as well as in Australia.

Export failure, investment success

The deterioration in Australia's export performance is not due to the failure of Australian manufacturing to compete, as is sometimes supposed. On the contrary, the facts suggest that while manufacturing exports are not growing as fast as in the previous two decades, they have held up as least as well as exports of metals, minerals and energy this decade. The downturn in service export growth is related to lower demand growth for Australian education services, and lower growth in long haul flight tourism. Otherwise, much of the weakness has been precisely in those export categories where Australia is thought to be doing well – metals, energy and minerals. The shortcomings are in supply rather than demand, and the remedies must be at home rather than abroad. More attention to Australia's export infrastructure needs and workforce skills must be part of the solution. Meanwhile, as is apparent in the acceleration of direct business investment abroad, Australia's integration into the global economy flourishes in new ways.

Appendix 1: Stabilising Australia's net foreign liabilities

It is noted earlier in this paper that if Australia wants to stabilise net foreign liabilities at, say, 100 per cent of GDP, it must at that point permanently limit the current account deficit to a maximum of 5 per cent of GDP, and it must do so by running a trade surplus of 1 per cent of GDP

The current account deficit is also equal to the excess of domestic investment over domestic saving. In principle, the additional liability created by the current account deficit is matched by additional investment, which will service that liability. Not all the additional investment, however, is capable of servicing the additional liability. About half of the increased investment in the last decade has been in the construction of houses. These houses provide many valuable services, but there is only a tenuous link between the quality and cost of the housing stock, and a nation's capacity to export and thus service debt.

Business investment has certainly increased, but not all of business investment is capable of servicing an increased liability by adding to output. The capital stock is roughly five times the size of annual investment, and each year roughly one-tenth of capital stock wears out. Depending on the asset type, around half of total new investment therefore only replaces worn out capital, rather than adding to the capital stock. Since this proportion of new investment does not increase the existing capital stock, it cannot add to output.

The best measure of an additional capacity to service debt is the addition to net capital stock. This varies but in the period 1990–91 to 2004–05 it averaged around 5 per cent of GDP. There is a good argument for saying the average addition to net capital stock (excluding housing) should also be the average maximum sustainable current account deficit. If the current account deficit is bigger than the addition to net productive capital stock, the additional liabilities must be bigger than the additional productive assets. Part of the offshore borrowing must have been used to sustain the existing capital stock, household consumption and house building. Since the additional debt has to be serviced, the result would be a relative decline in living standards in future years.

This rule sets a desirable limit to the current account deficit. It does not say the foreign lenders will not provide the funding to exceed it. It does say that beyond about 5 per cent of GDP Australians are using foreign savings to fund household consumption, house building, and the depreciation of existing business capital rather than the creation of assets which would service the new debt.

A deficit of around 5 per cent of GDP is actually higher than the 4.3 per cent average of the 14 years of expansion to the end of 2005, and would not therefore appear to be a difficult challenge. It will increasingly become so, however, because of the iron arithmetic of the current account.

The first proposition in this arithmetic is that the Australian economy grows by around 5 per cent a year on average, including both increase in the volume of goods and services and the increase in their prices. The second is that net foreign liabilities are now equal to 60 per cent of GDP. The third is that foreign lenders and investors expect to receive a return of around 6 per cent on their Australian assets.

Those three propositions have some powerful implications. The first result is that any current account deficit higher than 3 per cent of GDP will see net foreign liabilities increasing as a share of GDP. (This is because 3 per cent of 100 is 5 per cent of 60.)

The second is that the cost of servicing existing liabilities is 3.6 per cent of GDP. (This is because 6 per cent of 60 is 3.6 per cent of 100.)

It follows that to stabilise net foreign liabilities at 60 per cent of GDP Australia would need to run a trade surplus of at least 0.6 per cent of GDP. This is because the net income deficit or cost of servicing foreign liabilities is a component of the current account deficit, and the net income deficit is 3.6 per cent of GDP. To get the current account deficit down to 3 per cent requires a trade surplus of 0.6 per cent.

When net foreign liabilities are 100 per cent of GDP the net income deficit will be 6 per cent of GDP. If at the point the economy is growing at 5 per cent, any current account deficit higher than 5 per cent of GDP will increase net foreign liabilities as a share of GDP. But since the net income deficit is already 6 per cent of GDP, it follows that Australia requires a trade surplus of 1 per cent of GDP to prevent liabilities continuing to increase faster than GDP. It also requires a trade surplus to prevent the current account deficit increasing and remaining beyond the critical level of 5 per cent of GDP.

So, the conclusion: if Australia does want to stop net foreign liabilities at 100 per cent of GDP in 2015, it must at that point to limit the current account deficit to a permanent maximum of 5 per cent of GDP, and it must do so by running a trade surplus of 1 per cent of GDP.

Appendix 2: Export volumes from 2004

In the period from 2004 onwards export volumes have continued to perform below their post-1982 trend rate of growth.

In the financial year 2004–05 the volumes of goods exports increased 3.2 per cent, and in the following year, 2.1 per cent. Rural exports were above the average of all goods in 2004–05, but fell in 2005–06, perhaps because drought conditions had initially stimulated sales as cattle were turned off, and then cut sales as the stock fell. Exports of metals ores and minerals were stronger than the average of all goods in both years, through at 3.9 per cent, the growth in 2005–06 was less than half the 8.4 per cent increase the previous year. Exports of metals fell in each of the three years to 2004–05, but then rose by a little over 9 per cent in 2005–06.

In 2005–06 manufactured export volumes increased well above the average of goods exports as a whole. Machinery exports expanded 11 per cent in 2004–05 and 4.2 per cent the next year, transport equipment (which includes cars) fell in 2003–04 and again in 2004–05 but rose nearly 6 per cent in 2005–06. The category "other manufactures" rose 6 per cent in 2005–06, and had increased in each of the previous years.

If the strength of manufactures is unexpected, so too is the persistent weakness of coal export volumes. They increased nearly 6 per cent in 2004–05 but fell by 0.6 per cent in 2005–06. So too, oil exports fell nearly 4 per cent in 2005–06 after increasing a little over 1 per cent in 2004–05. The volume of gold exports may be recovering. They rose nearly 9 per cent in 2005–06 after falling in the previous two years. However, gold exports are volatile from year to year and a sustained increase is not yet apparent.

Wine exports were widely said to be in trouble, but the numbers show the volume of beverage exports rose substantially in the three years to 2005–06, although at a little under 4 per cent export growth in 2005–06 it was less than a third of the previous year.

The weakness in volumes in the last year has been in coal, oil and rural exports.

ENDNOTES

1 Using the three Balance of Payments categories of machinery, transport equipment, and other manufactures. ABS 5302.0

2 Though the change was not as big, the real effective exchange rate also fell after the float. This is the exchange rate against a basket of currencies weighted for Australia's trade composition, and adjusted to take account of the different inflation rates in the countries concerned. The average real effective rate in the 23 years following the float was 27 per cent less than the same rate in the 13 years prior to the float.

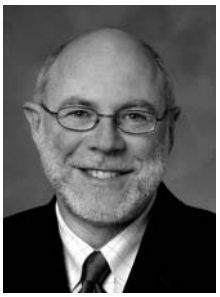
3 Taking financial years, the value of exports in 2005–06 was 51 per cent higher than in 2000–01 and the volume 12 per cent higher.

4 A study by the Productivity Commission appears to show otherwise. It reported that for 1999–2000 two-thirds of the businesses investing offshore were in manufacturing, and that the share had increased from 51 per cent at the beginning of that decade. The ABS data on the destination of offshore investment, however, suggests that labour cost cannot be the predominant motive. Presumably, manufacturers have indeed invested offshore but they are by and large small businesses. For example, this would be true of textiles, clothing and footwear, which have been forced offshore by tariff cuts. (Very often these businesses will contract with a local firm to make the product, so the move offshore does not show up as investment.)

competing THROUGH innovation

An international perspective

6



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Introduction

There is increasing recognition around the world that innovation is a key driver of the competitiveness of firms and organisations in the global economy, and the quality of both private and publicly provided services. The Australian Government is one of many encouraging innovation as part of a strategy to "enhance … international competitiveness, economic prosperity and social wellbeing" (*Backing Australia's Ability, 2001, 2004*). It will be argued here that this strategy has shortcomings that must be urgently addressed.

PHOTO: iSTOCK

Innovation has been defined and interpreted in many ways. Essentially, we can take it to mean "doing new things or doing things in a new way", drawing on knowledge and creativity to add value to products and processes. It is now evident that the most successful societies of the new millennium will grasp the challenge of innovation, make it their vision of the future and translate the vision into reality. To compete on a global scale, and to do so in a sustainable way, Australia must ensure that it is one of these societies. This is the central proposition of a recent policy statement by the Business Council of Australia (BCA 2006), which notes diminishing returns from microeconomic reform and makes the point that, "While productivity has become the primary determinant of our economic prosperity as a nation, innovation in turn has become an increasingly important factor in productivity growth".

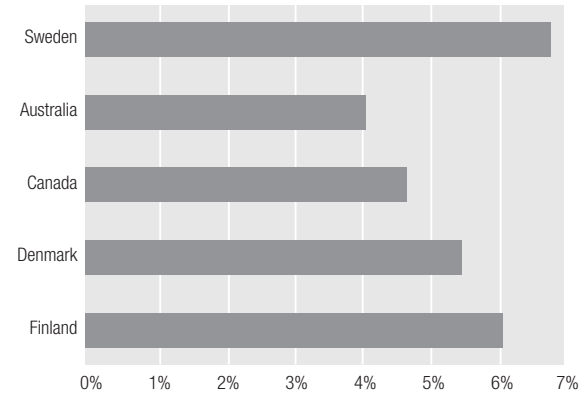
Why innovation

Traditionally, wealth was thought to have its source in land, labour and capital as factors of production, but with the joining of information to technology the world changed forever. This new industrial revolution has forged greater understanding among business leaders, researchers and policy-makers of the dynamic role of innovation in creating value for organisations and, in doing so, transforming the productive performance of whole economies.

Australia is currently experiencing an unprecedented boom in its primary commodity exports, and a reversal in the decades-long deterioration of its terms of trade, as markets are reshaped by China's entry into the world economy. Whether this boom proves to be temporary or longer lasting, significant adjustments will be required for Australia to take advantage of its good fortune and prepare for an uncertain future. Possible scenarios for Australia in coming years include the so-called "Dutch disease", where a rise in the exchange rate associated with North Sea gas discoveries made much of Dutch industry uncompetitive, or Britain in the 1980s, where a North Sea oil windfall was squandered on domestic consumption, or alternatively Norway, which has leveraged its oil wealth for strategic investment in research, education and infrastructure.

Norway is following the example of countries that have sought competitive advantage through knowledge-intensive products and services. Many of these are small economies on the periphery of larger markets. They include Finland, now a world leader in mobile telephony and related technologies; Ireland, whose success is based

FIGURE 1 INVESTMENT IN KNOWLEDGE (R&D, HIGHER EDUCATION, SOFTWARE), PERCENTAGE OF GDP, 2002



Source: OECD

on integrating global investors with local supply chains to build a presence in software, pharmaceuticals and medical devices; Taiwan, with its formidable manufacturing capability in electronics and information technology; and Singapore, which is reinventing itself as a trade, investment and financial services hub for the Asia-Pacific region.

Other successful knowledge-based economies may be larger, but they are similarly characterised by geographically concentrated clusters of skills and technologies that drive an increasing share of growth. Examples from the United States have included Silicon Valley, the Carolinas "Research Triangle", Austin Texas, and, following the exit of computer hardware, the remarkable emergence of a Massachusetts biotech region. And from Europe, examples include biosciences clusters in Cambridge and Munich, digital media in South-East England and Flanders, and French "competitiveness poles" such as Grenoble and Sophia Antipolis.

While these economies are diverse and complex, with distinctive systems of governance and public policy, there is arguably a single common thread in their success – *investment in human capital and infrastructure*. It is this investment, through a mix of government, business and education institutions that creates innovation capacity at national and regional levels. This capacity in turn underpins the development of more specific innovation capabilities at the organisational level, where it counts for growth, employment and competitiveness.

Scope of Innovation

Innovation can only be understood in its totality as a combination of different but interrelated elements contributing to the development of new, commercially relevant products and processes, or the delivery of better, more cost-effective services. It ranges from what Clayton Christensen calls "sustaining" or incremental innovation, by improving the performance of organisations, to "disruptive" innovation, which creates whole new markets. While the innovation pathway may proceed along a conventional, "linear" route from scientific discovery to exploitable invention, and then to market, this tends to be the exception rather than the rule. Innovation is both a more complex and much broader phenomenon.

Essentially, innovation has at least three main elements – technological, organisational and institutional. The first of these, *technological innovation*, is often identified with the formal, codified knowledge arising from basic research in science and technology, and its application to product and process development. In this sense, it can be measured by the output of scientific papers and patents, and a strong correlation with public investment in research and education is suggested by the international data. However, such innovation may also reflect continuous improvement in technology, which results from an internal focus on quality and externally from a broader process of networking and collaboration, including with customers and suppliers, and is inherently more difficult to quantify.

Australia has always compared well in scientific output, but declining research and education spending over many years threatens this achievement. There are also serious gaps and weaknesses in R&D performance and in the transfer of knowledge to markets by industry and public research organisations. While technological innovation has been stepped up in the past decade, so has the performance of the rest of the world, and in many countries at a faster pace. According to OECD data for 2004/05, Australia spent 1.76% of GDP on R&D,

Australia has always compared well in scientific output, but declining research and education spending over many years threatens this achievement.

lagging behind the OECD average of 2.26% and far short of leaders such as Finland (3.5%), Japan (3.13%) and the US (2.68%). While R&D may not be a comprehensive performance measure, it is a reliable proxy.

ABS data point to a 25% increase in higher education expenditure on R&D to 0.48% of GDP in the two years to 2004, which is still behind leaders such as Sweden (0.88, 2003) and Canada (0.73) but a clear improvement. On the other hand, the modest increase in business expenditure on R&D to 0.95% of GDP in 2005 compares much less favourably with the position in Sweden (2.95%), Finland (2.46%), Japan (2.36%) and Korea (2.01%). Aggregating expenditure on R&D,

higher education and software into an index of "investment in knowledge", OECD data show Australia trailing comparable countries at 4.1% of GDP, including Canada at 4.7% with a similarly substantial resources sector, Denmark at 5.5%, Finland at 6.1% and Sweden at 6.8% (see Figure 1).

Indeed, it is often the structure of Australian industry that is treated as justification for low levels of business expenditure on R&D. While Australia does have a larger resources sector and smaller scale manufacturing than other countries, there is also a much lower proportion of "high tech" industries in manufacturing exports than the OECD average, and less innovation reported as a percentage of total manufacturing sales. Moreover, this justification ignores the importance of R&D in mining and agriculture, and of innovation more broadly in "low tech" industries and services, where "absorptive capacity" for externally sourced technologies and skills may be the driver of competitive advantage rather than internal R&D. Even in the most advanced knowledge-intensive economies, high-tech firms account for a relatively small share of output and employment, though they impact disproportionately on growth and productivity.

Of course, not all knowledge is codified and measurable, and nor does innovation always embody R&D in new products and processes. The second element of innovation is *organisational innovation*, where knowledge and learning may be tacit as well as codified, and yet may transform organisations through adaptation and absorption of new technologies, introduction of new operational processes and implementation of new workplace structures and practices.

Significantly, a recent ABS-DITR (2006) survey, *Patterns of Innovation in Australian Businesses*, found that non-R&D spending accounted for over two-thirds of total business expenditure on innovation, but that only 35% of firms across industry sectors undertook even this broader definition of innovation in the survey period 2001–03. While most innovating firms reported changes that were "new to the business" rather than "new to the world", research suggests that organisational innovation can result in substantially improved performance. In this context, the BCA (2006) has argued that the innovation debate "needs to be broadened to address the question of whether businesses in Australia are able to maximise the potential level of innovation within their companies".

There is support for this approach in IBM's 2006 global CEO survey, *Expanding the Innovation Horizon*. While CEOs continue to place more emphasis on technological innovation, according to the survey, they now focus 30% of their efforts on organisational innovation, particularly changes in their business models. Further, "companies that have grown their operating margins faster than their competitors were putting twice as much emphasis on business model innovation as underperformers". In this context, CEOs identified "organisation structure changes" and "major strategic partnerships" as key features of business model innovation.

Clearly, as the IBM survey indicates, firms engaged in innovation do not operate in isolation from the external business and public policy environment. They also benefit from structured collaboration, technology spillovers, networking and knowledge diffusion, where the boundaries of the extended enterprise become less easy to draw. Recent research has highlighted the emergence of "open systems" approaches to innovation, including increasing engagement with the innovative feedback loop generated by customer engagement. In Australia, a recent DITR (2006) analysis, *Collaboration and Other Factors Influencing Innovation Novelty in Australian Businesses*, found that firms that collaborated for innovation had a much greater chance of achieving a "new to the world" degree of novelty, especially in technology intensive sectors.

…this justification ignores the importance of R&D in mining and agriculture, and of innovation more broadly in "low tech" industries and services.

Internationally, a Frost and Sullivan (2006) research program supported by Verizon Business and Microsoft found that "collaboration works in conjunction with strategic orientation and opportunities inherent in the market environment… to improve business performance", and that collaboration was more than twice as significant for performance than these other factors. This is largely confirmed by the results of the IBM survey which showed that "extensive collaborators outperformed the competition in terms of both revenue growth and average operating margin", though many CEOs were said to be "lacking the skills and expertise needed to collaborate and partner externally".

This is why the external environment of innovating firms is, and must be, shaped by *institutional innovation*, the third element of innovation. Successful and emerging knowledge-based economies are typified by sets of institutions that support not only the internal capabilities of firms and organisations but also the interrelationships that allow them to realise their full productive potential in the context of national "systems of innovation". International comparative studies by Michael Porter and others have demonstrated that national innovation capacity – including research, education and networking infrastructure – may be as important as internal technological capabilities in driving competitiveness.

Australia's innovation system

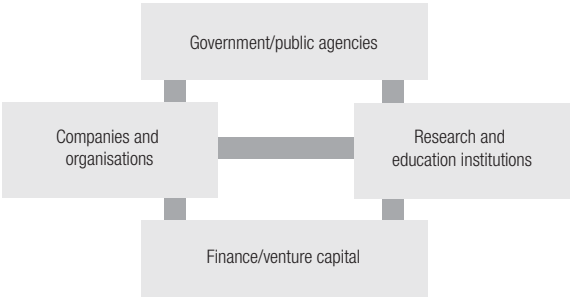
The development of world-class innovation capacity requires as its precondition a national commitment to invest in human capital and infrastructure, including schools and universities, vocational education and training and provision for life-long learning. Such an investment will ensure a skilled and adaptable workforce, ready to meet the challenge of innovation and change. Significantly, the IBM global CEO survey identified employees as the main source of innovative ideas in organisations, followed closely by business partners and customers.

While Australia performs well on some education and training indicators, a major problem inhibiting progress is that, against the trend of all other countries, total public education spending is actually in decline, and now even lags spending on defence. The OECD (2005) has noted that Australia is the only country "where the shift towards private expenditure at tertiary level has been accompanied by a fall in the level of public expenditure in real terms". This is at a time when, according to an independent working group for the Prime Minister's Science, Engineering and Innovation Council (PMSEIC), China and India, as well as the US and Europe, are increasing the rate of investment in human capital as a matter of priority: "Today we stand at the brink of a new era – investing in our education and research base now will create opportunities to build a technology-based Australian economy that is internationally engaged".

Similarly, the *Australian Innovation Scorecard* indicates a better than average performance up to now in per capita publication of scientific and technical articles. Yet other countries are catching up fast, and a much worse performance in per capita US patents suggests a "disconnect" between research and the transfer of knowledge to markets, which may in turn be symptomatic of a wider failure. It has been clear for some time since the work of Chris Freeman and Richard Nelson that innovation capacity depends not only on the research and education infrastructure, but also on an effective national innovation system, defined by Nelson in 1993 as a "set of institutions whose interactions determine the innovative performance of … national firms". Keith Smith and Jonathan West have recently applied these observations to Australia:

> *The capacity to innovate is capability based, cumulative, collaborative in character, and highly uncertain. So any successful innovating economy needs mechanisms and institutions to provide sustained investment in capabilities to manage collaboration and cope with risk and uncertainty and their implications for business development. The "national innovation system" is the totality of these mechanisms and institutions: it is the overall context within which innovation occurs (Smith & West, 2005, p. 16).*

FIGURE 2 NATIONAL INNOVATION SYSTEM



Source: BCA (2006)

The Australian Government's (2002) report on *Mapping Australian Science and Innovation* restated "the importance of strengthening our ability to generate ideas and undertake research, accelerating the commercial application of these ideas, and developing and retaining skills". *Backing Australia's Ability* (2004) emphasised "the complex nature of innovation and the importance of the people, linkages and interactions between the different system elements". Certainly, Australia's national innovation system has pockets of excellence, but its effectiveness is compromised by the lack of innovation policy focus and "joined-up thinking" in government, public agencies, business and universities as much as by funding deficiencies. These are key actors in the innovation system (see Figure 2) who must have a shared understanding of their role and interrelationships for the system to deliver results and build innovation capabilities at the level of individual firms and organisations.

For example, were there to be a substantial increase in research funding for priority areas of science, engineering and technology, how would resulting inventions and disclosures find their way to market as products with commercial potential? By what mechanisms would partnership opportunities between business and universities be maximised? And how would infrastructure and expertise be deployed for intellectual property protection, licensing arrangements, equity stakes and spin-offs? More broadly, as the UK's Lambert (2003) *Review of Business-University Collaboration* noted, the further challenge "is not about how to increase the supply of commercial ideas from the universities into business. Instead, the question is about how to raise the overall level of demand by business for research from all sources".

Australia's national innovation system has major gaps at both strategic and operational levels. At the strategic level, there is little understanding of the long-term advantages conferred by a comprehensive innovation system, which promotes both the generation and systematic application of knowledge within and across sectors. While Australia is unlikely to become a significant "tech-

nology maker" in its own right, this does not imply a role only as "technology taker". There is scope for a *technology integrator* to add value to existing products and services and create new ones by providing business solutions. Some validation may be found for this approach in the innovation literature, including the IBM global survey whose "CEOs view business and technology integration as integral to innovation", though a much lesser proportion had the capacity and skills to undertake it successfully.

At the operational level as well, innovation agencies in Australia have neither the support or funding to emulate the role of their counterparts in other countries, such as the Fraunhofer institutes in Germany, the Finnish Funding Agency for Technology and Innovation (Tekes) and the highly effective Enterprise Ireland. These agencies work with business and public research organisations to identify and evaluate opportunities and then to exploit them in a systematic way, from "proof of concept" stage to commercial application, including opportunities for business and technology integration. In some cases, these agencies also support technology transfer and commercialisation to ensure research funding is used for public benefit, either individually or on a "shared services" basis as in Switzerland, Israel, Midlands UK and the University of California system (Cunningham & Harney 2006), and to encourage universities to become "innovation hubs" for business networks and clusters. Public agencies of this kind are simply part of a whole new emerging technology and innovation infrastructure of "innovation intermediaries" (Dodgson, Gann & Salter 2005).

Building innovation capabilities

Ultimately, the purpose of a national innovation system is to transform knowledge and resources into dynamic capabilities at the level of firms and organisations, which are then better placed to contribute to the innovation performance of the economy as a whole. These capabilities will be exercised by workforces and their managers, who have the key task of leading, enabling and, crucially, mobilising the commitment to change and innovation at the organisational level.

As organisations change, so do labour markets which reflect the growing importance of knowledge resources and preponderance of "knowledge workers". Already more than a decade ago, the Karpin report (1995) on leadership and management skills noted that in drawing upon the pool of talent and creativity, managers face more complex challenges: "Future waves of technological innovation and new competitive challenges will require our enterprises to recreate themselves on a more or less continuous basis. To do so they will require multi-skilled managers with great capacity to learn and relearn both their own roles and the bases of their enterprises' competitive advantages" (1995, p xiv). However, the rewards are also increasingly being recognised. A recent Economist Intelligence Unit (2006) world-wide survey of executives and managers found that most identified knowledge and innovation management, in preference to areas such as marketing and product development, as the source of the greatest anticipated productivity gains over the next 15 years.

Knowledge management entails the development, tracking, measuring and sharing of intangible assets, particularly the knowledge and expertise employees may apply to products and services, and to the operations of the organisation itself. In line with much of the research, the IBM global CEO survey reported "creativity cultures as highly collaborative, collegial and team-oriented – as opposed to being focused on individuals or predominantly confined to specific sub-groups… Companies in which the CEO orchestrates a more team-oriented culture were decidedly more profitable than organizations with segregated pockets of innovators". The real issue for CEOs and managers was whether they possessed the skills to generate committed and effective teams and to ensure they were given structured opportunities to contribute to the innovative capability and performance of the organisation.

At the operational level as well, innovation agencies in Australia have neither the support or funding to emulate the role of their counterparts in other countries

A recent OECD (2004) report on *The Significance of Knowledge Management in the Business Sector* identified key knowledge management practices as (1) creating a knowledge sharing culture, (2) incentives policy to retain employees, (3) alliances for acquiring knowledge, and (4) written knowledge management policy. The study found that these practices were becoming more widespread internationally, and that a clear association could be observed between such practices and innovation and productivity, though not one that is well researched or understood. According to the study,

Knowledge management practices seem to have a far from negligible effect on innovation and other aspects of corporate performance. But there is little systematic evidence of just how great an effect ... Among the various categories of knowledge-related investments … knowledge management is one of the areas about which little is known in terms of quality, quantity, costs and economic returns.

