competing from Australia

CEDA
COMMITTEE FOR ECONOMIC DEVELOPMENT OF AUSTRALIA

Global Chains

Australia's challenge in the evolving world economy

Professor John Houghton

CEDA COMPETING FROM AUSTRALIA PROJECT PAPER 1

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 2005 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 for special interests. It is staunchly non-partisan. Its funding comes mostly from member fees and from its program of economic and business events.

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Foreword

Global Chains, written for CEDA by Professor John Houghton, is the first product of CEDA's latest research project. This project – called Competing From Australia – is one of our most ambitious. It explores Australia's capacity to trade and attract investment in the early decades of the 21st century. Despite the recent commodities-driven prosperity, there remain clear questions about our economy's engagement with the rest of the world.

Professor Houghton's paper points to a global industrial shift – the fragmentation and globalisation of production systems that is creating complex supply chains stretching in some cases, across the globe. The rise of these global chains could either harm or help Australia's global trade and investment performance. CEDA believes it is vital that we understand their effects.

The importance of these chains became clear to CEDA when we brought together our first reference group for this project in late 2005. The group – a mix of corporate leaders and economists, including Professor Houghton – brought the role of global supply chains quickly to the fore. We are indebted to this group for their contributions. We are also indebted to CEDA's Research and Publications Committee and to our Research Director, Professor Ian Marsh, for their work on the project.

Professor Houghton brings to the project both a global perspective and a special insight into the effects of information and communications technology. A former computer programmer, he is now a regular consultant to the OECD on issues such as the global effects of technology. No-one is better placed to help us understand Australia's place in the changing world environment.

Greg Meek
Chief Executive (Acting), CEDA

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Summary

World economic production has undergone substantial restructuring as a new wave of globalisation has emerged in the post-"Dot Com" era. A number of developing economies have risen in prominence as both producers and markets, and many businesses and services have rapidly become more globalised.

In both manufacturing and services, the focus of international investment has shifted towards "efficiency seeking", driven by competition and the global rationalisation of production. As a result, the production of both goods and services is becoming increasingly fragmented and geographically dispersed.

These trends raise very real challenges for Australia. As global production systems restructure, Australia will likely find it increasingly difficult to connect with, and participate in, those systems.

As global competition intensifies, global production systems rationalise and multinational enterprises increasingly permeate economies around the world. As a result we must consider shifting policy emphasis from the creation of local linkages and clusters towards the creation of global linkages and the participation in global production systems.

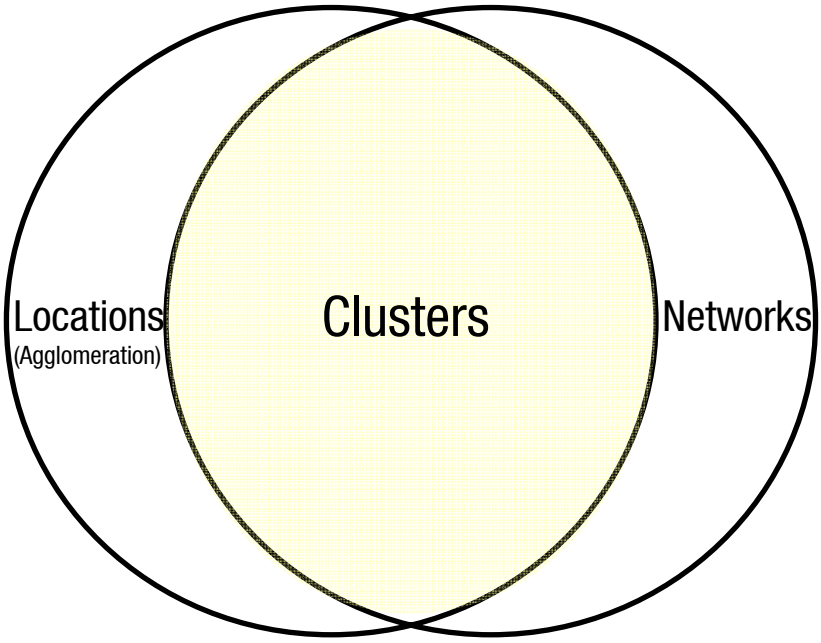
Introduction

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."

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 (eg universities, research institutes, engineering companies, etc), bridging institutions (eg 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 (eg Saxenian 1994). Analysts often focus on core factors underlying the regional clustering, be it natural resources (eg the Rhur), knowledge infrastructure (eg Stanford University), location (eg Hong Kong), or a central firm (eg 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 chains, 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 (ie 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.

Recent trends in globalisation

In an introduction to globalisation, the Organisation for Economic Cooperation and Development 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 (OECD 2005a, pp16–17).

> Globalisation is a multidimensional process, involving trade 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).

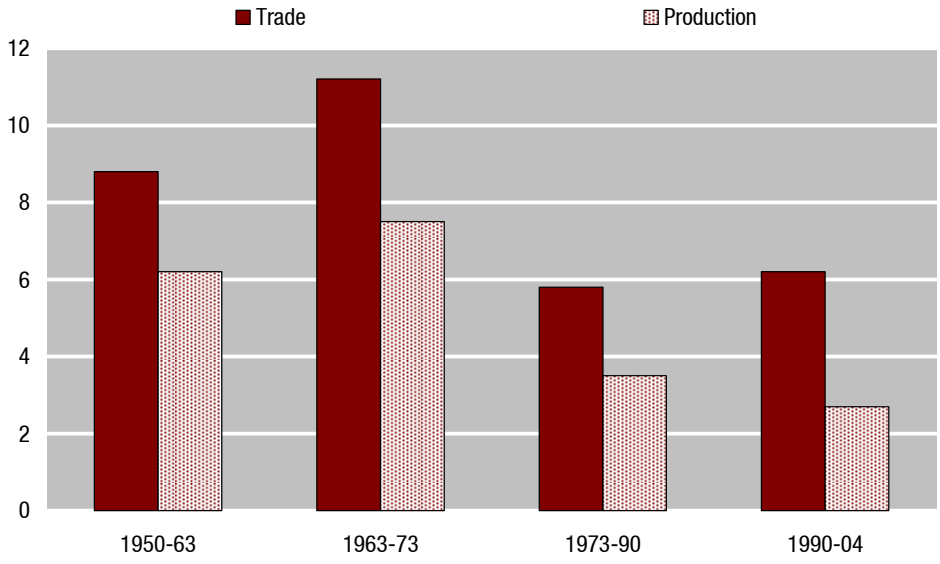
On any measure, the world economy is highly globalised. In 2004, there were an estimated 69,727 multinational firms with some 690,391 foreign affiliates employing around 57 million people worldwide (Annex Table A1). At almost $US19 trillion, affiliates' sales were worth twice as much as world trade. 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).

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

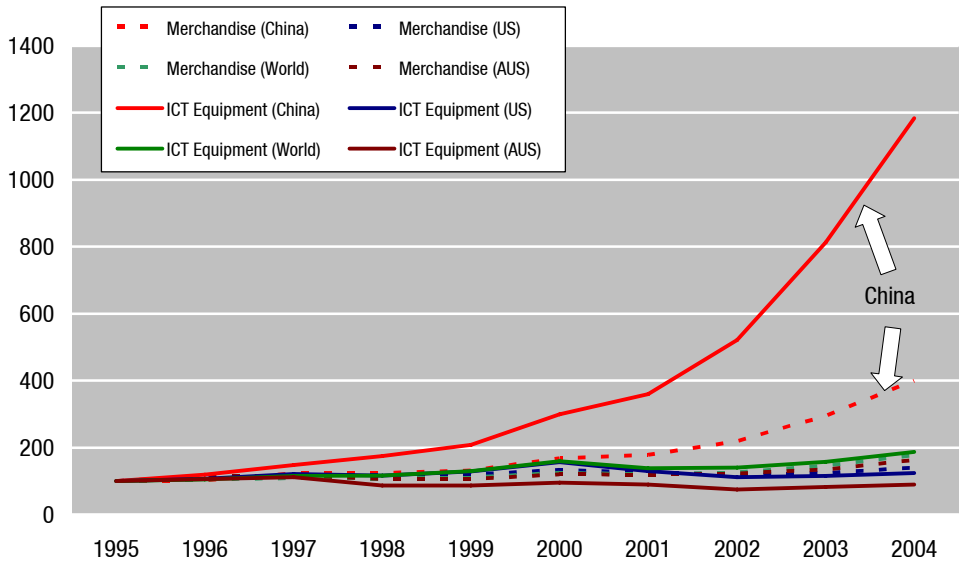


Source: WTO

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).