What is known is that Australian managers will have to develop a closer interest in these trends, and incorporate

them into the strategy of their firms and organisations. A new international survey of manufacturing firms conducted by Mark Dodgson and Peter Innes for the Australian Business Foundation (2006) concludes in relation to the local sample that "while there is evidence of manufacturers engaging in some innovative business practices, especially towards achieving production efficiencies, they generally fail to appreciate and employ innovation as a decisive competitive strategy". Other significant trends reported earlier are the increased "openness" of innovation activities in large firms (Chesbrough 2003), the "democratisation" of innovation through customer engagement (von Hippel 2005) and the increasing role of innovation "intermediaries" in the evolving technology and commercialisation infrastructure (Dodgson, Gann & Salter 2005). These trends again require new management skills and capabilities, building on the Karpin report and subsequent research and public inquiries.

The argument here is that the success of Australia's innovation system, at both national and regional levels, will depend on the quality and relevance of capabilities at the organisational level. Accordingly, as workplaces become more flexible and responsive in a changing competitive environment, the emphasis of microeconomic reform will need to evolve to a new stage – *the leadership and management of Australian organisations*, and the educational infrastructure and programs required to support the development of innovative capabilities at this level.

The way forward

In sum, the challenge of innovation is not just for the innovators but for the whole range of stakeholders in a modern and prosperous economy, positioning itself for long-term competitive success in global markets. These stakeholders include government, research and education institutions, business and individuals. *According to Backing Australia's Ability* (2004), "People and their interactions are critical in innovation. Collaboration increases the 'interconnectedness' of the system, providing more and varied pathways to use and the marketplace". It must be accepted and understood that all have a part to play in building innovation capabilities at the organisational level and, as a result, delivering high performance across Australian industries and services.

Clearly, *government* has a responsibility for establishing key elements of the national innovation system, which provides a framework for the development of a knowledge-based economy. This will require a cooperative process between federal and state governments to ensure coherence and "joined up thinking" across the system. *Research and education institutions* must prepare graduates for a labour market which increasingly values knowledge and skills, undertake world-class basic research with internationally comparable public funding, identify ideas and exploitable inventions with commercial application, and participate in innovation partnerships with industry. *Business* must develop innovation capabilities at the organisational level and in collaborative networks and clusters, so that knowledge may be deployed as a source of competitive advantage. Finally, *individuals* – both managers and workforce – must have the opportunity to develop their own skills and capabilities so that they contribute effectively to the innovation performance of their organisations while fulfilling their own personal potential.

Appendix: National Innovation Policy Framework

1. CREATE A POLICY FOCUS FOR KNOWLEDGE AND INNOVATION	Establish a new agency, Innovation Australia, with a board of business leaders and stakeholders in innovation policy. Benchmark Australia internationally and conduct a "Knowledge Foresight 2025" exercise to plan for the future.
2. IMPROVE RESEARCH AND EDUCATION INFRASTRUCTURE	Support public research infrastructure, centres of excellence and research careers in science, engineering and technology. Increase funding for education and skills at all levels, including vocational training and "lifelong learning". Compile "Expertise Australia", a national database of research expertise in universities and research institutions.
3. DEVELOP A PROGRAM OF INNOVATION SUPPORT MEASURES	Increase funding on innovation support measures, including a national network of "Innovation Resource Centres". Enable knowledge transfer and commercialisation activity of universities through shared services centres. Support "innovation partnerships" between universities and business, and industry-led knowledge and innovation networks. Build competitive regional industry clusters with a key role for local research and education institutions. Expand financial incentives for R&D through venture capital support, loan subsidies and income-contingent loans.
4. SUPPORT INNOVATION CAPABILITIES AT THE WORKPLACE	Facilitate workplace learning and development through support for "enterprise partnerships". Initiate a management and leadership program with a public inquiry into enterprise capability needs.
5. BUILD A NATIONAL CONSENSUS ON INNOVATION	Develop and diffuse a shared community understanding of the role of knowledge and innovation in Australia's future.

ENDNOTE

This chapter is based on work undertaken with the Business Council of Australia and Society of Knowledge Economics, which resulted in the BCA report, *New Pathways to Prosperity: A National Innovation Framework for Australia (2006)*. The author would particularly like to acknowledge the contribution of the advisory group led by Steve Vamos of Microsoft and Christina Boedker of SKE.

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innovation AND growth IN RESOURCE-BASED economies

7

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Introduction

One of the striking features of the economics of both development and growth, both in the mainstream and its self-styled heterodox alternatives, is a resolute failure to take account of some key empirical and historical characteristics of the world we live in. The major problem seems to be an inability to look clearly at the structures of production and learning that actually characterise growing economies. This failure takes two forms. On the one hand there is an approach, popular in treasuries and finance ministries, that conducts economic analysis at a highly aggregated level. This in effect erases industries and sectors by treating the economy as a one-sector operation that produces one output (an output that is labelled "GDP"). On the other hand, there is a sectoral and industrial approach that focuses on a small number of industries and technologies that are held to "drive" economic growth.

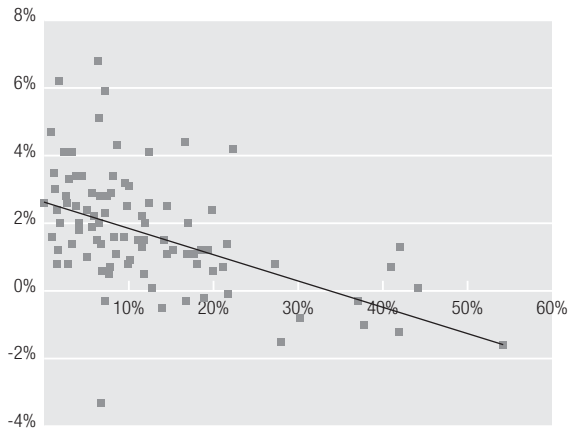
PHOTO: iSTOCK

In the latter perspective, much of 20th-century economic historiography consists of a focus on a series of allegedly critical industries such as steam power, mechanised factory technologies, electricity, vehicles, information and communications technology (ICT) and so on, without ever examining how large such sectors actually were and are, and without exploring the wider characteristics of growth and knowledge creation in industrialising economies. It often comes as a surprise to people to learn that a key productivity-growth sector of British industrialisation was agriculture, and that British agriculture and food processing developed such epoch-making innovations as replaceable parts, technical codification, assembly lines, large-scale enterprise management systems and national distributions networks.

This problem is even worse in the innovation studies literature, which far too frequently relies on a Schumpeterian "explanation" of the relation between innovation and growth, looking at a very limited number of technologies that are held to create new industries and drive growth. Economies that do not deploy these technologies/industries are, it is suggested, thereby doomed to slow growth and poverty. A subsidiary argument is that resource-based economies in particular are burdened by a "resource curse", and will remain poor until they shift their economic structures. A big problem in this is that there is no coherent theoretical explanation of the links between the industries deploying allegedly advanced technologies and the growth process. At the present time, for example, it is widely argued that growth is driven by ICT, by biotechnology or by nano-engineering, despite the fact that there are major problems in the size and inter-industry effects of these technologies and/or industries.

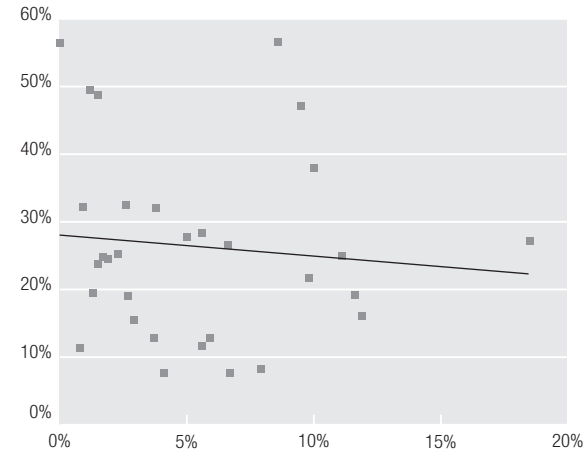
Two notable empirical features of economic life tend to be ignored in such approaches. The first is persistence

FIGURE 1 GROWTH PER CAPITA VS SHARE OF RESOURCES, GNP, 1960-97



Source: Gylfason, 2004, p.24

FIGURE 2 RATIO OF EXPORTS TO GDP VS SHARE OF RESOURCES GNP, 1960-97



Source: Gylfason, 2004, p.6

and impacts of "low technology" industries in the world economy. It is not difficult to show that these industries account for the bulk of world output and employment, are growing, are innovative, and deploy advanced knowledge bases. The second feature is the fact that resource-based economies are not invariably poor. On the contrary, some of the richest, and/or fastest growing, economies are resource based. These economies include Norway, Sweden, Finland, Canada, New Zealand, Australia and the Netherlands (which is the EU's biggest agricultural producer). How have these economies developed against the conventional wisdom on resources, and what are the implications for (a) their future development, and (b) economic development among resource-based economies more widely?

Theories

Within development economics it is sometimes argued that abundant natural resources are actually an obstacle to development. There is a "resource curse" that keeps developing countries stuck in low value-added and low growth activities. This notion derives from at least three relevant bodies of thought:

- In the 1950s to 1970s there were mainstream versus Marxist debates in development theory, in which Marxists took the view that resource specialisation was a basic method of exploitation of poor countries by the rich. The influential Prebisch/Singer hypothesis argued that the "resource curse" flowed from the declining terms of trade between resources and manufactures. (Here it is worth noting that over the past 15 years or so it is, in fact, the terms of trade of manufactures that have been declining);
- Sachs and Warner's influential 1995 NBER paper, "Natural resource abundance and economic growth" formalised the long-standing idea that resources inhibited growth, using regressions linking natural resource industries to growth and trade performance; and
- Neo-Schumpeterian ideas about sectoral structure of growth – Chris Freeman, for example, has argued that the key issue is that it is what you do, not how you do it, that matters. The basic challenge of innovation-based development is to get out of resource and out of low tech, into whatever happens to be driving the Kondratiev wave (at this time held to be ICT, biotech, etc.).

The evidence

The evidence used in the "resource curse" literature varies quite considerably. In some cases, the claims are made without any serious reference to evidence at all – that is, highly speculative assumptions are made which are then treated as though they are empirical facts. This is particularly the case in the Schumpeterian literature. Where evidence is sought and presented systematically, it usually takes the form of regressions exploring the industrial shares of natural resources, and GDP growth and trade. Figure 1 gives an example of this:

Here, long-run growth rates are regressed on the share of resources towards the end of the growth period. Quite a lot of the variation seems to be being explained here by the resource share – nearly 26 per cent, which is a lot for one independent variable. However, it is worth noting that one factor producing the result appears to be a small number of high-resource/low-growth outlier economies – there are six outlier economies with about 40 per cent of resources in GDP and low growth rates. Take the outliers away and it does not look like much will be left

of the regression. But a wider problem here is the independent variable, the share of resources in GDP. This is not, in fact, a good indicator of whether or not a country is "resource based"; it simply reflects the relative absence of non-resource industries, and so in a way the result is implied by the choice of indicator. A country such as Sweden, which has high resource output per capita but has succeeded in creating a large sector of non-resource industries, is simply not considered as a resource-based economy if using this indicator.

Similar problems exist with most such regressions. Figure 2 looks at natural resources and exports.

In this case, very little of the variation in trade ratios is being explained, and once again the regression seems to be heavily influenced by a small number of outlying observations. The explanatory variable – share of resources in GDP – has the same problems described above.

Explanations

The main economic explanations that are offered for these phenomena are:

- the "Dutch disease", in which exchange rate appreciation as a result of the resources sector renders domestic activity uncompetitive, and labour supply decreases (as the resources sector draws off key labour inputs from the rest of the economy) combine to inhibit non-resource growth;
- declining terms of trade in primary commodities and instability in commodities markets prevent capital accumulation and hinder growth;
- resources create rent-seeking behaviour that undermines entrepreneurship and growth; and
- resources sectors generally involve a lack of linkages with the wider economy.

To these, Michael Ross has added a set of potential political explanations. These are:

- cognitive (short-sightedness among policymakers);
- societal (empowering of elites that hinder growth); and
- state-centered (resources undermine state institutions, or create cumbersome state enterprises) (Ross, 1999).

However, if the data on resource-based economies is not as secure as it might be, then it may be that the problems the "resource curse" hypothesis is seeking to explain are not as general as they seem to be. This leaves us with an interesting question: what factors explain growth in successful resource-based economies? This requires a look at the characteristics of resource-based economic development.

Dimensions of resource-based development

Resource-based economies are often characterised by industrial structures with a strong emphasis on agriculture, a small manufacturing sector with a large proportion of output concentrated on low- and medium-technology sectors, and a large service sector incorporating a large social and community services element (meaning especially health and education). Natural resources may provide a significant proportion of output, but more commonly a large proportion of exports. Both the gross and business (GERD and BERD) R&D intensities tend to be low. There is usually a technology balance of payments deficit, suggesting significant technology import. Likewise, a significant share of gross fixed capital formation is met by imports; so here also there is likely to be a strong level of embodied technology import. Significant natural resources may include agricultural land, timber and forests, fish, hard rock minerals, and oil and gas. These countries often have significant area/population imbalances, and the physical make-up is such that there are communications problems and hence major physical infrastructure challenges.

In a general way such countries as Finland, Sweden, Norway, Denmark, Iceland, New Zealand, the Netherlands, Canada, and Australia share the characteristics described above. These small, open economies have rested their development paths on resource-based sectors, and out of them have developed low- and medium-technology industries that have driven growth within these countries. This has been the case not only historically, but in many instances remains so today. Even where some countries – such as Sweden, Finland and the Netherlands – have developed significant high-tech sectors, these have supplemented the low- and medium-tech specialisations, but have not replaced them.

The importance of the shared structures and geophysical situations lies in the fact that these comparator countries are not simply advanced economies, but are among the richest in the world. In terms of the underlying productivity measure, output per worker hour, several of them outstrip the United States and most of them have sustained very high growth rates of output and productivity in recent decades. Most of these countries have not only generated high income levels in terms of GDP per capita, but also maintain major welfare systems related to health, education and social protection. It is worth noting that this prosperity in many cases is relatively recent rather than intrinsic to the situation of the countries. The Nordic area countries in particular were, until comparatively recently, very poor. In the 19th century they all faced major rural crises, had low levels of income relative to other countries (Norway in the mid-19th century was comparable to Sicily), and had very high rates of emigration. So, against this background their development trajectories since the late 19th century have been spectacular.

TABLE 1 HISTORICAL INDUSTRIES AND CONTEMPORARY SPECIALISATIONS

COUNTRY	HISTORICAL GROWTH INDUSTRIES	SOME CONTEMPORARY SPECIALISATIONS
Norway	Fishing Timber products Marine transport Non-ferrous metals Hydro power	Fishing Aquaculture Marine biotechnology Timber products Oil Marine transport Marine electronics (navigation and subsea technologies including sonar and imaging) Non-ferrous metals and aluminum
Sweden	Timber products Iron ore Iron and steel Marine transport	Timber products including advanced building materials and flooring Engineering products Vehicles Telecommunications Aerospace (military and civilian) Ships and boats
Finland	Timber products Machinery Transport equipment (especially ships) Chemicals	Newsprint and high-quality paper Machinery (especially for paper industry) Chemicals (especially for paper industry) Telecommunications equipment Ships and boats
Netherlands	Agriculture Trade and Finance Machinery Agriculture	Agriculture (including extension into new products, e.g. fresh flowers) Agricultural trading and commodity exchanges Aquaculture (including feedstocks and technology) Electronics Finance and Insurance
Denmark	Timber products Shipping	High-value agriculture Domestic and Office Furniture Architecture and interior design Agricultural equipment Transport and ports Electronics Pharmaceuticals

How can these development trajectories be understood? Three points can be noted:

- development through knowledge upgrading and investment strategies in resource-based industries;
- development through the leveraging of resource bases into downstream industries; and
- knowledge creation via knowledge infrastructures.

Development through knowledge upgrading and investment strategies in resource-based industries

Here the point is that resource industries can be the site of major learning processes that permit sustained productivity and output growth. It is not the case that terms of trade for these products are inevitably declining, and – even if they are – the real issue is overall revenues, not unit prices. The development of sophisticated seismological knowledge and techniques, the construction of large-scale infrastructures, the automation of production technologies and the improvement of logistics can all maintain the viability of resource industries over the long term.

Development through the leveraging of resource bases into downstream industries

Resources are almost invariably capable of development downstream, away from the resources themselves and into related resource-using industries. This strategy has been central to many of the resource-based economies, leading to a degree of historical linkage between past and present specialisations. Table 1 sets out some of these specialisations, both from historical and contemporary perspectives.

In developing both upstream and downstream linkages from the resource bases, leading to major cluster development, Sweden shifted from iron ore production to iron and steel, to fabricated metal products (most notably cars and trucks), and then to machine tools and electronic systems. Norway moved from marine transport to shipbuilding to marine electronics, developing the world's first automated navigation systems, and continuing to be a leader in surface and sub-sea marine electronics applications. Finland went from paper production to chemicals for paper, and then to paper machinery (a major sector in which it is a world leader). Of course, four of the countries (Canada, Sweden, the Netherlands and Finland) have succeeded in creating important electronics and telecommunications sectors, and the processes through which this happened deserve attention; however,in each of these countries electronics remain a relatively small sector, and prosperity continues to depend on continuously upgraded traditional industries (Finland's paper exports are roughly equivalent to its electronics exports). Moreover, it remains the case that the Netherlands, Denmark, Australia and New Zealand are heavily agricultural economies, with substantial

export earnings from food products (a point which is also true of another allegedly high-tech small economy, namely Israel). It is worth noting that these linkages have underpinned a distinctive approach to economic policy in some of these economies.

The Swedish economist Erik Dahmen developed an influential body of analysis based on the concept of "development blocks", that is, mutually supportive industries that could be linked in both the input–out senses and in terms of shared knowledge bases. This work became a key contributor to the development of innovation system concepts (Dahmen 1970). Much later, it also became the basis of the work of Michael Porter on clusters. Here it should be noted that Porter has strongly emphasised the importance of cluster development out of existing industries and resources.

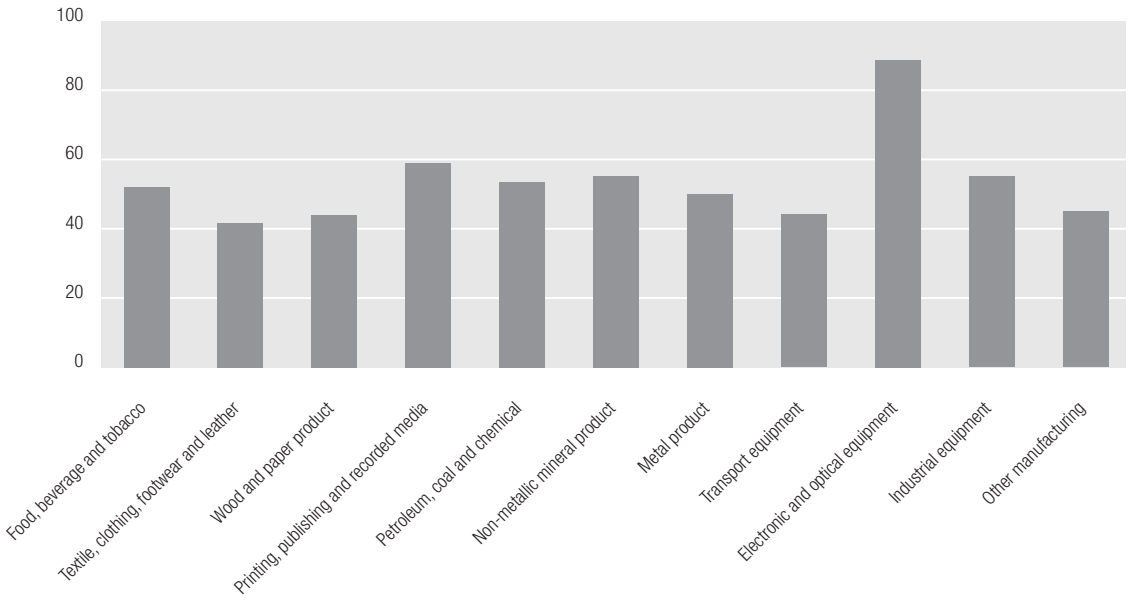
Dahmen's work both reflected and contributed to a specifically Swedish mode of industrial organisation. The key point is that in Sweden, and in the Scandinavian economies more generally, the emergence of linkages and development blocks did not just happen, it was organised. In Sweden a specific form of corporate organisation and governance emerged that was central to its industrial development. The main specifically Swedish element is the persistence of concentrated ownership and practical control of key industrial enterprises by family spheres or other conglomerate blockholdings. Sweden is characterised by large-scale blockholdings in significant parts of the industrial system by what are in effect active family-based or bank-based closed-end investment companies. The most famous of these is the investment vehicle of the

TABLE 2 INNOVATION ACTIVITY IN NEW ZEALAND: PROPORTION OF INNOVATING COMPANIES

	NUMBER	PERCENTAGE
Industry sector		
Agriculture, forestry and fishing	1476	32
Mining and quarrying	57	37
Manufacturing	3522	56
Electricity, gas and water supply	12	50
Construction	1209	25
Total	**6276**	**44**
Services sector		
Wholesale trade	1767	46
Transport and storage	885	38
Communication services	87	41
Finance and insurance	282	54
Business services	2181	42
Motion picture, radio and television services	84	61
Total	**5286**	**42**
Overall	11562	44

Source: Statistics New Zealand, 2003

FIGURE 3 INNOVATION IN NEW ZEALAND MANUFACTURING SECTORS (PERCENTAGE OF INNOVATING COMPANIES)



Source: Statistics New Zealand, 2003

Wallenberg family, Investor AS. There are at least a dozen such family groupings, often playing an active role in enterprise strategy, organisation and operations. This is by no means unknown elsewhere, but the scale and impact of this pattern nevertheless remains a distinctive feature of the Swedish system. The "investment trust" ownership structure also has an institutional form outside of the family groups, based on bank-centred investment companies that own and control very significant parts of the Swedish economy. So closed-end conglomerate holdings dominate large parts of the economy, and form a core element of the governance system. These holdings have rather deep historical roots and in some cases even the individual holdings stretch back almost a century. So they impart an important degree of continuity to the Swedish system. At the same time the fate of these holdings is one of the key elements that is shaping change at the present time. Such arrangements are not unique to Sweden. Distinctive, development-oriented governance arrangements can be found across the industries of the Nordic world.

These general points are more widely relevant for small, open resource-based economies because they share the low-tech emphases, the resource characteristics and the widely distributed economic structures of the small economies mentioned. Such an industrial structure is not non-innovative (see Ferranti et al, 2002, and Hirsch-Kreinsen et al, 2005, for arguments on this point). If we look at the distribution of innovation activity (meaning introduction of new products or processes, or expenditure on innovation) in New Zealand, for example, we find the following:

Firstly, innovation activity is widely distributed across all the major sectors, according with the "pervasiveness" characteristic described above. Figure 3 above shows that within manufacturing, innovation is found across all sectors, regardless of their formal classifications of technology intensity. That is, in common with other small open economies, New Zealand has innovative low-tech sectors.

These results accord quite closely with those of other innovation surveys in small, open economies. For example, in all sectors of the Australian economy at least 30 per cent of firms are innovating over any three-year time period. In Australian manufacturing the most intensively innovating sectors are machinery and equipment and chemicals, each with about 50 per cent of firms innovating. Nevertheless in such "traditional" industries as food products, textiles and metal products, between 30 and 35 per cent of firms are innovating (see Australian Bureau of Statistics 2005; see also Eurostat 2004).

What follows from this structure is the suggestion that innovation policy for resource-based economies cannot simply be based on high-tech sectors, but will have to have an extensive base in the resources and industries actually possessed by an economy. Linkages, development blocks or clusters have not, in similar economies, emerged out of some general propensity to cluster growth, rather, they have emerged from locationally specific resources, and have developed in rather logical ways both forward and backward. The result is strong "vertical" clusters. For New Zealand, for example, an important current challenge is to technologically upgrade and to innovate in such sectors as food and beverages, textiles and clothing, printing and publishing, timber products and so on, while also developing their upstream and downstream potentials.

Such linkages need not be directly into related manufacturing industries, but can also lead to service sector development. The clearest case of this is Australia where the major financial markets in Sydney are heavily focused on specialised finance for the resource sector. Resource exploration and exploitation involve major risks, and the investment banking and equity markets in Australia (both in Perth and Sydney) are heavily involved in managing the risk-spreading portfolio problems of the resource sector. Over time, this has led to Sydney evolving into one of the major financial centres of the world – the growth of Sydney as one of the pre-eminent financial centres of the Asia-Pacific region rests in part with its resource-finance background (which continues to be one of its major specialisations).

A final point here relates to knowledge infrastructures. In general, neither resource-based activities nor the industries linked to them are R&D intensive. Rather, they rely on flows of knowledge emanating from infrastructural institutions such as universities and research institutes, as well as embodied R&D in technologies used in capital and intermediate goods. This means that a major focus of public policy for these industries is infrastructural.

Research questions on the resource economies

There are clearly a number of important but unresolved questions concerning resource-based economies. These include:

- What kinds of learning determine the capabilities needed to exploit resource bases?
- Are there spillover effects related to resource extraction? Czelusta and Wright (2004) suggest that "if resources are developed through advanced forms of knowledge development, their spillover effects may be just as powerful as anything done in manufacturing".
- What was the dependence on resources historically? How important was the reliance on resources by such large economies as the US? (It is important to remember here that Habbakuk's influential argument was that resource abundance was a contributor to high productivity in the US).

- Is natural resource abundance itself a natural phenomenon? David and Wright suggested that "natural resource abundance was an endogenous, 'socially constructed' condition that was not geologically pre-ordained". How should this relate to potential resources of the future?
- How are allegedly non-renewable resources *extended* through exploration, technological change, advances in country-specific knowledge and so on?
- How have linkages been created historically? Is the view that they are essentially a policy issue correct? What are the contemporary implications?

The issue of how today's small resource-based economies became so rich is a neglected and important one in economic history. How they might stay rich, however, is a critical issue in their futures and in Australia's future. Answering some of these questions might give important pointers to some answers.

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Australia's capability FOR systems integration

8

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Background

For the best part of the 20th century, growth in the Australian economy lagged behind that of other developed nations. National policies geared towards protecting Australian manufacturing industry and homegrown Australian ideas consistently failed to generate economic returns to our society. Over the course of the century, Australian gross domestic product (GDP) per capita declined from the highest in the world at the start of the First World War to a middling position among developed nations in the 1970s (Maddison, 2001).

Moreover, Australians were especially slow to discover the value of deregulation and of allowing markets, not governments, to establish where comparative advantage lies. By the 1960s our tariffs in some sectors were among the highest in the developed world.

However, this tardiness may ultimately have accentuated the benefits of transition to a more open economic system, when it finally did occur. Following deregulation of the Australian economy in the 1980s and 1990s Australia has prospered – perhaps even to an unexpected degree.

The country's economic expansion since 1990 now represents the longest period of growth (that is without two consecutive quarters of negative growth) since Federation at the start of the 20th century. From the early 1990s to the present, Australian per capita GDP has increased faster relative to the rest of the developed world than at any other period throughout the preceding century. Indeed, across the final two decades of the 20th century, Australia was one of only three developed countries to increase its share of world GDP.

PHOTO: iSTOCK

Australia's recent economic history presents a powerful case-study. Deregulation and the opening up of the Australian economy have had a positive impact on national prosperity. But the lesson for Australia is not simply an economic one. When Australian governments stopped trying to impose a particular industrial structure on Australian society they forged the conditions not only for better economic growth, but also a change in focus of Australian innovation. This created an opportunity for understanding something new about ourselves and our place in the world.

Trends in the Australian economy

Let us start by looking at some of the broad trends in the Australian economy. Since the 1980s the sectors of the Australian economy that have most markedly increased their share of total Australian production have been in services. Over the past 25 years:

- the average annual rate of growth in property and business services has been three times that of manufacturing;
- the average annual rate of growth in finance and insurance has been two and a half times that of manufacturing; and
- the average annual rate of growth in communications services has been four times that of manufacturing.

This trend is shown in Table 1. Indeed, although the granularity of this data do not show it, property and business services have now surpassed manufacturing as Australia's leading sector of the domestic economy.

For those who associate innovation predominantly with the production of widgets and gizmos, these trends may seem disturbing. The rise of the service economy can create the impression that we are not as clever as we ought to be – or even perhaps as we used to be.

But it may be cleverness of a different kind that is driving the present shifts in our economy. As we shall see, one of the consequences of Australia's changing economy is that Australians have begun innovating in new ways – in ways that do not appear "high-tech" in any traditional sense, but which are probably more reflective of Australian strengths.

Changing patterns of innovation intensity

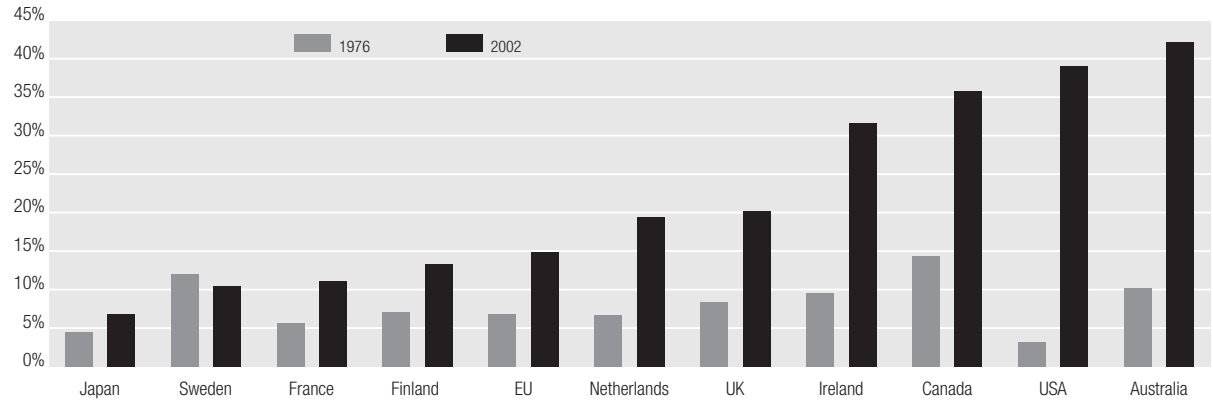
One important indicator of innovative activity – business expenditure on research & development (R&D) – has grown dramatically across all sectors in Australia in recent years, albeit from a relatively low base (OECD, 2005a). Over the decade 1993–2003, business R&D expenditures grew by 6.4% per annum in real terms in Australia, compared with 3.6% growth for the OECD as a whole (ABS, 2005b). More recently, over the five years to 2004–05, Australian business expenditures on R&D have increased in real terms at 14.3% annually.

TABLE 1 TRENDS IN PRODUCTION VOLUMES BY AUSTRALIAN INDUSTRY SECTOR THROUGH TO 2003–04.

INDUSTRY	AVERAGE ANNUAL CHANGE OVER LAST 10 YEARS, PER CENT	AVERAGE ANNUAL CHANGE OVER LAST 25 YEARS, PER CENT	SECTOR AS PROPORTION OF GROSS VALUE ADDED, 2003–04 PER CENT
Property and business services	5.2	5.0	14
Manufacturing	2.0	1.7	14
Finance and insurance	4.1	4.2	8
Construction	5.2	3.5	7
Retail trade	4.2	3.3	7
Health and community services	4.0	3.8	7
Wholesale trade	4.5	3.1	6
Transport and storage	4.3	3.7	5
Education	1.9	2.6	5
Mining	2.7	3.5	5
Government administration and defence	2.5	2.5	5
Agriculture, forestry and fishing	3.2	2.1	4
Communication services	6.1	6.7	3
Electricity, gas and water supply	1.3	2.6	3
Accommodation, cafes and restaurants	4.2	3.5	3
Personal and other services	3.7	3.1	2
Cultural and recreational services	3.5	3.3	2
Total all industries	3.7	3.3	100

Source: Australian Bureau of Statistics, 2005a.

FIGURE 1 THE PROPORTION OF BUSINESS EXPENDITURES ON R&D (BERD) OCCURRING IN SERVICE SECTORS, 1976 AND 2001 (SELECTED OECD COUNTRIES)

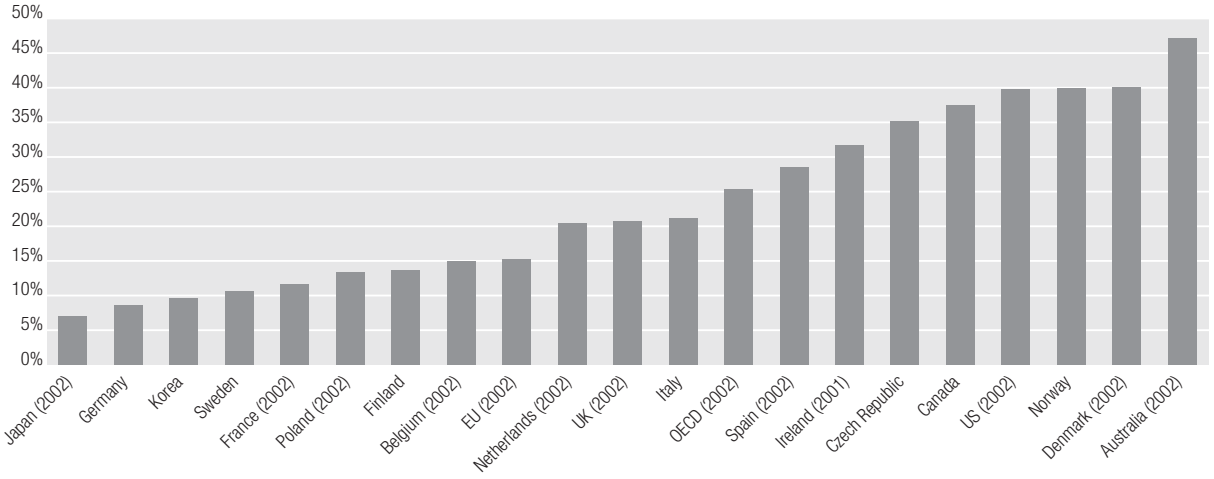


NOTE: BASED ON DATA FROM THE OECD ANALYTICAL BUSINESS ENTERPRISE RESEARCH AND DEVELOPMENT DATABASE, WHICH IS CONSTITUTED OF ESTIMATES MADE BY THE OECD SECRETARIAT IN ORDER TO MAXIMISE COMPARABILITY BETWEEN NATIONS, AND WHICH MAY DIFFER FROM OFFICIAL NATIONAL STATISTICS ABOUT BUSINESS R&D.

Source: OECD, 1999 & 2005a.

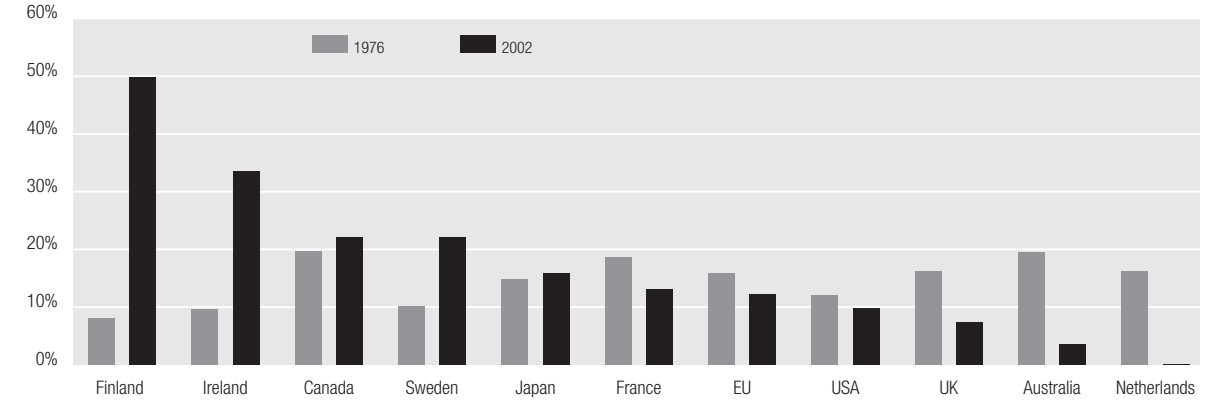
Business expenditure on research and development (R&D) is probably overrated as a metric of a society's levels of innovation – most innovation occurs outside of R&D. Nonetheless, the spread of business investments in R&D can give some indication of where concentrations of innovative activity are occurring. Indeed it is

FIGURE 2 THE PERCENTAGE OF BUSINESS EXPENDITURES ON R&D (BERD) PERFORMED IN THE SERVICE INDUSTRIES, 2003 (OECD COUNTRIES)



Source: OECD, 2005c.

FIGURE 3 THE PERCENTAGE OF BUSINESS EXPENDITURES ON R&D (BERD) OCCURRING IN KEY COMMUNICATIONS EQUIPMENT SECTORS, 1976 AND 2002 (SELECTED OECD COUNTRIES)



NOTE: BASED ON DATA FROM THE OECD ANALYTICAL BUSINESS ENTERPRISE RESEARCH AND DEVELOPMENT DATABASE, WHICH IS CONSTITUTED OF ESTIMATES MADE BY THE OECD SECRETARIAT IN ORDER TO MAXIMISE COMPARABILITY BETWEEN NATIONS, AND WHICH MAY DIFFER FROM OFFICIAL NATIONAL STATISTICS ABOUT BUSINESS R&D.

Source: OECD, 1999 & 2005a.

interesting in this respect to observe that, while business R&D has grown across all sectors in Australia in the past 30 years, it has clearly grown much more quickly in some sectors than others.

Figure 1, for example, shows just how markedly Australian businesses in the service sector have increased their share of national business R&D. And Figure 2, which presents an analogous contemporary dataset based on official national figures, shows the consequences of this dramatic increase: Australia is now a world leader in the share of its business R&D that is performed in services.

Of course, most developed countries have experienced some increase since the 1970s in the proportion of business R&D in services, and a decline to some extent in the share of total business R&D in manufacturing. However, it should be noted that this rebalancing has been disproportionate in Australia.

Implications for high-tech

Does a shift into services mean that Australia is becoming less high-tech? This is a question I am often asked, and indeed Figure 3 shows one fairly specific respect in which this is certainly the case. Over the final decades of the 20th century, Australia experienced a dramatic decrease in the proportion of business R&D being performed in the radio, television and communications equipment sector.

In the 1970s one-fifth of Australian business R&D was performed around communications equipment, compared with less than one-tenth of the business R&D conducted at that time in Finland. By 2002 though, the two economies' degree of research specialisation towards this sector had dramatically reversed. Today, due predominantly to the growth of Nokia, 50% of Finland's business R&D is concentrated in this area, while Australian R&D intensity is negligible.

Moreover, this is a picture that is broadly emulated across several sectors of manufacturing and hardware development, and is entirely consistent with Australia's position at the bottom of OECD league tables for the share of gross value added derived from high- and medium-technology manufactures.

Does this matter? Old-fashioned economic patriots and technophiles, no doubt, will find it disturbing. There is good reason to believe though that Australians are just migrating their innovation intensity to areas where they have greater comparative advantage – that they are, in fact, just beginning to work in ways that are more reflective of Australian strengths.

Systems integration

Australian innovation experts have argued that Australians are predominantly 'systems integrators'.[1] The term 'systems integration' is typically used in information technology and defence technology.

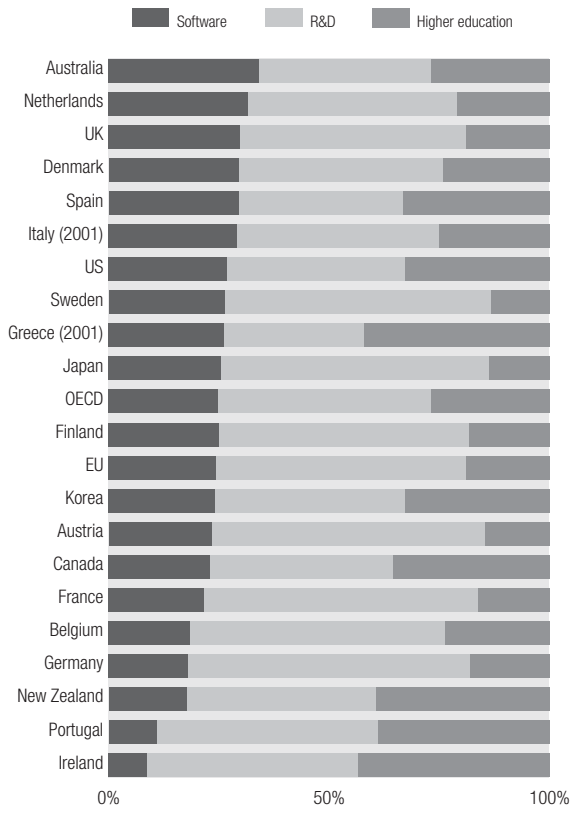
In information technology, the systems integrators tend to buy components (whether software or hardware) and then to integrate them into novel kinds of products, processes or capabilities – or they may simply work to help clients integrate existing applications. In defence technology, the systems integrators tend to do something similar – they combine a series of technologies, often a mixture of hardware and software, in order to create something greater than the sum of its parts.

But the term can be used in a broader sense too: to reflect a style of innovation that is relatively high level, that is typically generalist rather than specialist, that is focused on systems rather than products, and that involves the combination and modification of existing technologies rather than the creation of new technology.

The success of Australian firms in mining, construction, and event management has often been attributed to these kinds of skills. These are industries where every project is different and where performance is often linked to sophisticated integration skills in marrying established technologies to solve site-specific problems, and in managing people, often contractors or temporary workers, who may come together for one-off projects or just for short parts of projects.

But the systems integrator model is of underlying importance in other sectors too – in services for example

FIGURE 4 EXPENDITURE ON SOFTWARE AS A PERCENTAGE OF TOTAL KNOWLEDGE EXPENDITURE, 2002 (OECD COUNTRIES)



Source: OECD, 2005c.

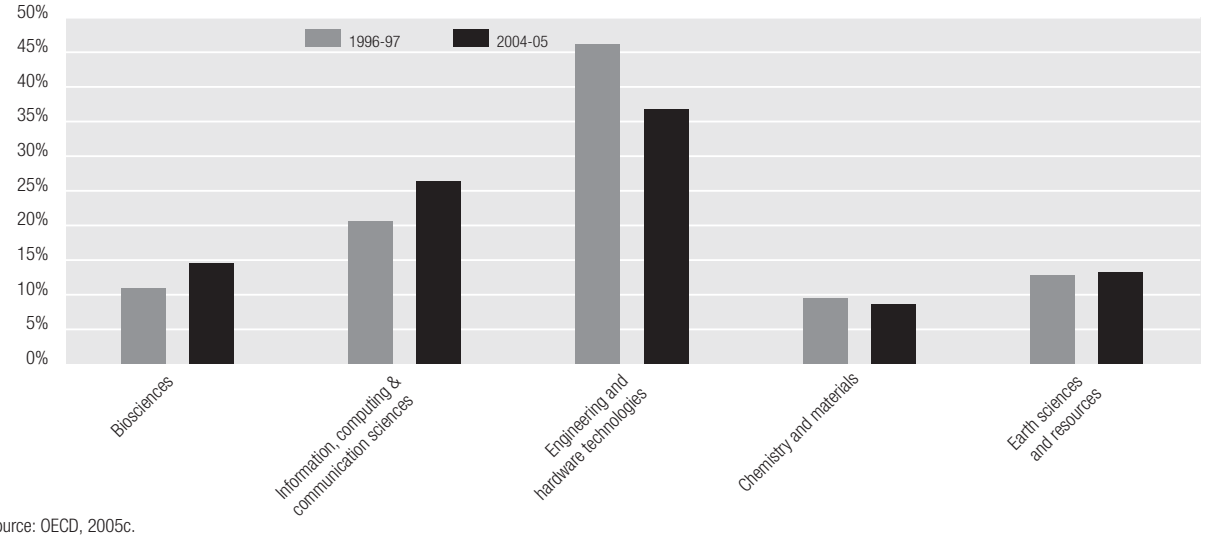
– where such skills may be invisible to the wider community because the innovations they engender are too low-tech to attract much public attention.

Westfield provides a good example of this effect. Doubtless few shoppers ever reflect on the origins of their experience in a Westfield Shoppingtown, but the fact that an Australian company is now the world's largest shopping centre group must be attributed, at least in part, to that company's flare for integration. Since the 1970s Westfield has led the world in combining retail shopping with the provision of services and entertainment, and in blending retail servicing with property development and construction.

Of course, having an apparent national strength in one mode of operation does not rule out Australian competitiveness in other respects. Today Boeing and Airbus, to give a countervailing example, both source key wing components from Boeing's Australian subsidiary Hawker de Havilland – a reminder that the bias in the Australian economy towards services, low-tech industry, and systems integration does not at all preclude outstanding specialised technology creation in manufacturing.

Indeed, ironically Hawker de Havilland's American owner, Boeing, is itself increasingly a high-tech global 'systems integration' company, outsourcing nearly all

FIGURE 5 PERCENTAGE OF BUSINESS EXPENDITURE ON R&D (BERD) IN DIFFERENT RESEARCH FIELDS, 1996–97 AND 2004–05



Source: OECD, 2005c.

aspects of aircraft development and parts manufacture, while retaining for itself simply the ability to design, coordinate and assemble.

The balance of successful Australian innovation, nonetheless, does seem weighted disproportionately towards systems integration, and the consequence of the recent transformation of the Australian economy appears to be that business innovation intensity is concentrating in this direction.

Further evidence?

Additional support for this view can be taken from a closer analysis of Australian business R&D statistics. As mentioned previously, R&D expenditures are an imperfect indicator of activity in innovation.

There is an out-dated, though popular, view that all the best innovation is generally focused on the invention of technological products, especially hardware. Yet in 2003, the Australian Bureau of Statistics surveyed businesses about innovation and found that fewer than half of Australia's innovating businesses were involved in the introduction of a new good or service: the vast majority of innovating Australian businesses were actually involved either in introducing a new operational process (a significant change in the means of producing or delivering goods) or in developing a new organisational/managerial process (representing a change to the strategies, structures or routines of business operation) (ABS, 2003).

There is also a popular, and related, misapprehension that the best way to do innovation (i.e. to invent these technological products) is through R&D. But look at Figure 4. The OECD currently regards the combined investment in R&D, software and higher education as a good indicator of a society's total investment in knowledge. Comparing the relative weightings in each of these areas gives an indication of emphasis, or of the style of knowledge production favoured by different nations. Out of its total investment in knowledge, Australia emphasises software rather than R&D.

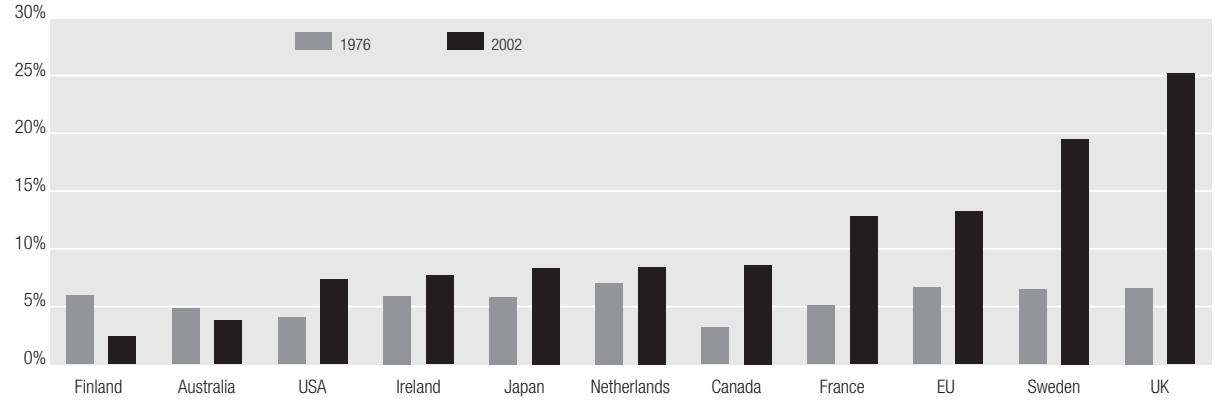
Using R&D investment intensities as an indicator of Australian directions in innovation is thus inevitably incomplete and almost certainly biased in a way that overstates the role of manufacturing, hardware development and related disciplines. Yet even with such a conservative metric, it is increasingly clear that ongoing changes in the fields of research being pursued by Australian businesses, even just in the last few years, are highly indicative of an innovation system that is repositioning itself for systems integration.

Figure 5 shows that over the last eight years alone there has been a significant dip in the proportion of business R&D performed in core engineering and hardware disciplines, with a noteworthy rise in the proportion of business R&D performed in biosciences and in developing applications for information, computing and communications technologies.

This is an extension of a 20-year trend and is a telling development. Engineering and hardware development are still the areas that contribute most to business R&D in Australia. But proportionally less engineering and less hardware development means less consistency with the old-fashioned conception of business innovation that is focused predominantly on the technological invention of high-tech manufactured goods.

What is most striking, however, is the extent to which the growth in R&D intensity in other key technology disciplines is increasingly linked with a flourishing of 'systems integration' behaviours among Australian innovators.

FIGURE 6 PERCENTAGE OF BUSINESS EXPENDITURE ON R&D OCCURRING IN THE PHARMACEUTICAL SECTOR, 1976 AND 2002 (SELECTED OECD COUNTRIES)



NOTE: BASED ON DATA FROM THE OECD ANALYTICAL BUSINESS ENTERPRISE RESEARCH AND DEVELOPMENT DATABASE, WHICH IS CONSTITUTED OF ESTIMATES MADE BY THE OECD SECRETARIAT IN ORDER TO MAXIMISE COMPARABILITY BETWEEN NATIONS, AND WHICH MAY DIFFER FROM OFFICIAL NATIONAL STATISTICS ABOUT BUSINESS R&D.

Source: OECD, 1999 & 2005a

Information and communications technology (ICT)

Let me explain this briefly for ICT. We saw in Figure 4 just how important information technology is as a part of Australian knowledge expenditures, and Figure 5 illustrated that information and communications technology is also a significant and growing part of Australian R&D expenditures (OECD, 2005c), and between 1995 and 2003, only Sweden and the United States received so large a boost to GDP growth from ICT capital investment (OECD, 2005d) .

However, the beneficiaries in Australia have not been in the traditional high-tech sectors. Australia does not produce many high-tech ICT products. It is particularly in Australia's service industries that the integration of information and communications systems have had their greatest impact. Throughout the second half of the 1990s, it was Australian wholesale and retail trade, finance, insurance and business services sectors – key sectors that use ICT – that were contributing to national productivity growth at one of the highest levels in the developed world (OECD, 2003).

It is an effect that often goes unnoticed. But interested observers can continue to see in the reports and announcements of innovative businesses in Australia today. When ASX-listed ABC Learning recently merged with Peppercorn Management Group and Child Care Centres Australia to form one of the largest childcare companies in the world, I remember the company identified the use of information and communications technologies as critical for the planning and implementation of the merger. However, this aspect of the deal went largely unnoticed in the media. As is so often the case with new technologies, the adoption of ICT has been amazingly surreptitious (even despite the fanfare that has sometimes surrounded the sector). Arguably it is something that has just happened in Australia as innovative individuals and firms with a latent proclivity for integration suddenly discovered an availability of exciting new technologies ripe for their talents.

Biotechnology

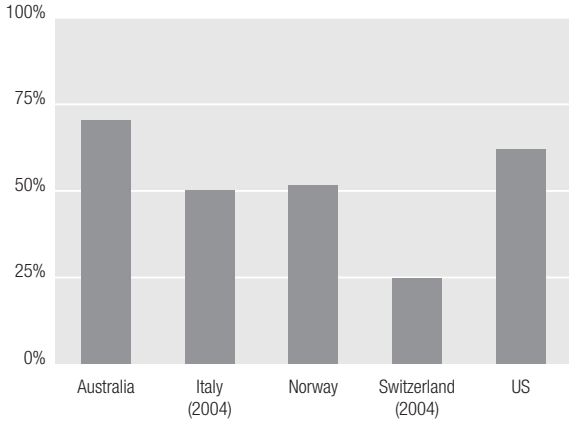
Surprisingly, a similar story can also be told about biotechnology. If there is one innovative and growing sector of the Australia economy that might seem likely at first glance to transcend the 'system integrator' paradigm it is the biotechnology sector.

Over the past 20 years there has been very high growth in commercial activities relating to biotechnology in Australia. The Australian Government has estimated, for example, that the number of Australian biotechnology companies more than doubled in the second half of the 1990s. The biotechnology business model however, which is often built around exploiting a breakthrough in fundamental science, does not immediately appear to lend itself to the systems integrator approach.

Yet, this is exactly what seems to be happening in Australia. Somewhat remarkably, as shown in Figure 6, Australia is one of the few developed countries to have actually decreased the proportion of its business R&D investments in the pharmaceutical sector since the 1970s. At first glance, this seems quite firmly to contradict the notion of an expansion of innovative intensity in the commercial biomedical arena in Australia.

But as it transpires, most Australian biotech is not involved directly in manufacturing or distributing drugs. It turns out, in fact, that most players in Australian biotech are very clearly systems integrating companies: they acquire rights to some IP, they contract out the development of the IP, they work with regulators, universities, and foreign partners; they develop an integrated package of which their original technology is but a small

FIGURE 7 PERCENTAGE OF BIOTECHNOLOGY R&D PERFORMED IN THE SERVICES SECTOR IN 2003 (SELECTED OECD COUNTRIES)



Source: B. van Beuzekom, & A. Arundel, 2006.

part; and in many cases their end point is a licence deal with a big overseas firm that will manufacture and distribute their product.

Indeed, for this reason a disproportionate share of biosciences business R&D in Australia is actually categorised as R&D in services. (See Figure 7.) Most Australian biotech firms are in fact service companies. It is little wonder then that a recent survey conducted by the Australian Bureau of Statistics found that a quarter of Australian biotech firms contract out all their R&D and that the majority contract out at least some part of their R&D (ABS, 2004). This is classic system integrator behaviour.

Australia's comparative advantage

Traditionally, Australian innovators have struggled to compete globally in activities that placed a premium on scale – notably in consumer-goods manufacturing – but also in activities that placed a premium on technology creation. Yet for much of the 20th century our country's industry policy has been oriented precisely to foster activity in this direction.

Perhaps for this reason, there is a myth in Australia of the brave inventor, the imaginative Aussie battler who leads the world in the race to invention, but who then struggles to develop his idea in the face of financial constraints, investor ignorance, and marketplace resistance.

In my book *The Australian Miracle (2006)* I have debunked this myth, arguing on the one hand that Australians are much less inventive than they think and, on the other hand, that they are far more adept at commercialisation than is popularly imagined.

Unfortunately, while the unravelling of economic protectionism in Australia in recent decades has revealed a new kind of Australia, one that is vigorous and that has prospered by pursuing comparative advantage, to some extent the negative view of Australian innovation persists.

Despite this, faced with the stark reality of global markets, Australian innovators are moving with their feet. In step with the shifting orientation of our economy, over the past decades Australians have been quietly transforming the ways in which they exploit knowledge. The changing investment patterns of innovative Australian businesses indicate that Australians are beginning to see themselves as they really are: as highly adept system integrators.

This is a journey that we've only just begun. In the years ahead, no doubt we will continue to hear periodic calls for reintroducing government support for manufacturing innovation. Some people will bemoan the prospect of a likely continued shift out of hardware. There will be the ongoing debates about whether Australian high-tech industries suffer from a shortage of ideas or a shortage of capital or a shortage of management expertise.

But the success of the Australian economy will ultimately depend upon our ability to act upon none of these things. Broadening the popular understanding of innovation in Australia would be a vastly more constructive aim – second only perhaps to an ongoing affirmation that ultimately the best and only way to identify a country's strength in innovation is not through analysis but in the market.

ENDNOTES

1 See, for example, Balaguer, A. et al., 2003.

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multinational companies IN Australia

9

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Introduction

Globalisation is changing Australian industry. Success depends on the enterprise and adaptability of Australian firms and the individual Australians who make up these firms. Australians have a deserved reputation for innovation and adaptability that has taken so many to the top internationally.[1] We should be confident that the changes in international business will benefit Australia.

The Minister for Industry Tourism and Resources, Ian Macfarlane, has identified four factors that underlie the growth of Australian industry – investment, innovation, global integration and international competitiveness – and announced in July 2006 the government's intention to release an industry statement in 2007 around the theme of global integration. Following extensive consultations, the 10-year, $1.4 billion Statement was released by Prime Minister John Howard and Minister Macfarlane in Sydney on 1 May 2007. Titled *Global Integration: Changing Markets, New Opportunities*, it aims to address impediments to growth and encourage the nation's businesses to achieve greater integration into the global economy.

For more than a decade Australia has enjoyed economic prosperity. Sound macroeconomic management has kept interest rates and inflation low. Microeconomic reforms including taxation policy, labour market and competition policy have supported strong productivity growth, increased business competitiveness, and encouraged greater firm flexibility.

In industry policy the focus has shifted from protectionism to encouraging capable businesses that can compete successfully in an open market. The tariff walls that once insulated Australian industry have gone.

PHOTO: iSTOCK

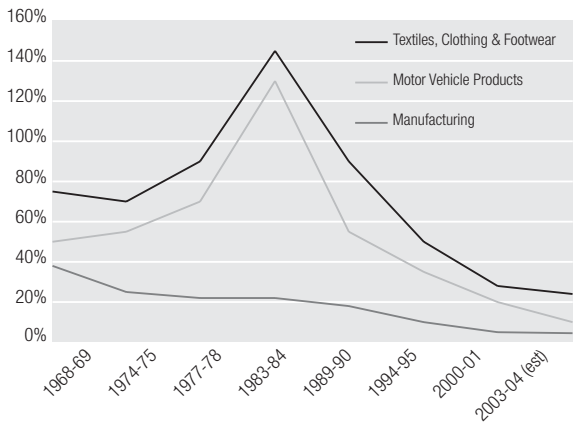
It is in this context of sustained economic growth that there has been increased interest in the factors that contribute to productivity, and the possibility that the recent period of catch-up be continued. Australia performs so very highly on a range of competitiveness measures[2] that it is reasonable to consider overcoming the gap with the best-performing countries. Productivity is not the only factor contributing to economic wealth (for example, discovery of gold or oil can be significant), but it is the most sustainable factor. Economists agree that productivity is the key to long-term economic growth.

This chapter does not provide an overview of the various factors impacting on productivity. Economic analysis of productivity remains constrained by data limitations, although recent work by the Treasury, Productivity Commission and others has done much to improve clarity.[3] The OECD discusses Australian productivity growth in its latest annual review of structural policy, *Economic Policy Reforms: Going for Growth 2007*. The Productivity Commission has also recently analysed the benefits of continued microeconomic reforms.[4]

What this chapter seeks to show is how the changes in international business can benefit Australia, and particularly how they provide new opportunities not yet fully realised to raise Australia's productivity. In this it aims to contribute to the broader public debate initiated by the Minister for Industry, Tourism and Resources with the 2006 release of his department's *Global Integration: background paper*, and the new directions set by the Government in the recent *Global Integration*, statement.

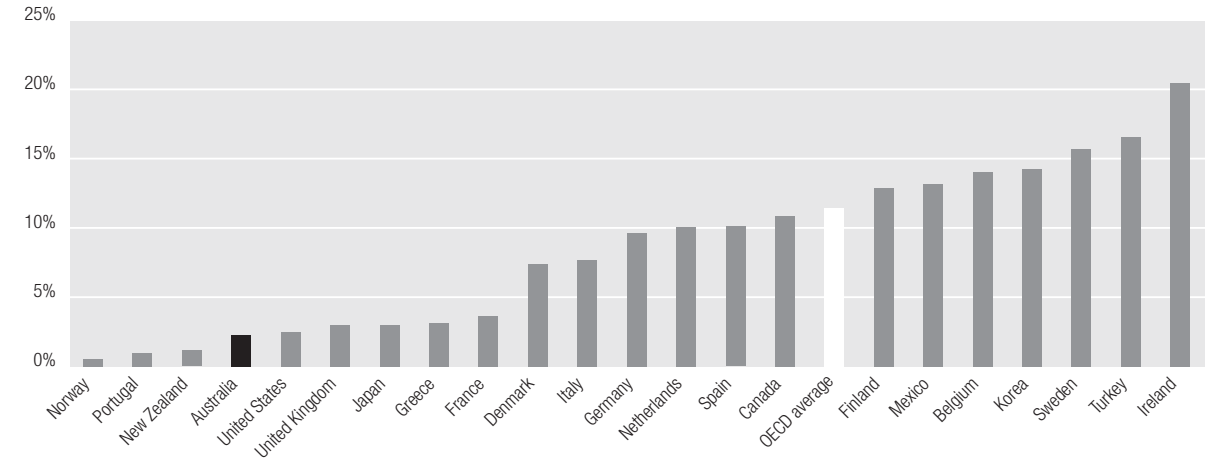
For a country of its economic size, Australia has a low level of trade and relatively few companies participating in international trade.[5] While tariff reductions (see Figure 1) resulted in the expected increase in Australia's trade intensity from the mid-1970s to early 1990s, Australia's trade exposure has barely changed over the past decade,

FIGURE 1 REDUCTIONS IN THE RATE OF MANUFACTURING INDUSTRY ASSISTANCE



Source: Productivity Commission, Department of Industry, Tourism and Resources (TCF textiles, clothing, footwear; MVP motor vehicle products)

FIGURE 2 TRADE TO GDP RATIO – DIFFERENCE BETWEEN 2004 AND 1991



Source: OECD Factbook 2006

despite further trade liberalisation, reductions in world transport costs and favourable world trade conditions (see Figure 2).

Analysis by officials at the Australian Treasury show that distance is a significant factor in accounting for Australia's productivity and trade exposure (Battersby 2006). The conclusion that geography remains a major constraint on Australian productivity overlooks the new opportunities provided by globalisation and global value chains for Australia to reduce its effective distance from world economic activity.

Large multinational companies (MNCs)[6] are at the centre of world trade, investment and industrial technology. Their value chains have become increasingly globalised as companies seek lower costs, specialist expertise, economies of scale and global markets. Intra-industry and intra-firm trade is increasing, and trade and foreign direct investment (FDI) is increasingly interdependent, as production has become more fragmented across borders and import and export flows of intermediates have grown in size. While there has been consolidation at the peak of the value chain, its fragmentation has created new opportunities for small and medium enterprises (SMEs) (OECD 2006a).

Australian industry is dominated by SMEs. The increased opportunities in global value chains come along with new management and financial challenges. SMEs may need to upgrade and protect inhouse technology, and meet strict requirements for product standards and quality. Insufficient working capital can also be a barrier to SME participation in global value chains, as payments from international partners may be delayed. To succeed, firms may need to take on a larger and more complex set of tasks. For example, they may need to contribute to product development, organise and monitor a network of sub-suppliers, implement internal systems of quality control and assure compliance to an increasing set of standards, ensure delivery and quality at competitive costs, and provide global technical support and maintenance services.

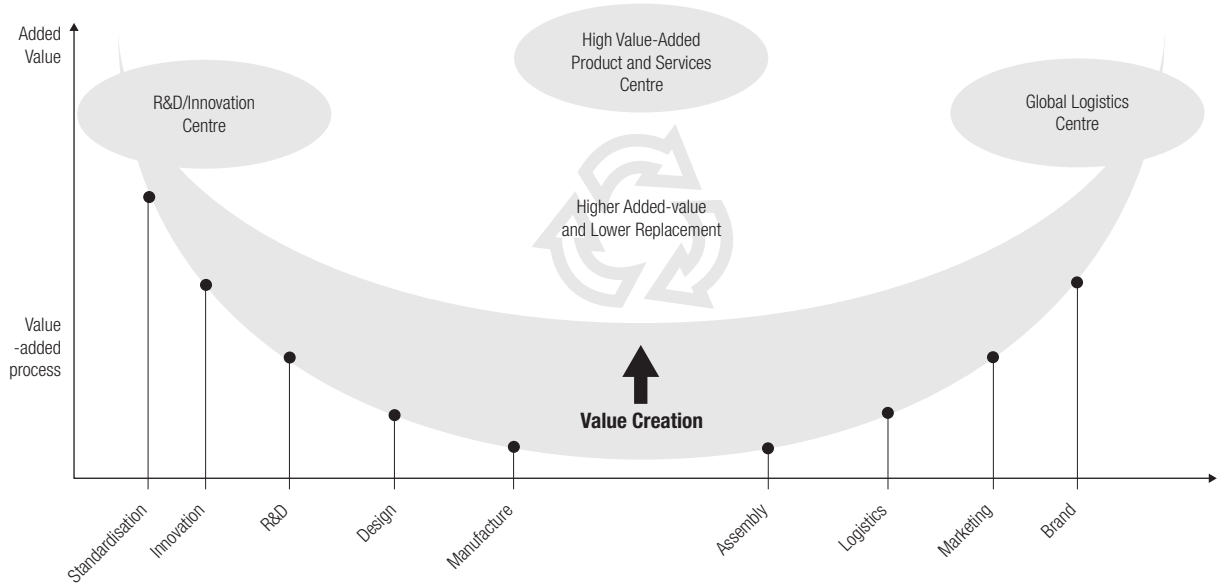
Studies undertaken by the Department of Industry, Tourism and Resources for the OECD show a range of responses by Australian SMEs to the challenges of globalisation (OECD 2005). Some SMEs are finding new avenues for growth. Others are not interested in international business and are determinedly pursuing alternative domestic opportunities, or plan to exit the industry. In between, there are a significant number of firms with some promising capabilities but significant gaps in capacity. The result is considerable restructuring, merger and acquisition activity, particularly in manufacturing industry impacted by global value chains.

The Treasury Secretary has noted the significant structural adjustment for Australian industry resulting from both the information and communications technology (ICT) revolution and the terms-of-trade impact of China and India. He has cautioned that "There is a risk of costly policy resistance to the structural changes implied by these external shocks" (Henry 2006).

SME awareness and capability are impediments to their engagement in global value chains. However, there may be relatively low-cost ways of addressing these impediments, thereby bringing the benefits of trade and foreign investment to a wider range of the Australian industry. Practical measures that build confidence in the merits and value of embracing globalisation can act as an important indicator to SMEs. They can also have the effect of reducing calls for more costly policy intervention.

When industry has taken a strong lead in the public debate on the benefits of moving up the value chain, public concerns about losses from restructuring have been reduced. CEDA, BCA, several of the industry Action

FIGURE 3 GLOBAL VALUE CHAIN MODEL BASED ON STAN SHIH'S "SMILING CURVE"



Source: Business Week International online extra, May 16, 2005, *Stan Shih on Taiwan and China*.

Agendas such as electronics and advanced manufacturing, and more recently the Australian Industry Group, particularly in its 2006 report *Manufacturing Futures*, have been active in advocating high-value growth prospects for Australia, including adoption of offshore manufacture where appropriate. As the recent furore about Blundstone illustrates, this issue remains sensitive.[7]

It is not just in Australia that offshoring has been controversial. South Korea, Taiwan and Hong Kong have all faced significant industrial restructuring resulting from low wage competition from China, particularly during the 1990s in the textile, clothing and footwear industries. Effective industry advocacy can counter calls for policy resistance.[8]

The "smiling curve" was developed by Stan Shih, founder and former CEO of Acer Computers in his role as industry adviser to Taiwan President Chen Shui-bian, when there was a concern about manufacturing of Taiwan laptops moving to China in the early 2000s:

I try to convince the Taiwan general public that the hollowing out of low-value-added activity is not a critical concern. Hollowing out the future higher-value-added activity is the concern, and those areas are more intangible. Hollowing out of tangible things is not critical. Hollowing out of intangible things is really critical. But this kind of message is not easy to communicate and appreciated by the general public (Business Week International online extra 2005).

Mr Shih was successful; no Taiwanese restrictions were placed on the migration of computer manufacture to China.

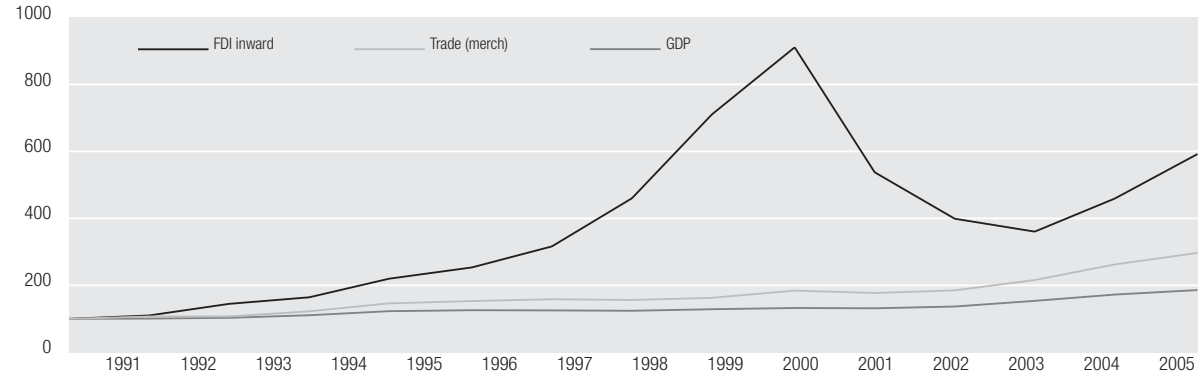
Multinationals and the global value chains

MNCs dominate global value chains. They undertake two-thirds of world trade, much of that in intra-firm transfers. The world's top 1000 companies direct 90 per cent of world foreign direct investment (FDI) (OECD 2003) and undertake the bulk of world business expenditure on R&D.[9] About seven multinationals spend more on R&D individually than Australian businesses in total (ABS 2006; Department of Trade and Industry 2006). The global markets served by multinationals are the main means of commercialising industrial innovation.

The largest firms are also important drivers of productivity growth. In the United States, between 1995 and 2005, labour productivity of the largest enterprises employing just 20 per cent of the workforce increased by almost 70 per cent. In consequence, the 1000 largest US enterprises are at the origin of a significant portion of the overall US economic growth (Dembinski 2007).[10] The industries that have shown the strongest productivity growth in the US are manufacturing, wholesale and retail – industries where large US firms have made extensive use of global value chains.

The political and economic changes of the past 15 years have seen a global move towards market economies, resulting in the emergence of significant new capital markets, trade liberalisation, privatisation and the spread of financial deregulation, as well as the creation of an increasingly integrated global economy. The conditions have provided MNCs with increased opportunities to achieve global economies of scale resulting from improvements in communications, transport and production process innovation within global value chains.

FIGURE 4 GLOBALISATION 1991–2005



Source: Trade data from WTO database, FDI data from UNCTAD database, and GDP data from IMF database.

The number of MNCs grew from 24,000 in 1990 to 77,000 in 2006, and they now employ 62 million people and create $US4.5 trillion in value-added goods (UNCTAD 2006). The growth in FDI (offshore investment by multinationals) has outstripped world economic and trade growth over the last decade, even discounting the exuberance of the 2000 technology boom. Figure 4 illustrates the impact of globalisation. While world GDP doubled over the period 1991–2005; world trade tripled and world FDI increased six-fold over the same period.

Global value chains[11] can be considered at both the industry and firm level. Figure 3, Stan Shih's smiling curve, provides an industry level schematic of a goods value chain. As illustrated in the figure, the value chain model maps the linkages and networks at the industry level and analyses the sources of value in the chain.

At the firm level, value chain analysis helps determine which specific activities give organisations a competitive advantage and create value, as well as which activities should be outsourced. It is now common for Original Equipment Manufacturers (OEMs) to outsource significant parts of their value chain. For example, OEMs for laptops and mobiles (such as Dell and Nokia) now typically outsource the goods manufacturing process to specialist electronics manufacturing service firms (such as Foxconn and Flextronics).

The capacity for value-adding processes to be sliced up finely among many firms has implications for national statistical classification systems (like ANZSIC) and the use of these classifications to understand productivity trends. Are pharmaceutical companies, where the cost of manufacturing a pill is a few cents, no longer manufacturers but really in business services (like Microsoft)? Are OEMs that contract out manufacturing still manufacturers? Such classifications can be a distraction from understanding the value-adding processes in the value chain. The industry classification systems used by major stock markets avoid this issue and classify companies such as Dell and Nokia in consumer goods and companies such as Foxconn and Flextronics in industrials.

The trends in global value chains mean:

- lead companies are categorised by their financial and technical capabilities with consolidation occurring among the lead companies in many value chains;
- domestic suppliers are being replaced by more technologically-advanced and lower-cost global suppliers;
- more manufacturing and service processes are being systematised and established in low-wage areas, spreading centres of global business beyond developed countries; and
- global value chains of networked suppliers have supplanted the model of vertically integrated regional operations within MNCs.

There is also a trend towards partnerships with key suppliers to reduce cost, risk and time of new product development. This is generating new opportunities for SMEs. Reflecting this, in many OECD countries SMEs affiliated with multinationals show stronger rates of output and export growth than independent SMEs (OECD 2003).

Global drivers of value

Customer expectations

Time Magazine person of the year for 2006, "you", reflects the growing recognition of the importance of consumers in the value chain. Increased incomes have increased discretionary spending, stimulating greater individualisation of products as a social trend and increased choice of goods and services. Environmental issues/values of consumers are impacting on brand value and regulation.

As Stan Shih's smiling curve illustrates, there is rich value associated with understanding consumers, the final customer in the value chain and ensuring that their needs are met – timeliness, design, fashion, environment, technology, reliability and cost. Some MNCs are viewing this relationship as their core business and are pushing consumer demands as they view them onto their supply chain.

Key developments include:

- widespread adoption of lean processes by customers in supply chains, with attention on build-to-order and time-to-deliver cycles;
- expectation of continual cost and quality improvements as a result of product and process innovation; and
- mass customisation that involves a "family" of products that appeal to a wider range of consumers.

Underlying mass customisation is a common platform from which distinctive product variants can be derived or customised. The platform is defined as components and subsystems commonly shared across a product family. A well-organised platform is critical to achieving economies of scale by identifying repetitive applications of share tooling, knowledge and other resources, including relating these to order fulfilment and customer service.

Achieving economies of scale in global supply chains

The lowering of trade barriers, including better intellectual property protection, improved communications and transport systems, convergence of global consumer needs, and increased miniaturisation of many products, is enhancing the scope for multinationals to gain economies of scale not available to domestic firms.

In the consumer electronics and clothing industries, global manufacturing centres have been established in Asia to take advantage of low wages. Manufacturing plants built in these regions by multinationals as global production centres are typically highly advanced, using the latest in process technology.

In the services industry, India has become a global centre for call centres, financial and accounting services, engineering design and software development.

The automotive industry has also sought to realise greater economies of scale. Faced with prospects for rapid technological innovation particularly in new engines, light materials and automotive electronics/telematics and the resultant need for massive investment in technology and new products, the industry has consolidated, as exemplified by the mergers of Daimler–Chrysler and Renault–Nissan. There are now 11 carmakers with annual production above one million vehicles.

In parallel with increasing scale through M&A, automakers have reduced exposure to risk and costs of technology development by reconfiguring their ownership of the supply chain. Ford and General Motors have sold their former parts divisions, forming the new specialist tier one supply companies, Visteon and Delphi.

Further structural change in the automotive industry seems likely. China has not been a significant manufacturer of automotive products for world markets, but that is about to change. Production is expected to double from 5 million vehicles a year in 2005 to 10 million in 2010, with an even greater increase in the value of parts production. All significant vehicle and parts manufacturers have already established or are establishing Chinese manufacturing operations.

Gaining economies of scale has also been important in the oil and gas supply chain. Oil majors have used partnerships and alliances to reduce risks. For example, oil majors now typically contract the construction of new plant facilities on a cost-performance basis to engineering, procurement, construction management (EPCM) firms such as Halliburton, Bechtel and Aker Kvaerner.

The trend by EPCMs towards modularisation of plants, systems and technology has given rise to international suppliers who have the capacity to competitively deliver modular process plants worldwide – for example, synthesis gas plants – and to absorb a significant level of risk. To lower costs, the major EPCMs have all established low-cost Asian engineering and design centres and encouraged consolidation and globalisation among their suppliers. Consequently, the proportion of domestic contracts in major oil and gas engineering projects has steadily declined.

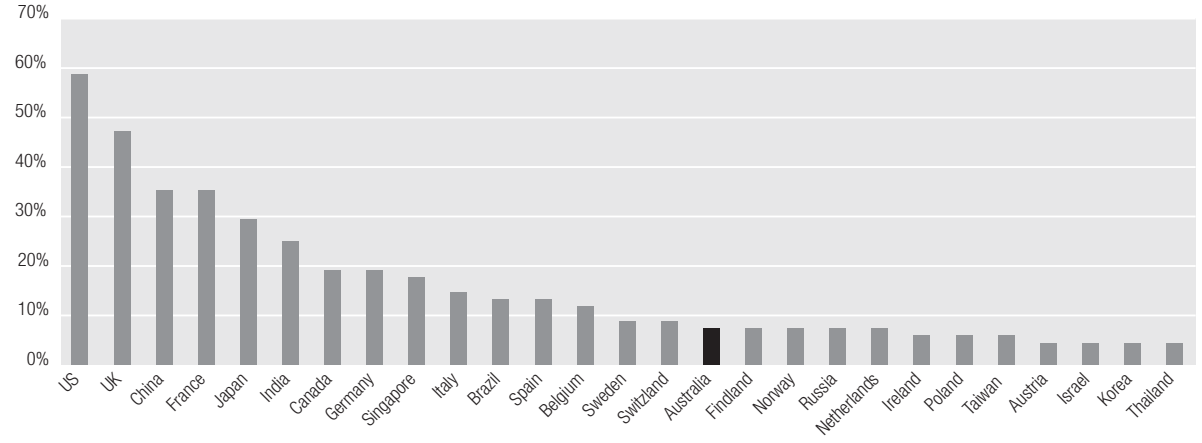
Rapid, flexible and low-cost means of achieving the benefits of global operations are increasingly being explored through alliances and partnerships.

In the tourism industry, airlines, travel agents, hotels and car rental companies are also turning towards global suppliers. For example, Qantas has outsourced much of its IT functions to Amadeus – one of the major global distribution systems. Better customer relationship management is a major focus for the development of IT business systems within the tourism industry.

Rise of virtual integration in supply chains

Rapid, flexible and low-cost means of achieving the benefits of global operations are increasingly being explored through alliances and partnerships. Improvements in ICT facilitate the lean integration of global operations.

FIGURE 5 DISTRIBUTION OF FOREIGN R&D LOCATIONS



Source: UNCTAD, World Investment Report 2005 (fig IV.8)

The success of this approach is shifting the competitive landscape from large, vertically integrated organisations operating within national borders to the virtual integration of a number of companies through partnerships and alliances across geographic locations (Porter 1998). This approach has opened up new opportunities for global operation by SMEs, with the apparel company Billabong being a well-known Australian example.

Traditionally, vertically integrated multinationals have operated and managed most functions in the supply chain. They have direct control of these functions, which enables them to maintain quality and timeliness of delivery, keep production close to the customer, and protect sources of supply. The approach was multi-domestic – there was a considerable degree of local management autonomy, many suppliers were domestic with little attempt to achieve global economies of scale in the supply chain.

The trend over the past decade has been to replace vertical integration within national boundaries with virtual integration. Here, the management processes of global enterprises are organised internationally. There is much less national autonomy and the global business centres look to suppliers that provide cost-savings through standardisation and improved quality and service – particularly in the context of lean production systems, in addition to unit cost savings. This means that suppliers with domestic supply capability only are being replaced by suppliers with regional or global capacity.

In the virtually integrated supply chain model pioneered by firms like CISCO and Dell, partnerships with key suppliers are developed to help multinationals manage costs and risks and respond faster to global changes. The value of the virtual integration model ability to perform in a superior way was demonstrated by CISCO/Dell during the 2001 technology downturn and now has been widely emulated by their competitors.

Impact of changing technology

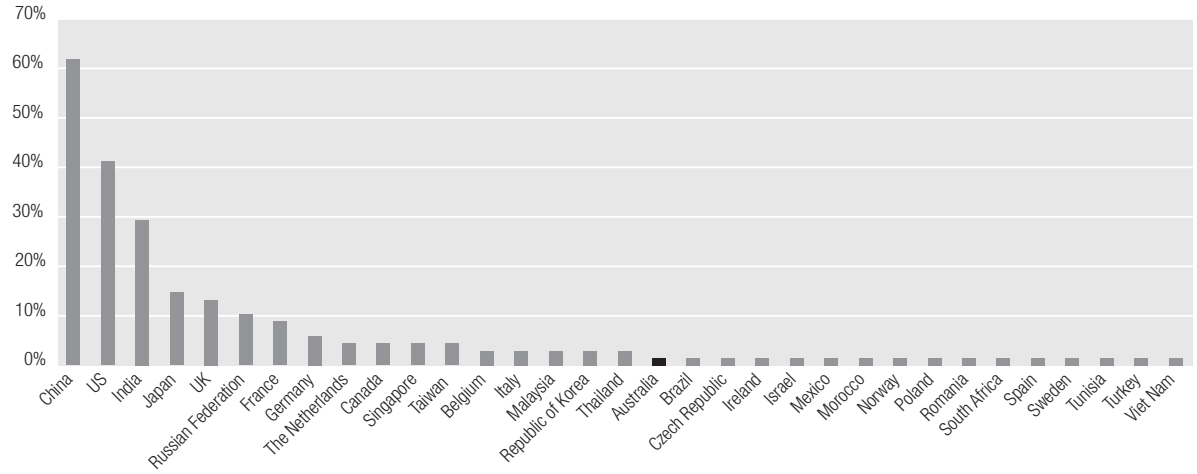
Of the various processes in the value chains of MNCs, technical development has been the least globalised and most commonly kept, predominantly in the home country. For some time technology's importance for MNC competitiveness has been growing. In response, MNCs are seeking to reduce the time to market and broaden their access to new ideas through rising levels of collaboration and increasing the global integration of their innovation process.

During the 1980s there was significant migration of R&D to production centres abroad, but the objective was primarily adaptation to domestic markets. During the 1990s, the trend of establishing foreign technical centres with global product development mandates became well established, drawing on specific skills and centres of expertise.

Increasingly over the past decade technical development has come to be treated by firms like other business services functions, with issues of cost and scalability driving companies to establish R&D centres in countries such China and India, and also to outsource longer term and non-core research. There is also a rise in foreign R&D investment from China, Korea, Taiwan and so on seeking advanced knowledge in the US and European Union.

Within the bounds of relatively static or slowly growing business investment in R&D within OECD countries there is considerable flux at the firm level. Developments in technology promise efficiencies in processes and new products at an increasing rate. Lead firms need to be able to respond rapidly to new develop-

FIGURE 6 MOST ATTRACTIVE PROSPECTIVE FOREIGN R&D LOCATIONS



Source: UNCTAD, World Investment Reports 2005 (figi IV.11)

ments, and failure to do so is a leading cause of consolidation at the peak of many value chains. The explosion of scientific knowledge in bio-, nano- and information technology is beyond the capacity of even the largest firms to assess and maintain inhouse capabilities.

Therefore leading firms are making greater use of R&D conducted elsewhere and targeting internal research at either filling in missing gaps or creating integration mechanisms that build upon external research activity. Many large firms use merger and acquisitions to gain the technology that they need. International corporate R&D involves mobility of people and collaboration around the world with suppliers, universities, research institutes, customers and even competitors.

Companies are using a variety of commercialisation processes to increase the speed to market. Internal deployment, spin-off companies and licensing are all used, depending on the business fit. The role of corporate technical centres has changed from being a developer of technology for use within the company to integrating globally distributed R&D to create business value either within or outside the company.

The pace of internationalisation of R&D seems to be increasing. An UNCTAD survey of the largest R&D investors in 2004–05 found that as many as 69 per cent of the responding firms stated that their share of foreign R&D is set to increase.

Figure 5 is based on data from the UNCTAD survey, and shows the distribution of foreign R&D locations among the largest MNCs. Notable is the rise of China, reflecting both China's increasing importance as a market and as the fourth largest R&D performer after the US, EU and Japan (OECD 2006d). Reportedly, there were 750 foreign R&D centres in China in 2005, up from 30 in 1999 (OECD 2006d, p. 133).[12] Although there are some caveats to this,[13] the growth and significance of China as a centre for industrial technical research remains impressive.

Figure 6 shows the most attractive prospective locations for R&D by major MNCs. China, India and Russia feature strongly.

The internationalisation of R&D poses issues for policy-makers. Detailed econometric assessment of the national costs and benefits must await development and collection of data – perhaps many years. In the meantime, policy-makers are being challenged to change their mindset from supporting R&D and innovation activities of "their" companies to making their country the best place for companies around the world to innovate and perform R&D (Karlsson, 2006, p. 11).

As Australia's location and size has frequently meant that our capabilities are overlooked, it is a fair assumption that internationalisation of Australian business R&D by raising the profile of Australian capability, is more likely to bring benefits than more centrally located but higher cost/lower capability economies.

Australia's international engagement

International engagement contributes to Australia's productivity growth and long-term economic growth. While efforts to improve Australia's trade performance are important, there are other means by which Australia can engage internationally. International engagement that generates productivity benefits can also be gained through FDI, and associated global value chains, and through engagement in world class science, R&D and innovation.

BOX 1

CSL IS ONE OF AUSTRALIA'S MOST SUCCESSFUL COMPANIES. SINCE ITS PUBLIC FLOAT IN 1994 ITS MARKET VALUE HAS INCREASED FROM AROUND $300 MILLION TO AROUND $15 BILLION IN 2007.

The Commonwealth Serum Laboratories (CSL) were established in 1916 to supply Australia with vaccines and other bacteriological products otherwise unavailable due to the First World War. Under public ownership, CSL was a leader in the introduction of several vaccines, including the vaccine for polio, and was one of the first organisations to manufacture penicillin following the discoveries made by Dr Howard Florey.

Before its public float in 1994, CSL was well advanced in developing commercial-scale chromatographic separation of blood. The chromatographic process was known to increase albumin purity from around 95 per cent to 98 per cent and the yield from about 65 per cent to 85 per cent over conventional blood separation processes, but there are significant impediments to doing this at commercial scale. Small percentage increases in purity can be therapeutically very significant.

CSL's chromatographic plasma fractionation plant in Broadmeadows, Victoria was built in 1994 and in 1995 CSL issued the world's first chromatography-based albumin product. CSL states that its $350 million Broadmeadows plant is "one of the most sophisticated plasma fractionation facilities in the world, and the only commercial scale facility of its type" (CSL 2007).

CSL has exploited its leading process technology mainly through acquisition of overseas plasma manufacturing and collection capacity, rather than exporting. Blood donation is an important mode of collection and people feel more comfortable with their blood being processed and used for local purposes. CSL purchased ZLB in 2000 and Aventis Behring in 2004 (acquiring manufacturing facilities and plasma product R&D capacity in Germany, Switzerland and the US). In doing this, the CEO of CSL noted that success in the plasma products industry demands "a broad portfolio of quality products, an innovative R&D pipeline, an efficient high yield production operation, the ability to balance market demands and outputs and a global marketing effort".[14] CSL has methodically put together each of these elements.

The strategy has been successful with CSL on track to record a $500 million after-tax profit in 2006–07, primarily via its US and European-based CSL Behring plasma group.

Australia has long made a significant global contribution in fields such as public health as the history of CSL illustrates. In the mid-20th century when public health authorities were dominant, CSL made its contribution through exchanges of technology with similar authorities overseas. In the 21st century commercial practices dominate health products, as Australia's fast-growing imports illustrate. The transformation of CSL into a private company illustrates that Australians remain just as capable of creating value in the development and use of health products as we were in the pre-commercial world.

Australian MNCs

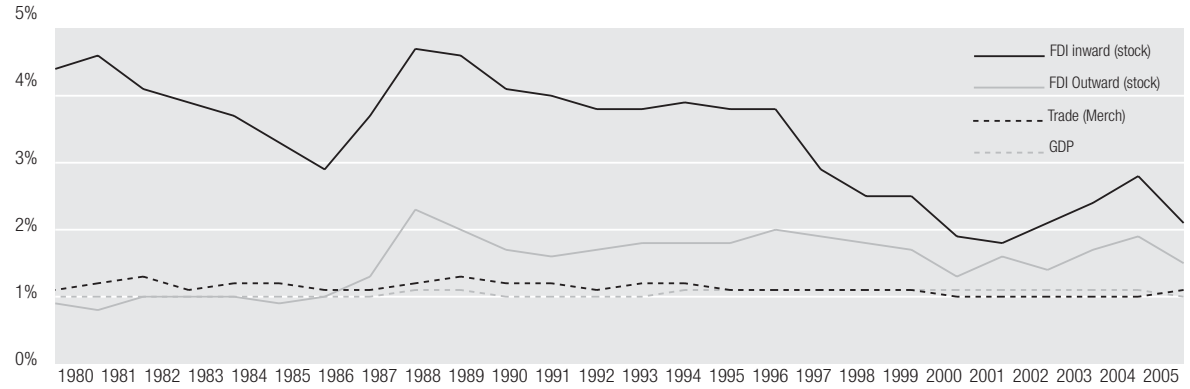
Australian firms including CSL, BlueScope Steel, Cochlear, ResMed and Billabong are showing Australia can grow global firms that take advantage of the opportunities for MNCs. Some of these companies are relatively new, their capabilities being realised and taken to world-leading performance following corporate restructuring.

The importance of intangibles such as intellectual property (IP), knowledge and relationships to the success of Australia's global firms has been noted by Bruce Grey, Managing Director, Bishop Technology Group (DITR 2006). Australia cannot compete with developing Asia on costs and is distant from world markets, so intangibles are especially important. The IP doesn't have to be developed just in Australia. Most of Australia's successful global companies have built on their IP with foreign acquisitions, licences and joint ventures so as to establish competitive advantage in their industry.

For example, through European and US acquisitions CSL has complemented its process technology with product-related IP and its plasma business now has five R&D centres outside Australia. See case study box for further details of CSL's global business.

Faced with competition from much larger steel companies, BlueScope Steel has focused on the branded products spectrum of the steel business, backing its lead in flat steel and coatings technology with a series of partnerships with companies like Bethlehem Steel, IHH Industries of Japan, Akzo-Nobel and Nucor. Since its split from BHP in 2002, BlueScope Steel has leveraged its world-class IP beyond its Australian base through investments in China (it is the largest Australian investor in China), India, the US and ASEAN. The global expansion strategy seems successful; BlueScope Steel's share price has risen from $2.80 from the share float in July 2002 to $9.60 with a market capitalisation of $7 billion in March 2007.

FIGURE 7 AUSTRALIA'S SHARE OF THE WORLD



Source: UNCTAD, WTO and IMF databases

Billabong is Australia's most successful apparel company, being an ASX Top 100 company with a market capitalisation of $3.5 billion. Under ANZSIC industry classifications, Billabong's business is clothing wholesale and it provides an illustrative example of productivity growth by the wholesale industry in Australia. Billabong invests heavily in the creation of brand loyalty and value through product design and iconic sports sponsorship. It has complemented its core brand with investment in other brands, Element (skates), Nixon (watches) and Van Zipper (sunglasses). The headquarters of Billabong are on the Gold Coast, Queensland, and it has business and product-development centres in Europe and North America. Its products are distributed globally with more than two-thirds of its sales outside of Australia. Billabong also owns and licenses retail stores. Manufacture is primarily contracted to Asia.

Australian suppliers succeed in global value chains

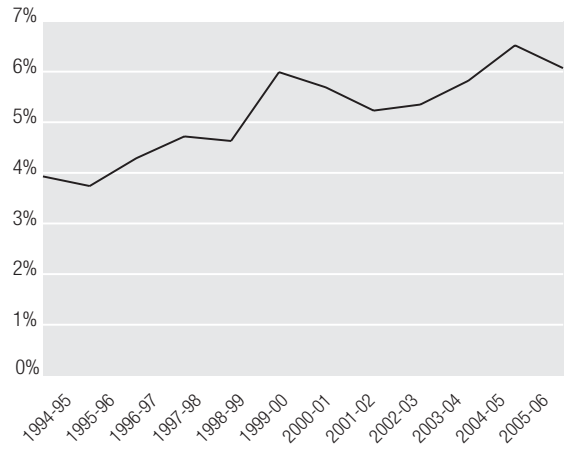
All major instrument manufacturers in chromatography and mass spectroscopy incorporate SGE analytical science manufactured components in their systems. Bishop Technologies is a supplier of steering technology to around 20 per cent of the world's cars. Worley Parsons is a global leader in alliance contracts in engineering services, especially in the oil and gas industry. Animal Logic produces visual effects, animation and design for the film, television and advertising industries such as the award-winning Happy Feet. GKN Aerospace Engineering Services Australia has designed more than 1000 parts for the Joint Strike Fighter[15] – 10 per cent of the total. Traditionally, aerospace engineering firms have been co-located or closely located to the final assembly site, excluding Australian suppliers, but technology allows work to be undertaken remotely where the best engineers are located (Invest Australia 2006). Peregrine Australia makes a radio frequency (RF) sapphire wafer chip that combines antennas with amplifier and is the RF chip of choice for top end Nokia and Motorola mobile phones. Silverbrook Research is a specialist IP developer in opto-electronics, and is Australia's leading filer of patents in global markets. Its CEO, Kia Silverbrook, has more than 800 US patents in his name.

What this means is that even though Australia's share of world trade in these industries is only about 0.3 per cent, Australian designs and products are inside a significant proportion of the world's cars, scientific instruments, films, aircraft and phones. Australian components are high value, helping make good products great. The companies that create these products in Australia generate high-value jobs, and their growth is a major contributor to Australian productivity growth.

Figure 7 shows that Australia's stock of outward FDI, that is investment in foreign affiliates by Australian MNCs, has consistently been above 1.5 per cent of world FDI stocks for most of the past decade, that is 50 per cent higher than Australia's share of world trade. Given the rapid rise in world FDI this is a strong indicator of the success of firms like BlueScope Steel and CSL.

Figure 8 shows that investment income from Australian FDI abroad has risen from 4 per cent to 6 per cent of all Australian credits from abroad, that is credits for exports or goods and services plus credits resulting from equity and portfolio income. In current dollars, the rise has been from about $4 billion in 1995–06 to $13 billion in 2005–06. Were FDI income to be compared with the top 20 exporting industries, it would be third only to coal and iron ore, and ahead of personal travel and education services. A large part of Australian outwards FDI is in manufacturing at 44 per cent, with finance and insurance the next largest at 36 per cent. FDI by business services companies is growing rapidly, but from a small base (ABS 2006a). Given the apparent constraints placed by Australia's location on trade growth, further growth in outwards FDI may be an important means of gaining the benefits of global integration.

FIGURE 8 AUSTRALIA'S OVERSEAS EQUITY INCOME AS PROPORTION OF TOTAL CREDITS



Source: ABS Cat. No. 5302.0

Asia may be the most promising location for growth in Australia's outward FDI. While overall Australian outwards FDI is strong, Asia is missing out. ABS data (2006a) on Australian investment abroad shows that at December 2005 around 88 per cent of Australian outwards FDI was in the US, EU, New Zealand and Canada; an increase from 82 per cent in 2001.

Out of the total $241 billion of Australian FDI abroad as of December 2005, investment in some Asian countries was low – $135 million in Japan, $47 million in India, $799 million in Korea and $856 million in China. Total stock of FDI in China was around A$415 billion,[16] so Australia's investment in China has the potential to rise more than seven-fold were Australian firms to invest in China at their global average (UNCTAD 2006). Given the productivity benefits that the US in particular seems to have derived from FDI in Asia, the Australian Government's focus on a free trade agreement (FTA) in Asia to address a range of impediments to investment is appropriate. Australia has strong cultural ties to much of Asia which should be a major benefit in developing investment opportunities. For example, there are 50,000 Australians resident in Hong Kong, and the Hong Kong chapter of Engineers Australia has 1700 members.

Trevor Rowe, Chairman, Investment Banking, Rothschild (Australia), noted the following impediments to Australian investment in Asia:

- the track record has not always been good;
- Australian institutional investors' attitude towards Asian expansion has generally been negative, with a preference to invest in proven and established ventures;
- difficulties in structuring the equity in a way that meets Asian requirements and is acceptable to the institutional investor in the Australian market;
- investing in Asian businesses often requires a longer investment timeframe. Articulating long-term benefits to shareholders who have an imperative for short-term returns can be challenging; and
- there is a lack of truly local knowledge and in numerous situations the lack of local partner connections.

As a result, Rowe (2006) says the race for investment in the high-growth Asian economies is often being won by the larger US and European players, who have greater capital to deploy and for whom the relative size of investing in Asia is significantly smaller than an Australian company.

The very rapid maturing of China's economy, with larger middle-class markets, greater opportunities for technology acquisition, fewer restrictions on investment and better intellectual property protection will open opportunities for Australian companies.

Foreign MNCs in Australia

Investment in Australia by foreign-owned multinationals is also an important mechanism for global integration. Figure 7 shows Australia has a share of world FDI stock around twice that of its share of world production. There are three primary drivers of foreign investment: access to markets, resources, and intangibles such as IP and knowledge. Multinational investment in Australia's resources sector remains strong with growth in Asia expanding and opening up major markets for Australian resources. This is attracting investment by MNCs, including from new sources in Asia beyond Japan. The challenge for Australia is in turning declining interest in Australia as a market into greater interest in Australia for its intangibles. As of December 2005, the $281 billion of FDI in Australia was allocated as follows: 21 per cent mining, 19 per cent manufacturing, 17 per cent wholesale, 14 per cent finance and insurance, 9 per cent transport and communications and 5 per cent business services (ABS 2006a).

There is a significant opportunity to expand Australia's position as a technology provider into global value chains. We have noted the increased willingness for multinationals to contract out and acquire R&D from innovative SMEs, research institutions and universities. Australian firms and research institutions are benefiting. Major acquisitions of Australian-developed IP include the purchase of the wireless technology firm Radiata by CISCO, the membrane technology firm Memtech by USFilter (itself now part of the French Veolia Environnement group), the electrical switches company Clipsal by Schneider Electric, and the 2007 investment by Bosch in Pacifica – the latter particularly for its drive-by-wire technology.

TABLE 1 R&D EXPENDITURES OF AFFILIATES OF US PARENT COMPANIES ABROAD BY DESTINATION, AS PERCENTAGE OF TOTAL

DESTINATION	1995	1996	1997	1998	1999	2000	2001	2002	2003
Canada	8.5	11.1	12.5	11.9	9.3	11.4	10.8	10.8	11.0
European Union (15)	70.4	66.9	66.4	68.6	65.6	61.0	58.8	61.4	61.5
Eastern Europe[1]	0.1	0.3	0.3	0.5	0.3	0.4	0.2	0.3	0.3
Latin America	3.1	3.9	4.5	5.1	3.4	3.2	2.9	3.7	3.1
– Brazil	2.0	2.5	3.0	3.0	1.6	1.2	1.0	1.4	1.5
Africa	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1
Middle East	0.8	1.2	1.4	1.0	2.1	3.1	3.7	3.5	3.1
Asia-Pacific	14.8	14.8	12.8	10.9	17.8	19.2	21.3	18.0	18.2
– Japan	10.2	9.5	7.5	6.6	8.4	8.0	7.6	7.3	7.4
– China	0.1	0.2	0.2	0.4	1.8	2.5	..	3.1	2.5
– Australia	2.3	2.9	2.5	2.0	1.6	1.7	1.5	1.5	1.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total in US$ billion	12,582.0	14,039.0	14,593.0	14,664.0	18,144.0	20,457.0	19,702.0	21,063.0	22,328.0

1 FROM 1999 ONWARDS, EASTERN EUROPE ONLY INCLUDES THE CZECH REPUBLIC, HUNGARY, POLAND AND RUSSIA.

Source: OECD Science, Technology and Industry Outlook 2006

Underlying Australia's capacity as a technology supplier is strength in basic research. Australia produces about 3 per cent of the world's scientific research publication. Table 1 shows the level of R&D expenditure by US MNCs abroad over the past decade. Australia has averaged around 2 per cent share of this expenditure, with a decline around 2000 being reversed in the more recent data. The recovery seems likely to continue, as major US firms such as GM, Ford, Pfizer, Honeywell, Merck Sharp & Dohme and Johnson & Johnson have reported increased R&D expenditure by their Australian affiliates in 2003–04 and 2004–05 over earlier years (IPRIA 2006).

Australia has also been successful in attracting European and Japanese investment in R&D facilities, with Bosch, GlaxoSmithKline, Mitsubishi Motors, Canon, NEC and Schneider Electric being among the major companies with R&D centres in Australia. Alcatel and Ericsson closed major R&D labs in 2001–02.

Public appreciation of the economic role of FDI is less strong than it is for trade. The Australian Bureau of Statistics has recently enhanced its commitment to globalisation statistics, which will improve the extent of Australian coverage in OECD analyses of globalisation and contribute to public understanding. General equilibrium models of the world economy are limited in their capacity to treat FDI, which reduces their capacity to explain the effects of investment liberalisation (Lejour & Rojas-Romagosa 2006).

While the public concerns about FDI remain (foreigners buying Australia, offshoring), expert opinion about its benefits has strengthened. At the general empirical and theoretical level, recent economic research has confirmed the value of FDI in a wide range of situations and countries.

For inward investment, it is recognised that multinationals, in general, are more productive than domestic firms and this effect increases national productivity. Multinationals also create spillovers, both for their supply chain and possibly also for other companies in the industry (vertical and horizontal spillovers). Where there is strong national absorptive capacity, recent empirical evidence shows positive vertical spillovers (Alazzawi, 2004), but there is less evidence for horizontal spillovers, which econometric studies have found to be generally close to zero or negative (Rojas-Romagosa 2006). Papers examining FDI chasing low labour costs have found little to no spillover effect (Günther 2005; Paul & Wziatek-Kubiak (eds) 2005; Sasidharan 2006).

In relation to outward investment by multinationals, it is common for concerns to be expressed in the home country about the export of jobs.

Most empirical studies have confirmed the OECD's findings in the early 1990s that outward FDI tends to increase output, employment and exports in the parent firm in the home country, in part because of the positive impact on the parent firm's competitiveness. The OECD (2006b) concludes that:

Any policy which sought to limit the ability of a domestic firm to establish operations abroad would have a negative macroeconomic impact equivalent to the effect of erecting trade barriers… if parent companies benefit by investing abroad, then the corollary must also be true that their competitiveness would suffer from any attempt to discourage those foreign activities.

For Australia, distance has limited the growth of trade, but is less a constraint on investment. Australia's share of world trade and world production is around 1 per cent, but its share of world inwards FDI typically has been several times larger (Figure 7). Australia's absorptive capacity is strong, it has strong research and innovation skills and a range of dynamic and innovative SMEs with world-leading capabilities ready to benefit from multinational linkages.

Taken as a whole, both the findings of the economic literature and Australia's specific circumstances (geographic location, industry structure, role of SMEs, technological capability) mean that for Australia inward and outward investment by multinationals is an important mechanism for global integration.

Realising the opportunities through global integration

I think the most emphatic reason why this country has done well and this country will continue to do well, is that Australians by world standards are remarkably adaptable people, and the capacity of Australian employers and employees in the face of dramatically changed world circumstances, facing the globalisation of the world economy, our capacity to adapt and change has been second to none. And the reason why Australian workers are sought after around the world, the reason why we have an enviable reputation as contributors and innovators, is that we do have a great capacity to adapt. (Prime Minister John Howard, MP)[17]

Enterprise and adaptability by firms are required to respond to the competitive challenges facing Australian industry. The government has a framework of industry measures to support firms realise opportunities through global integration. While the Minister for Industry, Tourism and Resources has indicated that further measures may be included in the forthcoming industry statement, the current initiatives are already extensive, and could be made better use of by industry.

An important underlying principle is that government initiatives are not a substitute for enterprise and adaptability by industry. An overview of the support available follows. Details of existing programs to strengthen global integration of Australian industry are provided in Appendix A.

1. Overcoming information deficiencies that result in multinationals failing to appreciate the benefits of investing in or sourcing from Australia and of Australian SMEs that lack knowledge of global value chains

There are several government agencies whose task is to raise awareness of Australian capabilities and address information deficiencies. These include: Austrade, Invest Australia, Geoscience Australia, Tourism Australia, Industry Capability Network Limited (ICNL), as well as many State and Territory agencies.

… for Australia, inward and outward investment by multinationals is an important mechanism for global integration.

Australia's size and location also means that many MNCs do not appreciate Australia's potential. It is difficult for an individual Australian company to remedy this issue on its own. Industry associations have an important role in helping companies share marketing costs and be more efficient users of government services such as Austrade.

There are examples where expatriate Australians in global headquarters with knowledge of Australian industry capability have resulted in access by Australian firms to global supply chains that they otherwise would not have been considered as potential suppliers. For example, Bosch Australia's success in becoming the global centre within the Bosch group for car security systems is attributed to Jac Nasser's role as CEO of Ford Europe.

International engagement is increasingly a core success factor for Australian firms. Government can help firms get started and facilitate networking, but cannot substitute for firm investment in this activity. There is a wide range of networks that firms need to develop to be successful internationally, company links with sales departments are not enough. Logistics, R&D and leading customers and CEOs are also important in global supply chains. Most international supply links also involve investment and corporate investment analysts. E-business systems are important in many supply chains and it is critical for firms to be informed on how to effectively use such systems to market to target buyers.

Industry associations have an important role to play in helping companies share marketing costs and be more efficient users of government services such as Austrade, Invest Australia and the ICNL. Several industries, for example, Aerospace, Electronics and Advanced Manufacturing, have mapped Australian capability for

use in export and investment promotion. Often the awareness by local subsidiaries of MNCs of Australian capability outside the state they are based in is weak. Industry Action Agendas can help bring Australian SMEs closer together with foreign-owned multinationals. This has occurred, for example, in the medical devices industry where AusBiotech mainly representing Australian-owned firms and Medical Industry Association of Australia, mainly representing foreign MNCs, are both engaged.

2. Ensuring that Australian firms are in a position to gain from the technology and production know-how of multinationals and access their supply chains

There is potential for many Australian firms to effectively become exporters by selling domestically to multinationals who then supply globally. This can be a low-cost means for Australian SMEs to enter export markets. Governments are keen to encourage these links with MNCs as they bring national benefits through the introduction of new or improved products and services, provision of technology and production systems that lower the costs of producing existing goods and services, and international market intelligence and global marketing channels that can open new markets for local firms.

There is potential for many Australian firms to effectively become exporters by selling domestically to multinationals who then supply globally.

Qualification can be a barrier. MNCs enforce advanced internal standards and accreditation systems relating to safety, quality, delivery, tendering, procurement, skills, labour and the environment that Australian SMEs and their supply chains may struggle to meet.

The costs of compliance procedures to required standards can be proportionally too high for small firms, particularly where these private standards set by customers are in addition to government standards.

One way that government can help is through reducing variation between national and local standards and international standards as recommended by the Banks Taskforce on Business Regulation. The taskforce recommendation is being acted upon by the government, including through Council of Australian Government processes (Treasury 2006).

Initiatives such as group certification for small firms in local regions might also prove effective, and engagement of MNCs in certification processes. ICNL and its network[18] have been active in providing advice on the certification requirements of MNCs. Education and training system are also important as specific workforce competencies may be mandated. Australian government leadership of efforts to improve the responsiveness of the skills system has been welcomed by industry.

The OECD work on SME access to global value chains has identified that while the information technology has made market intelligence more available for SMEs, their limited resources and lack of managerial capacities hamper development of opportunities in foreign markets. This also applies to the potential for SMEs to subcontract abroad part of their production in order to improve their competitiveness. Several government agencies have been active in assisting SMEs with e-business, including ICNL and Tourism Australia.

Even where Australian SMEs have established domestic supply relations with multinationals, new issues arise in becoming a global supplier. For example, it may be necessary to provide global technical and service support. Firms may need to develop enhanced or modified products, or bundle their product or service with other products or services through international strategic alliances and other partnering arrangements. MNCs also use advanced contractual arrangements with their suppliers that adopt a shared risk and reward approach. Many Australian SMEs lack experience in international collaboration, and many multinationals are reluctant to initiate significant partnerships with inexperienced companies. Alliancing initiatives have been sponsored in several Action Agendas, including the Construction Industry Action Agenda and the Heavy Engineering Action Agenda, which has helped to spread understanding of understanding of and capability in these arrangements to SMEs.

Experience generated through the Supplier Access to Major Projects program and the Team Australia engagement in the Joint Strike Fighter has shown that in some cases MNC engagement is needed for Australian supplier capability to be certified.

The assistance given by Siemens Transportation to Australian medium-sized firm Air International Transit provides an example of the value of certification. In accordance with its Australian Industry Participation Plan, and supported by DITR's Supplier Access to Major Projects program, Siemens fast-tracked Air International Transit through its supplier qualification processes (involving technology and know-how transfer). This enabled Air International to bid for and win the supply of air-conditioning systems for the Victorian tram contract. As a result of the commercial success of that contract, Siemens provided marketing assistance to Air International Transit that resulted in a $20 million

contract for air-conditioners through Siemens UK train supply. Air International Transit has gone on to establish a strong international reputation installing air-conditioning systems in some of the world's leading rail networks, including MTRC Hong Kong, the Las Vegas Monorail, Metro Taipei, Delhi Metro Rail and Sacramento Light Rail.

The measure of benefit is not the import replacement or export orders won, but improvement in productivity gained through knowledge and technology transfers, and the economies of scale gained from access to larger markets and supporting infrastructure.

3. Overcome impediments to supplier financing

Participation in value chains often requires substantial investments to acquire or develop superior production technologies and logistics systems, invest in human capital, or certify newly required standards. Moreover, suppliers normally receive incoming payments from their customers several weeks or even months after the delivery of orders which can result in liquidity problems.

Exporting from Australia has primarily been undertaken by large firms, so domestic bank managers who handle SME accounts are generally unfamiliar with export credit financing and how to assess the creditworthiness of a major order from an MNC or its suppliers. Export Finance and Insurance Corporation (EFIC)'s Headway program is an important measure to address this issue. Headway provides a guarantee from EFIC to a bank enabling banks to lend additional funds to SME exporters. The *Global Integration* Statement has enhanced EFIC's capacity to assist SMEs seeking to become global companies by extending their supply and distribution chains overseas.

4. Protection of intellectual property

SMEs need to develop a management culture and systems to enable them to establish effective dialogue with supply chain principals in relation to intellectual property. In an analysis of the ABS Innovation survey, DITR (2006a) has found that firms that collaborated for innovation had a much greater chance of achieving a "new-to-the-world" degree of novelty, especially in technology-intensive sectors. DITR discussion with Australian industry has found that many Australian firms recognise the importance of a more collaborative approach to innovation, but hesitate to act.[19] Developing effective partnerships requires building trust and sharing information. Many SMEs fear competitors may gain access to vital data about their business.

In new product development, protection of intellectual property is critical, and agreements with public research institutions and international collaborators can be complex. Business skills are needed to enable firms to determine what type of information is necessary and feasible to share and what could provide competitive advantages.

Several Action Agendas have recognised this issue and have sponsored industry-specific guides on the protection of intellectual property. One has been completed for the biotechnology industry and a further guide is planned for the electronics industry. Action Agendas are also helping industries work together on innovation projects of common benefit such as technology roadmaps through the support of the AusIndustry Industry Cooperative Innovation Program.

Another AusIndustry program, the Intermediary Access Program pilot is supporting the InnovationXchange (IXC) and the Australian Institute for Commercialisation (AIC) work with SMEs can act as trusted intermediaries. The Society for Knowledge Economics (established with the support of Westpac, Microsoft, CPA Australia, the Institute of Actuaries and the Australian Government Information Office) is helping form ideas on innovation.

The protection of intellectual property rights of SMEs may also warrant international policy action, perhaps through OECD guidelines. The power imbalance between small contractors and their multinational customers can result in misappropriation of the intellectual property rights of SMEs. Even when the legal position is clear the SME may not be in a position to enforce its rights. The negative impact is two-fold. In addition to the direct damage created by sharp business practices, there may be reduced incentives for small firms to innovate.

Weakness in enforcement of intellectual property rules, as is common in most developing and emerging economies, is a particular issue for SMEs as they lack the financial resources to ensure fair treatment. IP Australia has been active in much of Asia in helping build the national capabilities of many IP agencies. The Australian Government has also been active in developing FTAs which provide for bilateral government dialogue on IP issues.

5. Developing innovative suppliers

Australia's distance from world markets means that innovation is a key component of firms' international engagement strategies. All of IPRIA's list of top 50 R&D performers are either MNCs or exporters, with most being both. The evidence to date from the Pharmaceutical Partnership Program is that innovation support is very effective in generating export growth.

Sectoral analysis in Action Agendas and the 2005 report, *No Simple Solutions: How Sectoral Innovation Systems can be Transformed* (Scott-Kemmis et al, 2005) suggest that many of the leading Australian firms are successful technology integrators – their added value lies in understanding the customer's need and coordinating the development of the product for that need, more so than in fundamental R&D. With the rapid increase in Asian technical prowess within specific technologies, there has

been an increased appreciation of the value of the systems integration role and Asian interest in accessing Australian capabilities in this arena. This is driving the electronics industry Action Agenda's interest in product realisation and also in its Asia engagement strategy, for example through the Strategic Framework Agreement with Taiwan. Systems integration is the key process in many technologies, for example, surveillance, payment systems, telematics and eHealth.

In a recent report, the Business Council of Australia (2006) commented that:

There needs to be a more strategic approach to emphasise and capitalise on [the technology integration] role through a comprehensive policy focus. International engagement is an essential element of such a strategy, as systems integrators are looking for new technologies, new applications for new technologies and cost effective suppliers – where Asia is especially important.

In 2006, the Prime Minister's Science Engineering and Innovation Council commissioned two reports on international engagement, one assessing the impact of Asia (China and India) and the other more broadly examining Australia's science and technology priorities for global engagement. Because they focus on Australia's science and technology, neither of these reports identifies the strength of Australian industry in systems integration.

DITR (2006d) has raised the need for a stronger focus on the international aspects of innovation in comments on Productivity Commission's draft research report, *Public Support for Science and Innovation*. In line with these comments, the 2007 *Global Integration* statement made changes to the R&D Tax Concession that enable foreign firms to claim the concession when they use Australia as a base for global R&D. The previous policy meant that effectively foreign firms could only claim the tax concession when their Australian affiliate undertook R&D in Australia for domestic use.

Innovation is covered in a recent report on international engagement on R&D recently completed in the UK (Global Science and Innovation Forum 2006). Australia is included in the group of eight nations plus the EU, selected for scientific cooperation, but omitted from the group of seven nations plus the EU selected for innovation cooperation. The report notes that the proposed EU seventh Framework Programme (2007–13) with an average annual budget of about ?7 billion will introduce a limited number of "Joint Technology Initiatives", large-scale public-private partnerships to deliver priority research agendas essential to the competitiveness of European businesses. The Framework Programme allows collaboration with third countries that are not EU or associated countries. The large public-private partnerships being supported under the seventh framework are likely to include projects of interest to Australian systems integrators.

6. Developing an Asia strategy

The Australian Government recognises that government has a special role in facilitating business in Asia.

In Asia, there are FTAs with Singapore and Thailand and discussions are progressing with Malaysia, China, Japan and Association of South-East Asian Nations (ASEAN) with New Zealand (the ASEAN-ANZ FTA). In addition, Australia is undertaking studies to assess the benefits of pursuing an FTA with South Korea. These FTAs can provide improved market access for exporters and investors, particularly in addressing a range of non-tariff and administrative barriers. They are faster to negotiate and implement than other trade deals.

Austrade has more than 40 offices throughout Asia with more than 350 staff. In 2005–06, Austrade assisted a total of more than 7000[20] clients throughout Asia. Of these, Austrade assisted more than 3000 with export sales with a total value of about $9 billion. In China alone, Austrade has more than 70 specialist staff in 20 locations.

The Electronics Industry Action Agenda with assistance from the Australian government has supported a strategic framework agreement with Taiwan to encourage industrial technology cooperation between Australian and Taiwan electronics industries.

The views expressed in this paper are provided for the purpose of stimulating discussion and do not necessarily represent those of any Commonwealth department.

Appendix: Australian Government programs to strengthen global integration

Several new programs to strengthen global integration of Australian industry were introduced in the $1.4 billion over ten years *Global Integration* statement. These include:

- the new $254.1 million Global Opportunities programme, which will help Australian firms win work in global supply chains and major projects; and
- the $351.8 million Australian Industry Productivity Centres, which will help firms review their business performance and capitalise on new market.

These build on an existing of set of programs to strengthen global integration of Australian industry. These include:

Industry Capability Network Limited/Supplier Access to Major Projects helps maximise opportunities for Australian suppliers to be part of major domestic projects and global supply chains. SAMP Global has recently been established with a focus on offshore opportunities.

*Export Market Development Grant*s assists firms develop export markets. Austrade and Invest Australia provide market information, advice and contacts for exporters and investors.

Team Australia helps maximise Australian participation in the development of the $12 billion Joint Strike Fighter Program.

Free Trade Agreements (FTAs), including with the US, Singapore and Thailand help improve bilateral business links, including on investment, regulation and transfer of business people. FTAs increase trade and investment opportunities for Australian firms.

EFIC Headway, a guarantee from Export Finance and Insurance Corporation (EFIC) to a bank, enables banks to lend additional funds to SME exporters.

$7 billion *Automotive Competitiveness and Investment Scheme (ACIS)* helps link Australian suppliers to global markets, and stimulate increased R&D and exports.

Provision of geoscientific information through *Geoscience Australia*, which has helped establish Australia as a leading location for exploration.

AXISS facilitates the establishment and operation of global financial services firms in Australia.

Tourism Australia helps strengthen links between Australian tourism operators and the international travel value chain such as travel agents and airlines.

$150m *Pharmaceuticals Partnerships Program* stimulates investment in high quality pharmaceuticals research and development.

Action Agendas foster industry leadership and industry-led strategies for growth, including via global integration.

Industry Cooperative Innovation Program provides grants for projects that meet strategic industry sector needs, including for international projects.

The Intermediary Access Program supports the InnovationXchange and the Australian Institute for Commercialisation , which are intermediaries expert in linking SMEs with both public researchers and MNCs. The Program has been extended in the *Global Integration* statement.

International Science Linkages Program supports Australian scientists, from both the public and private sectors, to collaborate with international partners on leading-edge science and technology.

ENDNOTES

1 See for example, Barlow 2006.

2 See for example, Invest Australia 2006a.

3 See for example, Dolman B et al. 2007, where Australian productivity is assessed as being 87% that of the US; Dolman B et al. 2006; Department of Communications, Information Technology and the Arts, 2006.

4 The Productivity Commission has identified a potential 2.4 per cent improvement in GDP via continued domestic reforms. See Productivity Commission 2007.

5 Only around 4100 companies exported more than $1m in 2005-06, ABS 2006b.

6 MNCs engage in foreign direct investment, the ownership of productive assets outside the home country. An MNC comprises a parent company and its foreign affiliates. An affiliate is a business that is located in one country but is owned or controlled by a parent company located in another country. Thus, an Australian MNC comprises an Australian parent company and its foreign affiliates; a foreign MNC is a corporation whose parent company is located outside Australia.

7 Blundstone, a Tasmanian footwear company announced in early 2007 that it was relocating most of its manufacturing to India and Thailand, stimulating much debate, see for example, Luke McIlveen, "Union ban on Blundstones", The Daily Telegraph, January 17, 2007.

8 Korea, Taiwan and Hong Kong have resisted support programs for TCF industries; Australian budgetary assistance to the TCF industries over the last decade has been around $1.3 billion – not including the effective assistance provided by tariffs.

9 World data are not available but for example in the US, MNCs performed around 85% of the $204 billion industrial R&D in 2003, with US MNCs contributing just under 70% and affiliates of foreign MNCs the additional 15%; NSF 2006. In Australia, 43 of the top 50 R&D performers on the ranking by Intellectual Property Research Institute of Australia are multinationals, including 22 foreign-owned companies and 21 Australian MNCs.

10 Australian dollar conversion to UK sterling exchange rates ruling at 31 December 2005, $2.34.

11 The value chain is a concept from business management developed in Michael Porter 1985.

12 Based on official Chinese government figures.

13 The establishment of an R&D centre is often a licence condition for foreign companies operating in China, and subsequently a number never operate. A more realistic number of centres is around 250-300, with most undertaking adoptive R&D for the China market. Swedish Embassy analysis as of 2005 found around 30 multinational companies have up to 60 innovative/global R&D centres in China, primarily based in the Beijing and Shanghai areas. See Karlsson, 2006 p. 255.

14 Brian McNamee, CEO CSL, 1 April 2004 media release on acquisition of Aventis Behring.

15 Lockheed Martin is teamed with Northrop Grumman and BAE to develop and then produce the Joint Strike Fighter (JSF) aircraft.

16 US$317b, exchange rate 1.31.

17 Address on the occasion of the 150th Anniversary of CSR 22 March 2005

18 Industry Capability Network Limited (ICNL) is independently managed and financially

supported by the Commonwealth Department of Industry, Tourism and Resources (DITR). ICNL is part of a network that has 24 offices located around Australia and a staff of around 80 technical experts across a number of major industries, from oil and gas to manufacturing and engineering.

19 The 2003 ABS Innovation Survey found that only 27% of innovating businesses in Australia were involved in any form of collaboration or alliance, with only 6.5% of innovating businesses having collaborative links to universities, governments or research institutions.

20 Clients who Austrade has assisted in more than one market are only counted once.

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global chains

Australia's challenge in the evolving world economy

10

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Introduction

In recent years, Australia's industry and technology policy debate has been influenced by the core ideas of two major analytical approaches – clusters and innovation systems – and, to a lesser extent, complex product systems. Most cluster analysis has a strong geographic dimension, and a focus on *national* innovation systems has predominated over the discussion of sectoral or technology-based innovation systems (Carlsson 2005). Recent globalisation trends may call into question this geographic focus and encourage policy makers to pay greater attention to more geographically diffuse networks, innovation and production systems.

Clusters

Clusters can be thought of as occurring at the overlap of locations and networks (Figure 1). Rosenfield (1995) defined a business cluster as "a geographically bounded concentration of similar, related or complementary businesses, with active channels for business transactions, communication and dialogue, that share specialised infrastructure, labour markets and services, and that are faced with common opportunities and threats."

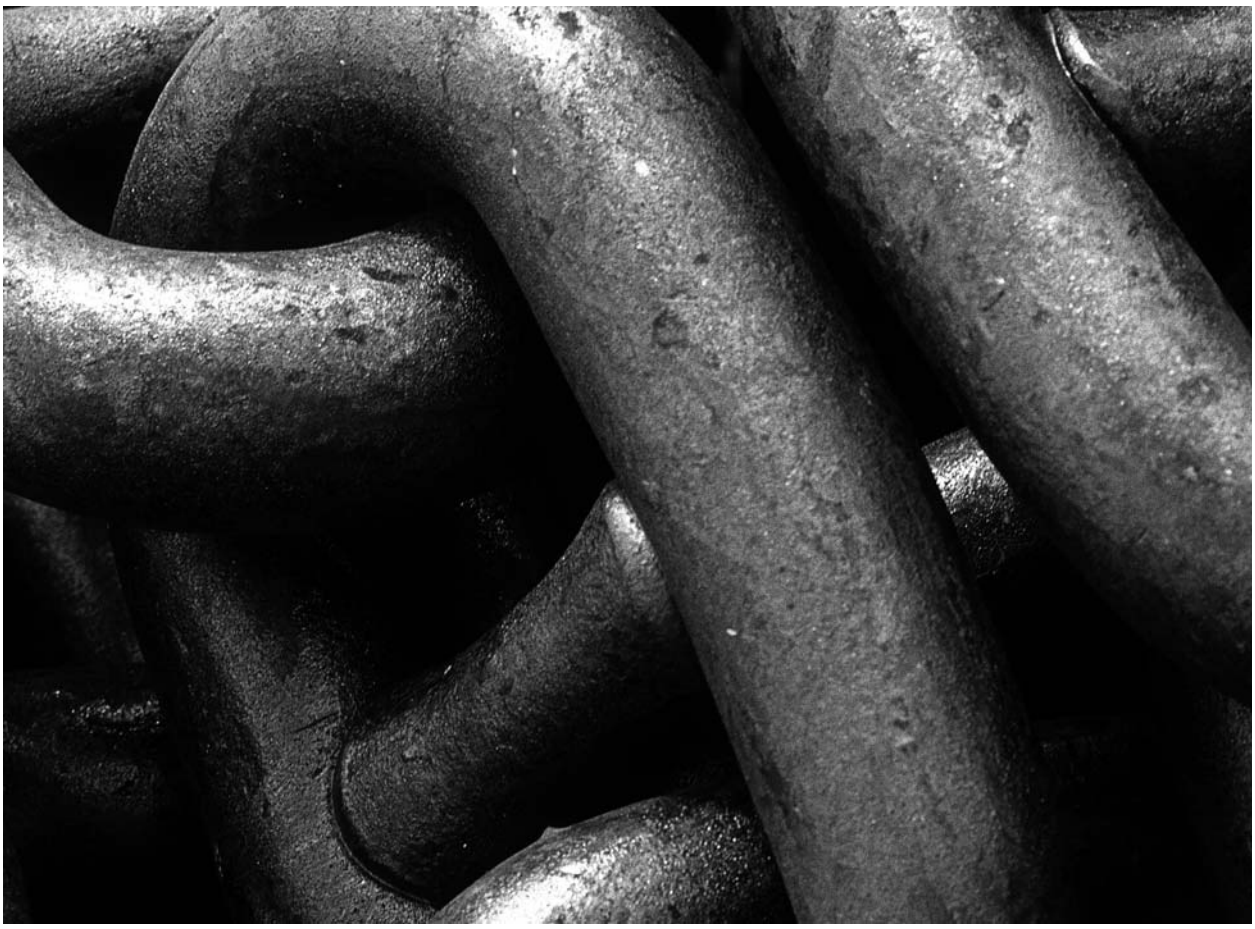
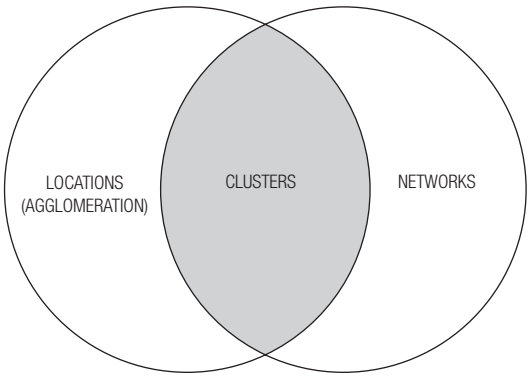


PHOTO: iSTOCK

FIGURE 1 AGGLOMERATIONS, NETWORKS AND CLUSTERS



Source: Author's analysis

Perhaps the most widely known cluster studies are the "Porter Studies" undertaken during the late 1980s and early 1990s, and reported in *The Competitive Advantage of Nations* (Porter 1990). However, as DeBresson and Hu (1999) noted, these were by no means the first of such studies. As early as the 1890s, Alfred Marshall commented on the development of "industrial districts", and Schumpeter noted the importance of "innovative clusters" in 1912. However, it was probably the work of Dahmen on "development blocks", and Perroux and later Hirschman during the 1950s and 1960s on "growth poles", that first fully developed the idea of clusters of economic development. The common take-off point for these early works, as well as those constituting the Porter studies, was the observation that economic development is unevenly distributed and often concentrated in particular locations.

Subsequent work on cluster development at the national level was brought into focus by the Organisation for Economic Cooperation and Development (OECD), which, under the auspices of the National Systems of Innovation Project, established a focus group on Cluster Analysis and Cluster-based Policy. The OECD group focused more directly upon innovation, and in so doing suggested a convergence of cluster and innovation systems analysis (OECD 1999). Indicative of this shift, Roelandt and den Hertog (1998) suggested that clusters could be characterised as "networks of production involving interdependent firms (including specialised suppliers), knowledge producing agents (e.g. universities, research institutes, engineering companies, etc.), bridging institutions (e.g. brokers, consultants, etc.) and customers, linked to each other in a value adding production system."

Regional clusters are the main focus for regional policy-makers and have been very widely discussed, with perhaps the best known example being Silicon Valley (e.g. Saxenian 1994). Analysts often focus on core factors underlying the regional clustering, be it natural resources (e.g. the Rhur), knowledge infrastructure (e.g. Stanford University), location (e.g. Hong Kong), or a central firm (e.g. Nokia in Finland or Philips in the Netherlands). Value chains have also been a popular focus of cluster studies in the form of chains of production, value systems, and complex product systems (Piore and Sabel 1984; Porter 1985; Kaplinsky and Morris 2003; Hobday et al. 2000).

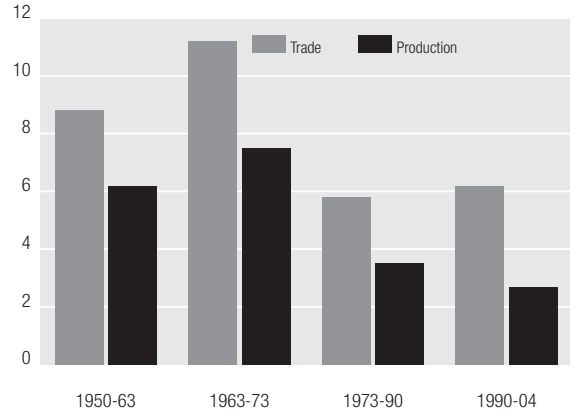
There are several ways of distinguishing between clusters. One distinction is between those studies using "cluster" in a statistical sense (ie a grouping of entities according to some specific characteristic), and those intending to imply actual relationships between the objects (i.e. networks, alliances, etc.). Overlaying this is the basic distinction between studies having a geographic dimension and those without, which Spielkamp and Vopel (1999) described as the distinction between "milieux or districts" and "clusters, chains or networks". Hence, at the analytical level, if not the policy level, there has been considerable blurring of the distinction between agglomerations, clusters and networks, and an increasing focus on innovation and production systems.

Clusters and globalisation

Porter (1998, p90) suggested that "in a global economy – which boasts rapid transportation, high-speed communication, and accessible markets – one would expect location to diminish in importance. But the opposite is true. The enduring competitive advantages in a global economy are often heavily local, arising from concentrations of highly specialised skills and knowledge, institutions, rivals, related businesses, and sophisticated customers. Geographic, cultural, and institutional proximity leads to special access, closer relationships, better information, powerful incentives, and other advantages in productivity and innovation that are difficult to tap from a distance. The more the world economy becomes complex, knowledge based and dynamic, the more this is true." However, as information and communication technologies develop, geographic proximity may be becoming less important – replaced perhaps by a "geography" of bandwidth and latency wherein it matters not how far we are apart, but how many megabits per second separate us.

In a knowledge economy, few firms can alone command the range and depth of competencies necessary to continuously innovate. As a result, they are becoming more dependent upon alliances with other firms and research institutions with complementary technology and knowledge assets. Hence, leading firms are becoming increasingly involved in a network of relationships – which Dunning referred to as "alliance capitalism". At the same time, the increasing complexity of products and the increasing drive to offer differentiated, service-enhanced products is forcing firms to integrate supply chains and changing the nature of competition in such a way as to encourage greater cooperation and collaboration. There is, in short, mounting pressure for firms to link into increasingly complex value chains or production systems. As a result, what is perhaps in question is the geographic focus of the cluster perspective vis-à-vis networks, innovation systems or production systems.

FIGURE 2 WORLD MANUFACTURES TRADE AND PRODUCTION, 1950–2004 (AVERAGE ANNUAL PERCENTAGE CHANGE IN VOLUME TERMS)



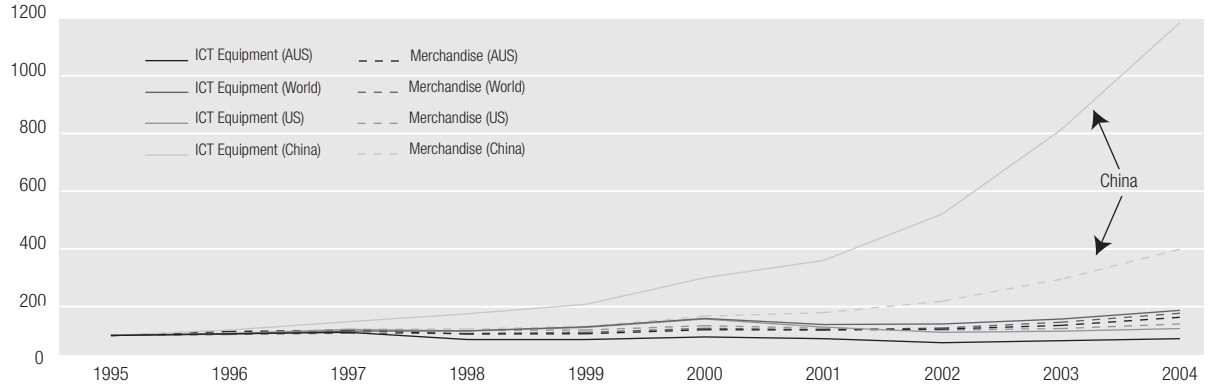
Source: WTO

Recent trends in globalisation

In an introduction to globalisation, the Organisation for Economic Cooperation and Development (OECD) recently noted that:

The globalisation of trade in goods and services is opening up new and increasingly large markets. The globalisation of financial markets has triggered sharp growth in investment portfolios and large movements of short-term capital, with borrowers and investors interacting through an ever more unified market. The globalisation of competition heralds the emergence of new strategic considerations for enterprises. The globalisation of technology stems from the speed with which innovations are propagated, with international networks linking to public and private research centres, as well as from converging standards. The globalisation of corporations and industries was led by sharp increases in foreign direct investment and relocation of enterprises, driven by joint ventures, co-operation agreements, strategic alliances and mergers and acquisitions. One consequence of these changes is the fragmentation of production processes, with different stages of production carried out in different countries… Thanks to ICTs, firms are organising themselves into transnational networks in response to intense international competition and the increasing need for strategic interactions Globalisation is a multidimensional process, involving trade

FIGURE 3 MERCHANDISE AND ICT EQUIPMENT EXPORTS, 1995–2004 (CURRENT PRICES, INDEXED)



Source: WTO, Author's analysis

in goods and services, capital and labour flows, and the transfer of production facilities and technologies. None of these is new, but the intensity and multiplicity of transactions have accelerated over the past decade. More advanced information and communication technology, lower transport costs, firm's strategies regarding location and the need to exploit technological and organisational advantages worldwide, liberalisation of trade and financial flows, have all contributed to speeding up the globalisation process (OECD 2005b, p16).

On any measure, the world economy is highly globalised. In 2004, there were an estimated 69,727 multinational firms with some 690,391 foreign affiliates employing around 57 million people worldwide (Appendix Table A1). At almost $US19 trillion, affiliates' sales were worth twice as much as world trade. Worldwide, foreign direct investment (FDI) inflows amounted to $US648 billion and accounted for more than 7 per cent of global gross fixed capital formation. The world economy is also becoming increasingly globalised. Between 1990 and 2004, worldwide GDP increased by 4.3 per cent per annum (in current prices), while FDI flows increased by more than 8 per cent per annum, FDI stocks by more than 12 per cent, and the total assets of foreign affiliates by almost 14 per cent (UNCTAD, 2005).

Trade

Although now of less significance in the process of globalisation, trade continues to grow faster than production (Figure 2). Between 1990 and 2004, world trade in manufactures grew by an annual average 6.3 per cent, compared with an annual average 2.6 per cent growth in production (WTO 2005a). Between 1995 and 2003, the ratio of trade to GDP increased in all OECD countries, with the average trade to GDP ratio of goods rising from 26 per cent to 36 per cent. Over the same period, the share of domestic demand met by imports increased from 34 per cent to 41 per cent for goods, and from 35 per cent to 48 per cent for services (OECD 2005a, p28). Australia has one of the lowest trade to GDP ratios among OECD countries, with goods trade around 20 per cent of GDP, and services trade less than 5 per cent and declining (OECD 2005a, p150).

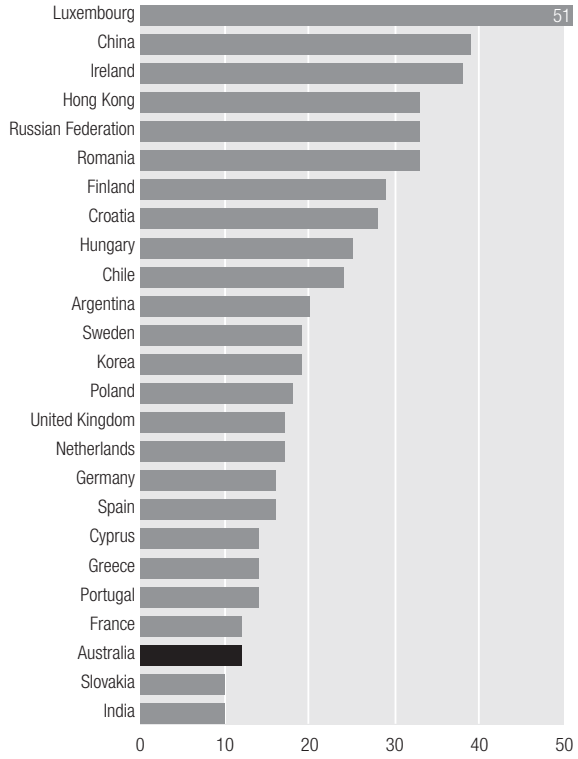
Developing countries are increasingly active in the highly globalised high-technology industries. Asia's real exports of manufactures are estimated to have expanded by 15 per cent during 2004 and amount to 30 per cent of world trade. Between 2000 and 2004, the export volume of manufactures from Asia is estimated to have increased by 40 per cent, while that from Europe increased by 13 per cent, and North America's export volume (due to contraction in 2001 and 2002) only regained its previous peak level of 2000 during 2004 (WTO 2005a, p2). A major feature of recent world trade is the increasing weight of China. The growth of China's exports and imports over recent years has been such that it ranked third among the leading traders in 2004. For many commodities, China has become the largest importer, and for a number of manufactured goods (including ICTs) it is now the largest supplier in the world (WTO 2005a, p1).

International trade in information communications and technology (ICT) equipment rose 19 per cent to $US1134 billion in 2004. It expanded at nearly twice the rate of world merchandise trade in the 1990s, but has fallen short of the rate of global trade expansion since the "Dot Com" crash of 2000 – due, in part, to rapidly rising commodity prices. Trade in telecommunications equipment grew 25 per cent in 2004. Exports of computer and office equipment, as well as those of integrated circuits, contracted sharply in 2001–02 and grew less strongly thereafter. Only in 2004 did they recover fully. Asia's exports of ICT equipment rose by 25 per cent during 2004, twice as fast as the exports of all other regions combined. Within Asia, China stands out. Its exports of ICT equipment increased by 32 per cent per annum between 1995 and 2004, compared with 7 per cent per annum worldwide (Figure 3). China has become the

world's largest importer of integrated circuits, and its exports of computer and office equipment now exceed the combined exports of the United States and Japan (WTO 2005a, p5). What is notable is the contrasting performance of China and other "new" suppliers, and that of traditional suppliers like the United States in the post-"Dot Com" recovery (Figure 3). The recovery features a marked restructuring and a new wave of globalisation of ICT production.

This restructuring has also effected services. World services exports grew 9 per cent per annum between 2000 and 2004, with commercial services (excluding government, transport and travel) growing by 11 per cent per annum. In contrast to the deceleration of export growth in North America and Europe, Asia's exports of other commercial services (including a range of IT and IT-enabled business services) recorded growth of almost 25 per cent. India emerged as Asia's second largest exporter of other commercial services in 2004, ahead of China and Hong Kong. India ranked 9th among the world's leading exporters of commercial services in 2004, Hong Kong ranked 11th and China 15th. As importers, China ranked 11th and India 14th (WTO 2005a). India and China are also among those countries growing their IT and IT-enabled services exports most rapidly – although India was affected by the "Dot Com" downturn over the 2000–03 period (Figure 4). They are among a number of developing countries experiencing rapid growth in exports of ICT and related IT-enabled business services (van Welsum and Rief 2006).

FIGURE 4 ANNUAL GROWTH OF COMBINED IT AND IT-ENABLED SERVICES EXPORTS, 2000–2003 (PER CENT)



NOTE: INCLUDES THOSE COUNTRIES EXPORTING MORE THAN $US500M IN COMBINED IT AND IT-ENABLED BUSINESS SERVICES DURING 2003 AND RECORDING AVERAGE GROWTH OF 10 PER CENT OR MORE BETWEEN 2000 AND 2003, RANKED BY AVERAGE ANNUAL GROWTH RATE.

Source: UNCTAD, Author's analysis

Intra-industry and intra-firm trade

In addition to the increasing intensity of trade, a key recent feature has been the development of international sourcing (ie international purchasing of intermediate product and service inputs) both within firms and between firms in the same industry (ie intra-firm and intra-industry trade). These forms of trade reflect the global reach of multinational firms, the fragmentation of value chains, and the rationalisation of production on a global basis.

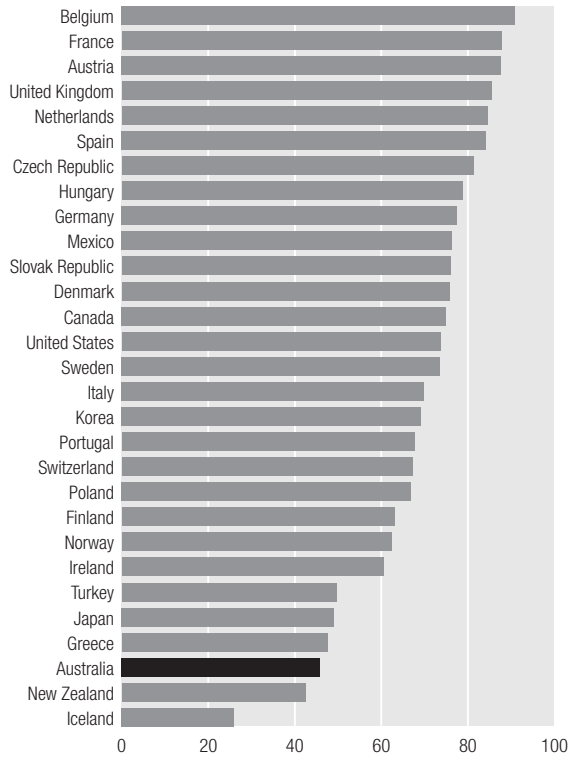
The relative level of a country's intra-industry trade reflects a number of factors, including the industrial structure of the economy, traditional and emerging economic linkages, and the level of participation in global production systems. Across OECD countries, intra-industry trade accounted for almost 70 per cent of total manufacturing trade between 1996 and 2003. At an average of 46 per cent, Australia's intra-industry trade is among the lowest in the OECD (Figure 5). It compares with the United States' 74 per cent and United Kingdom's 85 per cent (OECD 2005a, p177).

In 2004, intra-firm trade accounted for 42 per cent of total US merchandise trade – 48 per cent of imports and 31 per cent of exports (Department of Commerce 2005). Reflecting a high level of globalisation, intra-firm trade is a particular feature of the ICT manufacturing industries. In 2004, it accounted for more than 68 per cent of US ICT goods imports and 34 per cent of exports, while ICT goods alone accounted for 21.5 per cent of US related party imports and 12.5 per cent of related party exports.

Intra-firm trade is also increasingly important in services. In 2003, affiliated trade accounted for 29 per cent of US cross-border exports of services and 23 per cent of cross-border imports – compared with 16 per cent and 22 per cent, respectively, in 1997. Again, the ICT sector appears to be highly globalised, with affiliated trade accounting for 28 per cent of US cross-border exports and 63 per cent of cross-border imports of computer and information services – compared with 31 per cent and 50 per cent, respectively, in 1997 (Borga and Mann, 2004). The emergence of "offshoring" may be one factor accounting for the relatively high and growing share of affiliated imports of computer and information services, reflecting, in part, the extent of captive (i.e. in-house) offshoring of such services by US parent firms (WTO 2005b).

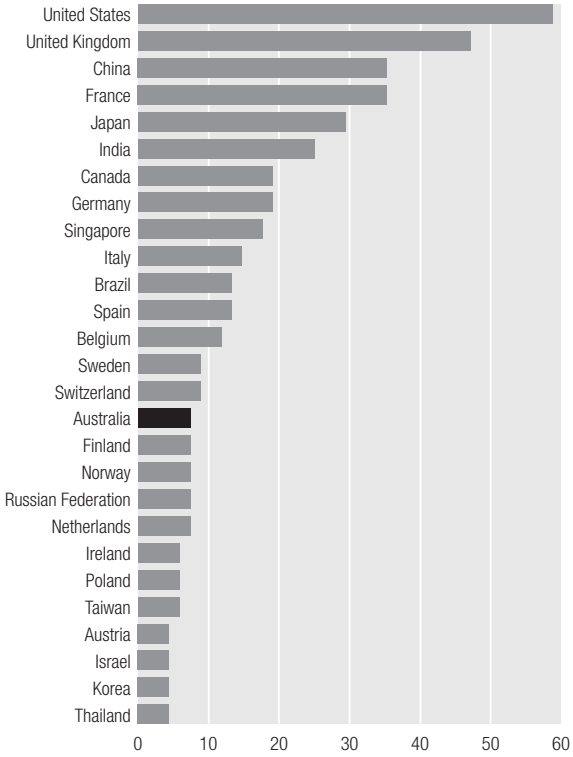
The large and growing proportion of trade that is within industries reflects increasing specialisation and outsourcing along the value chain, while that within

FIGURE 5 INTRA-INDUSTRY TRADE SHARE OF TOTAL MANUFACTURING TRADE, AVERAGE 1996–2003 (PER CENT)



Source: OECD, Author's analysis

FIGURE 6 CURRENT FOREIGN LOCATIONS OF R&D, 2004 (UNCTAD SURVEY)



NOTE: PERCENTAGE OF RESPONDENTS CITING LOCATIONS BY COUNTRY, UNCTAD SURVEY (2004).

Source: UNCTAD (2005) World Investment Report 2005: Transnational corporations and the internationalisation of R&D, United Nations, New York and Geneva, p133

firms reflects their reach and the global rationalisation of production within the production systems operated by multinational firms. Both are leading to a highly integrated global economy wherein, increasingly, global markets involve competition between entire production systems, orchestrated by multinational firms, rather than between individual factories or firms (UNCTAD 2002, p121).

Foreign direct investment

Trade has become somewhat less important as Foreign Direct Investment (FDI) has played an increasing role in globalisation. Direct investment activity is affected by cyclical fluctuations in income and growth. On the supply side, FDI is affected by the availability of investment funds, which have been boosted over the last year or so by a return to profitability and increasing stock market valuations. On the demand side, growing overseas markets lead multinational firms to invest, and strong growth in Asia and returning growth elsewhere has increased the attractiveness of international expansion (OECD 2006). As a result, FDI flows have recovered from the depressed levels of 2002 and 2003 – with worldwide FDI inflows increasing 2.4 per cent to $US648 billion, and outflows by 18 per cent to $US730 billion during 2004 (UNCTAD 2005).

A shift to developing countries

A major feature of recent FDI flows has been the shift to developing countries, with inflows to developing countries rising 40 per cent during 2004 to $US233 billion, while inflows to developed countries fell 14 per cent. The major recipient regions were Asia and Oceania, wherein East Asia experienced a 46 per cent increase in FDI inflows during the year. Combined, China and India accounted for 23 per cent of worldwide greenfield FDI investments in 2004, and 10 per cent of worldwide FDI inflows. These flows are not entirely one-way. Significant investment flows have come from China (e.g. Lenovo's acquisition of IBM's PC manufacturing division) and India (e.g. Tata's acquisition of Tyco Global Network), with combined FDI outflows in excess of $US4 billion during 2004 (UNCTAD 2005).

FDI is playing an important role in China's emergence as a major trader. China's total merchandise exports amounted to $US762 billion during 2005, of which almost 60 per cent were produced by foreign companies or joint ventures, 22 per cent by state-owned enterprises and the remainder by private firms. Of the $US660

billion of goods imported into China during 2005, almost 59 per cent were imported by foreign invested companies, 30 per cent by state-owned enterprises and 11 per cent by local private firms (Ryan 2006).

Moving up from simple assembly, there has been a significant increase in FDI into semiconductor manufacturing in China (UNCTAD 2005). As a result, China plays an increasingly important role as a market for semiconductor manufacturing equipment – accounting for more than 30 per cent of European semiconductor capital equipment manufacturers' sales during 2004 (The Information Network 2005). The US Semiconductor Industry Association recently noted, "there is no question that a major migration of chip manufacturing activities toward Asia is under way. More than two-thirds of all the state-of-the-art chip making facilities now under construction are being built in Asia" (SIA 2005). These investments are attracted by both cost advantages and market growth. Asia is now the leading market for semiconductors, accounting for almost 45 per cent of worldwide sales in 2005 (WSTS 2005).

A shift to services

The other significant trend in FDI is a shift of focus from manufacturing towards services – including telecommunications, computer and information services, a range of IT-enabled business process services, and R&D, technical testing and design services with a strong emphasis on ICT (e.g. mobile communications related R&D and "chip" design). Over the period 2001 through 2003, FDI flows to services were 2.8 times greater than those to manufacturing, and services accounted for more than 60 per cent of all cross-border M&As during the 1990s (UNCTAD 2004). In 1990, business services accounted for just 7 per cent of inward FDI stock in developing economies. By 2002, their share had risen to 38 per cent (UNCTAD 2004, p100).

During 2002–03, there were an estimated 632 export-oriented FDI projects in IT services worldwide, with a further 513 call centre projects, and 139 projects relating to shared services centres. The number of IT services projects in developing countries more than doubled during 2003. Asia dominated among developing regions, accounting for 265 or 42 per cent of the IT services projects – with India alone accounting for 18 or 19 per cent of the worldwide total. More than half the 513 FDI projects in call centres went to developed countries. Nevertheless, Asia accounted for 33 per cent of the call centre projects, and 47 per cent of the shared services centre projects. Almost all (98 per cent) of the IT services projects were within the IT services and software industry (UNCTAD 2004), suggesting that they were focused on the rationalisation of IT and IT-enabled services production (OECD 2006).

A focus on R&D

The growth of international investment in R&D has been particularly notable. Between 1995 and 2001, the growth of foreign affiliate R&D in manufacturing in OECD countries was more than twice that of total R&D expenditure. Multinational firms are key players. A conservative estimate is that they account for close to half of global R&D expenditures, and at least two-thirds of business R&D expenditures (estimated at $US450 billion). Between 1993 and 2002, the R&D expenditure of foreign affiliates worldwide rose from an estimated $US30 billion to $US67 billion (or from 10 per cent to 16 per cent of global business R&D). The rise was relatively modest in developed host countries but quite significant in developing countries – with the share of foreign affiliates in business R&D in the developing world increasing from 2 per cent to 18 per cent between 1996 and 2002 (UNCTAD 2005).

The share of R&D undertaken by foreign affiliates varies considerably from country to country. In 2003, foreign affiliates accounted for more than 50 per cent of all business R&D in Ireland, Hungary and Singapore, and about 40 per cent in Australia, Brazil, the Czech Republic, Sweden and the United Kingdom (UNCTAD 2005; OECD 2005b). Of the worldwide 1,773 greenfield FDI projects involving R&D during 2002–04, the majority (1,095) were undertaken in developing countries or Eastern Europe. Asia and Oceania alone accounted for half the worldwide total (861), of which 723 were in China and India. Again, ICTs are central. In 2002, three-quarters of the R&D expenditure of US majority-owned foreign affiliates in developing Asia was related to computers and electronic products, while in India more than three-quarters of their R&D expenditure went into services (notably software development). "From practically nothing in the mid-1990s, the contribution of South-East Asia and East Asia to global semiconductor design reached almost 30 per cent in 2002" (UNCTAD 2005).

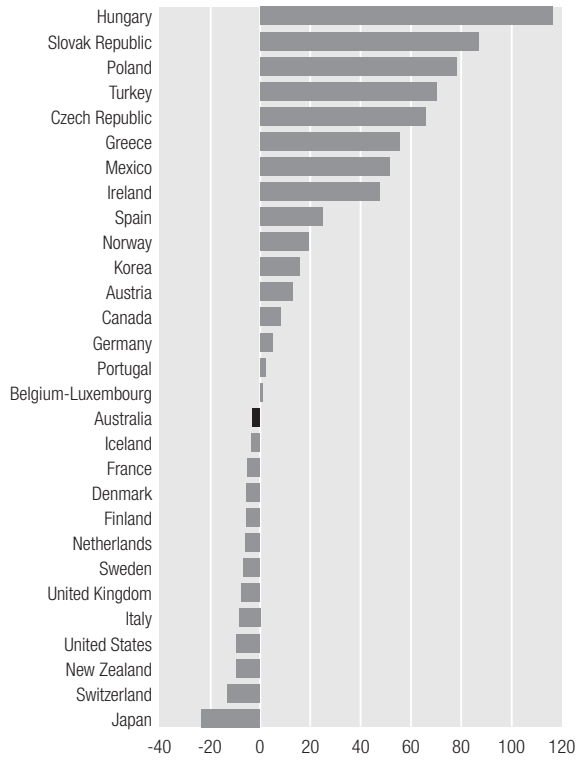
What is perhaps most significant about these recent developments is a shift from FDI targeting market access to FDI in IT and a range of IT-enabled business services that is clearly "efficiency-seeking". This is leading to a new international division of labour and a global rationalisation of services production similar to that seen in high-technology manufacturing, with developing countries playing an increasing role.

Competing from here?

On many of the indicators of globalisation, Australia scores relatively low (i.e. is less globalised and less integrated into global production systems than most other OECD countries). One obvious question is whether this is affecting Australia's economic performance.

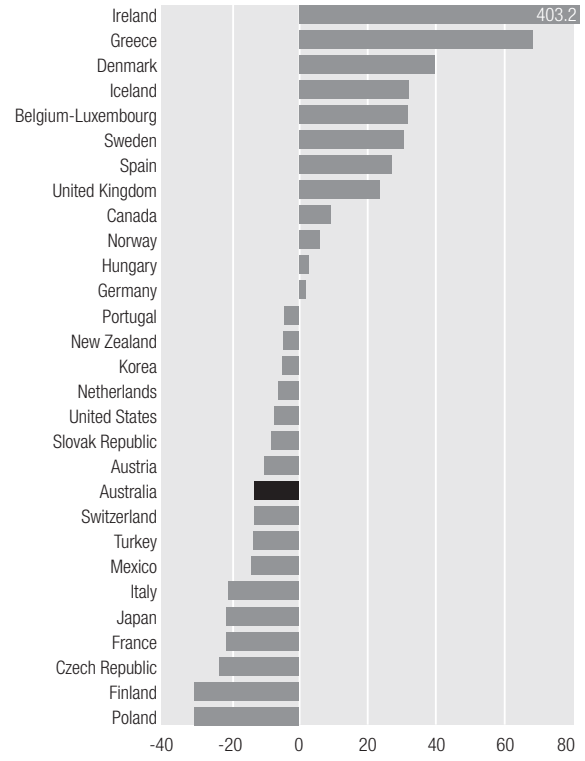
Export market shares are affected by a number of factors, including relative domestic and international growth rates, exchange rate fluctuations and changing economic structure. Nevertheless, export market shares are often taken to be a shorthand indicator of firm com-

FIGURE 7 TRENDS IN EXPORT MARKET SHARES: GOODS, 1995–2003 (PER CENT)



Source: OECD, Author's analysis

FIGURE 8 TRENDS IN EXPORT MARKET SHARES: SERVICES, 1995–2003 (PER CENT)



Source: OECD, Author's analysis

petitiveness. Australia's export market shares in both goods and services declined between 1995 and 2003 by around 5.2 per cent (OECD 2005b). Perhaps surprisingly, Australia's share of services markets has declined more than its share of goods markets – by 13 per cent compared to 3 per cent (Figures 7 and 8).

A new wave of globalisation?

Recent discussion of world development trends has highlighted key elements of a new wave of globalisation, namely the emergence of international production systems, a shift towards services in trade, FDI and M&A activities, and the internationalisation of R&D and other knowledge intensive services (UNCTAD 2002; 2004; 2005). Each has potentially profound implications for Australia.

International production systems

Multinational firms have located different parts of their production processes around the world to take advantage of sometimes quite small differences in costs, resource availability, logistics and market access for many years. What is distinctive about the recent rise of international production systems is the intensity of integration on a global scale and the emphasis on the efficiency of the system as a whole (Kaplinsky 2000). Global markets increasingly involve competition between entire production systems, orchestrated by multinational firms, rather than competition between individual factories or firms (UNCTAD 2002, p121).

A major feature of the development of global production systems is the trend towards outsourcing, with increasing specialisation and fragmentation of the global value chain in both functional and locational terms. Leading firms are increasingly focusing on specific core activities (e.g. research, design, branding, marketing, etc.) and shedding the other value chain activities to affiliates, alliance partners and contract suppliers. Whereas original equipment manufacturers used to draw on contract manufacturers for additional and more flexible production capacity at the margin, it is now increasingly common to outsource entire functions (e.g. Cisco Systems) (UNCTAD 2002, p123). This trend has a number of implications.

First, many aspects of "innovation" are driven by the system's leading multinational firm (e.g. product definition, setting and enforcing technical and quality standards, etc.) and imposed on other participants up and down the value chain as a condition of participation. At the periphery, this can have the effect of divorcing

BOX 1
AMENABILITY OF SERVICES TO ONLINE DELIVERY

Important factors influencing the amenability of services to online delivery include: the significance of the role of information exchange in the service concerned; the level of standardisation; the complexity of the tasks involved; the nature of the knowledge involved; the nature of the "problem" addressed by the service; and the context of delivery.

The level of *standardisation* of processes is an important determinant. Services that can be standardised and delivered in online form (e.g. research reports, statistical updates, images, etc.) and services that can be standardised and ordered via the internet (e.g. courier delivery services, advertising space, airline tickets, etc.) are most amenable to online delivery. Those that resist standardisation tend to be less amenable.

The *complexity of the tasks* involved is one of the factors retarding standardisation and online delivery. Morris (2000) pointed out that many have underestimated the complexity of the work environment, and noted two related concepts that shed light on these complexities: articulation and emergence. Articulation is the way in which people arrange and co-ordinate activities to mesh with colleagues. Emergence refers to actions that are often difficult to articulate too far in advance. Complexity makes remote delivery more difficult, although bandwidth increases enable greater richness of interaction and can support remote delivery of more complex services.

The *nature of the knowledge* involved also affects the amenability of services to online delivery. It is common to make the distinction between codified and tacit knowledge. Codified knowledge is knowledge that can be written down and readily transmitted from one person to another (e.g. standard operating procedures, policy manuals, legislation, taxation formulae, etc.). Tacit knowledge tends to resist codification and remain a part of the knowledge and skills of individuals – it is more fluid and interpretive. Knowledge that can be codified is more amenable to online delivery than tacit knowledge. The transmission of tacit knowledge often requires face-to-face interaction in the negotiation of meaning and in learning. This makes online delivery more difficult. Again, however, high bandwidth networks can enhance the richness of mediated communications and enable the online delivery of more knowledge-intensive services.

The *nature of the problem* involved also affects amenability to online delivery. Rittel and Webber (1973) noted that there are major differences between different kinds of problems and hence strategies to solve them. A "tame" problem can be expressed independently of its solution. In engineering, for example, one can specify what needs to be designed independent of any particular design solution. In contrast, a "wicked" problem cannot be explained without its solution. In working out a solution one understands the problem more clearly and can redefine it if necessary, which in turn leads to a better solution, and so on. Tame problems are easier to distribute in space and time, because they can be more accurately specified, and worked on independently, drawing on codified knowledge bases.

The *context of delivery* also affects amenability. In high context work, significant (informal) interaction is needed between co-workers to get the job done, whereas in a low context activity workers can proceed relatively independently. High context work tends to require a high degree of awareness of co-workers and of clients. Low context work is more amenable to online delivery than high context work.

Source: Houghton, J.W. (2003) Online Delivery of Business Services, OECD, Paris Available http://www.oecd.org/dataoecd/40/5/31818723.pdf

local firms from local innovation systems, reducing local demand for local innovation and limiting commercialisation pathways. It has been suggested that the major innovation policy challenge is the lack of demand for innovation (Howells 2006, p26).

Second, the organisation and distribution of activities throughout the global value chain becomes central. Value chains are becoming fragmented as functions are differentiated and activities become more specialised. At the periphery, this can create a number of challenges, such as adopting mechanisms for participation in global productions systems (e.g. e-commerce, supply chain management and e-business solutions), the capacity for scale in specialisation (e.g. large demand for niche skills, niche financing, etc.), and so forth.

Third, the increasing coordination of the global production system and the integration of elements into solutions may pose particular challenges for some participants. For example, a postponement, just-in-time or build-to-order delivery system (e.g. Dell Computers)

may make participation from a distance increasingly difficult, simply because of transport time and costs, time zone differences, etc., and may favour alternative suppliers closer to major growth markets.

Fourth, these issues of integration and coordination interact with the locational diversity to create additional adjustment and coordination challenges. For example, a firm might suddenly go from a position of supplier to a major US or European multinational, with activities oriented to the multinational firm's core competencies and home market, to one in which it is a supplier to a developing Asian-based intermediary contractor. As a result, expanding business may mean fundamentally reassessing comparative advantages in the face of rapidly changing circumstances. What a firm's advantage is relative to a German electronics conglomerate may be very different to its relative advantage vis-à-vis a Chinese contract manufacturer, but it may need to re-define and re-articulate that advantage almost overnight. Moreover, for Australia, it is often the very things we have competed on (e.g. lower cost, high skills relative to the United States and Europe) that we are increasingly competing against. The rapid shift of relatively high end manufacturing and services to Asia brings an urgent need for many Australian firms, and governments, to re-define and re-articulate their competitive and comparative advantages.

The shift towards services

The shift in trade and investment towards services is driven by a number of factors, including the increased weight of services in the world economy, the liberalisation of services sectors (e.g. banking and finance, infrastructure, transport, etc.), the privatisation of state-owned utilities, the globalisation of services providers on the coat-tails of their major clients, increasing competition, and the drive for growth through expansion into international markets. However, a major factor in the recent globalisation of IT and IT-enabled business services has been the development of information and communication technologies (ICTs) and global networks.

The use of ICT allows "knowledge to be codified, standardised and digitised, which in turn allows the production of more services to be split up into smaller components that can be located elsewhere to take advantage of cost, quality, economies of scale or other factors. This makes it possible to produce certain services in one location and consume them (or use them in further production) in another – either simultaneously (e.g. information provided via call centres) or at a different time (e.g. data entry or software development). Such fragmentation exceeds that in manufacturing, as the new technologies do not just make services transportable, they also often simplify the tasks involved and so allow them to be relocated more easily. Thus, progress in ICT has solved the technical problem of non-transportability and, for many services, that of non-storability" (UNCTAD 2004, p149).

UNCTAD (2004) suggested that offshoring represents nothing less than "a revolution in the tradability of services". That "tradability revolution" is already visible in the balance-of-payments data of some countries (van Welsum 2004; Borga and Mann 2003). For example, the United States has reported the largest increases in services imports over recent years, with its share of global imports rising from 11 per cent in 1992 to 13 per cent in 2002 (WTO 2004). The largest increases in the export market share of other business services and computer and information services are reported by the United States, India, Ireland, the United Kingdom, Sweden, Spain, China and Israel, in that order (van Welsum 2004; UNCTAD 2004, p149).

"The tradability revolution has fundamentally changed the environment for doing business and opened completely new opportunities for restructuring the production of corporate service functions across borders. This new international division of labour has the potential for producing considerable welfare gains for the world economy as a whole – possibly, in the longer-term, even more considerable than in the case of manufacturing activities." (UNCTAD 2004, p177) What we are seeing is a new wave of globalisation, based around IT and IT-enabled services, that could be even more significant than the globalisation of manufacturing. The implications are profound.

Globalised service activities depend upon local education and skills, cultural affinity and language skills, timezone, regulatory and business affinity in relation to such things as privacy and data security, recognition of professional qualifications, industry standards and business quality accreditation. Nevertheless, they can be very footloose. Offshoring may deliver cost savings, but it may also involve job losses. On the one hand, cost savings and efficiency gains provide the foundation for productivity growth and the creation of new employment opportunities. They enable firms to compete, win new business, gain market share and grow. On the other hand, some of the jobs lost may be difficult to replace, and there is some concern that labour conditions will be eroded through competition with locations without equivalent labour and social welfare provisions – leading to a "race to the bottom" (OECD 2004, pp97–98).

Reduced costs for those businesses with offshore operations or making use of outsourced offshore operations should make them more competitive. In the first instance they should gain market share and profitability should improve. Over time, competition should ensure that the benefits flow through to consumers in the form of lower prices. Thus, offshoring should enable developed economy-based firms to gain market share in the global economy, grow, and expand employment opportunities both at home and abroad. In addition, the jobs created offshore generate demand for developed country goods

BOX 2

OFFSHORING: THE CUTTING EDGE OF SERVICES GLOBALISATION

While the offshoring of services is still in its infancy, the tipping point may be approaching rapidly. Offshoring represents the cutting edge of the global shift in production activity, giving rise to a new international division of labour in the production of services.

While the fragmentation and globalisation processes in services and manufacturing are similar, there are important differences.

First, although the services sector is much larger than the manufacturing sector, only some 10 per cent of its output enters international trade, compared with over 50 per cent for manufacturing.

Second, the pace of globalisation of services affected by the tradability revolution is faster than in manufacturing.

Third, whereas the relocation of goods production has involved, overwhelmingly, firms in manufacturing only, service functions are offshored by companies in all sectors.

Fourth, the skill intensity is generally higher for offshored tradable services than for manufacturing located abroad, thus affecting white-collar jobs in particular.

And fifth, services that are offshored may be more footloose than relocated manufacturing activities because of lower capital-intensity and sunk costs, especially services that do not require high skills.

Source: UNCTAD (2004) *World Investment Report 2004: The shift towards services*, United Nations, New York and Geneva

Source: Houghton, J.W. (2003) Online Delivery of Business Services, OECD, Paris Available http://www.oecd.org/dataoecd/40/5/31818723.pdf

and services exports – for ICT equipment and communications services immediately and, over time, for a wide range of consumer goods. At the same time, wages and prices in the offshore locations are likely to increase, creating increasingly wealthy developing country consumers and reducing the wage cost differential and arbitrage opportunity. Such a scenario would make offshoring a win–win.

However, there are adjustment costs and there may be some longer term challenges. Personal adjustment costs for those losing their jobs are high, but can be ameliorated through a range of outplacement and job search support, retraining opportunities and, perhaps, through insurance schemes (Kletzer and Litan 2001; McKinsey Global Institute 2003). Many of the activities going offshore may have previously located in lower-cost rural locations within the home economy (e.g. call centres). This may limit the opportunities for displaced workers and demand special mechanisms to assist regional adjustment. There may be particular adjustment difficulties for smaller countries which are neither low cost locations nor the home base of major services multinationals (e.g. Australia) – with jobs lost to India and benefits accruing in the first instance to US and European multinational firms and their shareholders, and a greater time lag between job losses and realising the benefits of lower cost structures through lower world prices.

In the longer term, there may also be a need to adjust education and training, not only to account for the types of jobs being lost and created, but also for the possible loss of traditional career paths – where, for example, there are fewer career path opportunities for learning about systems design as programming activities move offshore (i.e. offshoring the bottom few rungs of the ladder). All of these adjustments are made more difficult by the potential speed of relocation of IT and business process services activities, which are typically less capital intensive and more footloose than manufacturing activities.

Nevertheless, a protectionist response that forfeits the potential benefits of offshoring is unlikely to be the most constructive. A more measured response would be to take advantage of the benefits while managing the adjustment process, compensating for adjustment costs where necessary and enabling workers to seize new job opportunities. One of the keys to maximising the benefits will be to ensure that they flow to the consumer as quickly as possible through continued attention to competition policy. In the long run, contributing to further trade liberalisation and development in developing countries, and pressing for the harmonisation of minimum labour and welfare conditions are the most effective ways to reduce the opportunities for wage arbitrage and, thereby, the motivation for offshoring (Dossani and Kenney 2003).

Potential opportunities for Australian participation as a major venue for "on-shoring" (i.e. being a major services exporter) will depend above all else upon education and skills, ICT infrastructure and the ability of would-be local suppliers to link into global production systems and offer a cost-effective solution that fits with other elements within that particular global production system. Education and training, and communications policy will be central.

The internationalisation of R&D

The focus on the internationalisation of R&D and technical services is an extension of that on services more generally. What is new is the rapidity with which such services have become internationalised (i.e. offshored), and the speed with which developing country locations

have been able to build a presence. In a very short space of time, Asia has become not just the location of many assembly and routine services activities, but also the location of an increasing range of relatively knowledge-intensive R&D, design and technical services.

Traditionally, core research activities were located close to the home base of multinational firms, with overseas R&D being confined to adaption to local markets (Patel and Pavitt 1991; Pavitt 2001, 2002). While still often the case, there is also increasing globalisation of core R&D activities. There are a number of drivers, including: the increasing scale and complexity of industrial R&D; aging populations and skill shortages in some developed countries and increasingly large populations of highly skilled engineering and science graduates in some developing countries; the increasing international mobility of science brought about by the ICT revolution and e-science networks; cost differences; and timezone differences, allowing 24/7 round-the-world development (UNCTAD 2005). Increasingly, R&D is treated like other services and is subject to asset and efficiency seeking global rationalisation.

The importance of skills and local innovative capacity in the host economies is borne out by the fact that the internationalisation of R&D involves relatively few developing countries (e.g. China, Hong Kong, Malaysia, India). In 2000–01, China, India and the Russian Federation together accounted for almost one-third of all tertiary technical students in the world (UNCTAD 2005). In 2004, China added 380,000 science and engineering graduates to its talent pool, India added 360,000 and Russia 240,000 (Hemerling et al. 2005). As noted above, multinational firms account for a large share of business R&D in many countries, including Australia – where foreign affiliates account for more than 40 per cent of all business R&D expenditure. Again, it is not all one-way. Developing country multinationals are increasingly expanding R&D activities into developed countries in order to tap into their knowledge bases.

No country can expect to produce all the knowledge needed to stay competitive, so participation in these commercial networks of innovation is as important, if not more so, than international collaboration in public sector research. There are particular opportunities for developing countries to "trade" highly-skilled labour for links to, and participation in, global innovation networks that carry the promise of accelerating innovation development and possibly generating spillovers to local firms. Key determinants in realising the potential include the capacity of the host country's innovation system and supporting infrastructure (e.g. treatment of intellectual property rights) (UNCTAD 2005). As is the case with the other two key developments noted, creating and maintaining linkages into increasingly complex and fragmented global systems of production and innovation will be crucial, as the linkage between local innovation and local commercialisation breaks down.

Conclusions

The current phase of globalisation involves an increasing intensity of competition, with greater specialisation and fragmentation of global value chains. The advantage developed countries have enjoyed in knowledge intensive products and services no longer holds. What is perhaps new is the speed with which some developing country locations are emerging as key participants in global production systems, and services production is being rationalised on a global basis. Both facilitated and led by ICTs, this "tradability revolution" in services has the potential to be even more significant than the globalisation of manufacturing (UNCTAD 2004, p177).

The importance of global linkages that facilitate participation in global production systems is increasing and yet, on most indicators, Australia is not highly linked into the global economy. In many areas of manufacturing, and increasingly in services, there is a fragmentation of the value chain, and this fragmentation is global in scope. Unable to compete with developing locations on labour costs and remote from major markets, Australia's manufacturers must seek to maintain a position as a design and development "centre of gravity" and/or focus on lower unit volume products (Houghton et al. 2004). In services too, there is a need to build capabilities in design and development that offer creativity, skills and value for money. Integration and remote delivery require leading-edge infrastructure, especially communications and transport, and strong capabilities in integrating supply chain and work flow management and logistics.

The key issue is how to participate in these rapidly emerging, globally organised production systems from a remote location. Roberts (2005, p51) recently reported on the success of Playford (South Australia), quoting Playford's Industrial Strategist, Rodin Genoff, saying: "We are all working in global markets. Building the capabilities of local companies we help them engage in global supply chains." Successful clusters focus on global linkages, as well as local capabilities. Local linkages are still important, but as multinational firms permeate every economy and competition is between entire production systems, global linkages become increasingly important. This is not necessarily inconsistent with cluster theory, but may require a change of emphasis in policy. Often, the focus has been on cooperating locally in order to compete globally. With the new wave of globalisation, perhaps it is time to change the emphasis and think about doing the opposite – cooperating globally in order to compete locally (or, perhaps, in order to compete at all).

Appendix

TABLE A1 WORLDWIDE FDI, CROSS-BORDER M&AS AND ACTIVITIES OF AFFILIATES, 1982–2004 ($US BILLIONS IN CURRENT PRICES, NUMBER OF EMPLOYEES AND PERCENTAGES)

	1982	1990	2003	2004	CAGR 1990–2004 (PER CENT)
FDI Inflows	59	208	633	648	8.5
FDI Outflows	27	239	617	730	8.3
FDI Inward Stock	628	1769	7987	8902	12.2
FDI Outward Stock	601	1785	8731	9732	12.9
Cross border M&As	—	151	297	380	6.8
Sales of foreign affiliates	2765	5727	16,963	18,677	8.8
Gross product of foreign affiliates	647	1476	3573	3911	7.2
Total assets of foreign affiliates	2,113	5,937	32,186	36,008	13.7
Exports of foreign affiliates	730	1498	3073	3690	6.7
Employment by foreign affiliates ('000)	19,579	24,471	53,196	57,394	6.3
GDP (current prices)	11,758	22,610	36,327	40,671	4.3
GFCF	2398	4905	7853	8869	4.3
Royalties & Fees receipts	9	30	93	98	8.8
Exports of goods and non-factor services	2247	4261	9216	11,069	7.1
FDI Inward flows as percentage of per cent GFCF	2.5	4.0	8.1	7.3	..
FDI Outward flows as percentage of per cent GFCF	1.1	4.7	7.9	8.2	..
FDI Inward stock as percentage of per cent GDP	5.3	8.9	22.0	21.9	..
FDI Outward stock as percentage of per cent GDP	5.1	8.4	24.0	23.9	..

Source: UNCTAD 2005

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Appendix: Australia's 50 global leaders

Australia's global engagement is evident in *The Diplomat Global 100* - a list of the top Australian companies by offshore revenue compiled by business information firm IBISWorld.
The following extract shows the top 50 companies by offshore revenue.

RANK	NAME	INDUSTRY
1	BHP Billiton	Mining
2	Rio Tinto	Mining
3	Lend Lease	Services
4	QBE Insurance	Financial services
5	Amcor	Manufacturing
6	National Australia Bank	Financial services
7	Brambles Industries Limited	Services
8	PaperlinX	Manufacturing
9	Rinker Group	Manufacturing
10	Qantas	Services
11	BlueScope Steel	Manufacturing
12	Macquarie Bank	Financial services
13	Woodside Petroleum	Mining
14	Sims Group Australia Holdings	Manufacturing
15	Westfield Group	Services
16	CSL	Manufacturing
17	Foster's Group	Manufacturing
18	Orica	Manufacturing
19	WorleyParsons	Services
20	Santos	Mining
21	Commonwealth Bank	Financial services
22	ANZ Banking Group	Financial services
23	Leighton Holdings Limited	Services
24	AWB	Agrbusiness
25	Computershare	Services
26	Multiplex Group	Services
27	Coal & Allied	Mining
28	Babcock & Brown	Financial services
29	Murray Goulburn Co-op	Agribusiness
30	Zinifex	Mining
31	Coca-Cola Amatil Limited	Manufacturing
32	Macquarie Airports	Services
33	Boral	Manufacturing
34	Newcrest Mining	Mining
35	Telstra	Services
36	Village Roadshow	Services
37	Ansell	Manufacturing
38	Smorgon Steel Group	Manufacturing
39	Nufarm	Agribusiness
40	Iluka Resources	Mining
41	Aristocrat Leisure	Manufacturing
42	Macquarie Communications	Financial services
43	Billabong	Manufacturing
44	Gold Corporation	Manufacturing
45	Oxiana	Mining
46	Westpac	Financial services
47	Ridley	Manufacturing
48	Pacifica Group	Manufacturing
49	Macquarie Infrastructure Group	Services
50	Macarthur Coal	Mining

* Revenue figures are for most recent available year

OFFSHORE REVENUE, $BN*	SHARE OF OFFSHORE REVENUE	TOTAL REVENUE, $BN*	MAJOR LOCATIONS
39.25	73.3%	53.57	China, Europe, Japan, North America, Other Asia, Rest of the World, South America, South Korea, Southern Africa
23.96	94.2%	25.44	Africa, Europe & Other Countries, Indonesia, North America, South America
9.56	78.8%	12.13	Americas, Europe
9.01	74.1%	12.17	Americas, Asia/Pacific, Europe, Other
8.48	75.6%	11.22	Asia, Europe, Latin America, North America
7.85	20.5%	38.24	Asia, Europe, United States
6.79	82.8%	8.21	Europe, Americas, Rest of the World
6.06	81.7%	7.42	Asia, Europe, North America
5.71	77.8%	7.33	United States of America
5.51	40.4%	13.65	Japan, Other Regions, South East Asia & North East Asia, The Americas & the Pacific, United Kingdom & Europe
3.90	48.6%	8.03	Asia, North America, Other
3.80	48.0%	7.92	Asia Pacific, Europe, North America, Other
3.38	88.8%	3.81	Africa, Asia, Other, United States
2.53	67.4%	3.76	Europe, North America
2.36	58.4%	4.05	United Kingdom, United States
2.33	80.2%	2.90	Americas, Europe, Middle East & Africa
2.17	42.3%	5.12	Americas, Asia & Pacific, Europe
2.14	44.6%	4.80	Americas, Asia, Other
1.81	75.5%	2.40	Americas, Asia & Middle East, Europe
1.81	66.2%	2.74	International
1.74	6.1%	28.56	Other Countries
1.69	6.6%	25.51	Overseas Markets
1.68	16.8%	10.03	Asia
1.57	32.3%	4.85	Other, Switzerland
1.44	88.1%	1.64	Asia Pacific, North America, UK, Ireland, Germany & South Africa
1.40	36.9%	3.80	Europe & Middle East
1.33	94.8%	1.40	Asia, Europe, Other
1.32	60.4%	2.18	Asia Pacific, Europe, North America
1.22	60.3%	2.03	Asia, Middle East & Africa, Other, The Americas
1.20	39.3%	3.06	Europe, USA
1.19	26.9%	4.42	South Korea, Indonesia & PNG
1.16	93.5%	1.24	Bermuda, UK & Europe, Other
1.14	24.0%	4.77	Asia, Other, USA
1.14	78.9%	1.45	Europe, Japan, Korea, Other Asia
1.14	4.9%	23.17	Non Australian Countries
1.11	73.2%	1.51	Asia, British Virgin Islands, Europe, USA
1.06	91.9%	1.15	Americas, Asia Pacific, Europe
0.93	29.1%	3.21	Asia, Other Regions
0.93	55.0%	1.69	Americas, Europe
0.88	87.6%	1.00	Asia, Europe, North America
0.82	74.8%	1.09	Japan, North America, Other, South America
0.82	81.2%	1.01	United Kingdom
0.73	71.0%	1.03	Americas, Europe, Rest of the World
0.72	76.3%	0.94	Asia, Europe, Other Countries, USA
0.71	55.4%	1.28	Europe, Laos
0.69	3.2%	21.67	Other
0.68	53.8%	1.27	European Union, North America
0.66	78.0%	0.84	Asia, Europe, United States of America
0.54	51.3%	1.06	Europe, North America
0.53	100.0%	0.53	Americas, Asia, Europe, Other



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