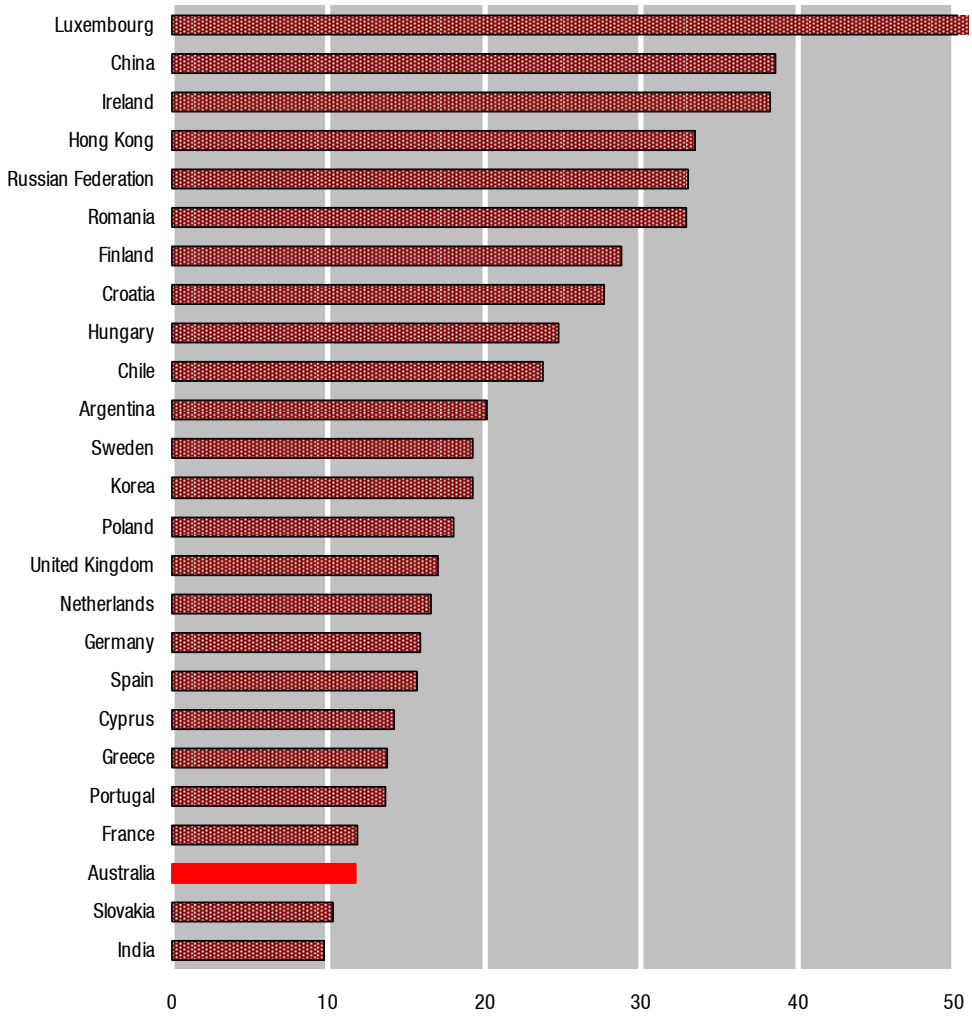
FIGURE 3: MERCHANDISE AND ICT EQUIPMENT EXPORTS, 1995–2004 (CURRENT PRICES, INDEXED)



Source: WTO, Author's analysis

International trade in ICT equipment (ie office and telecom 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 telecom 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.

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

This restructuring has also affected 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).

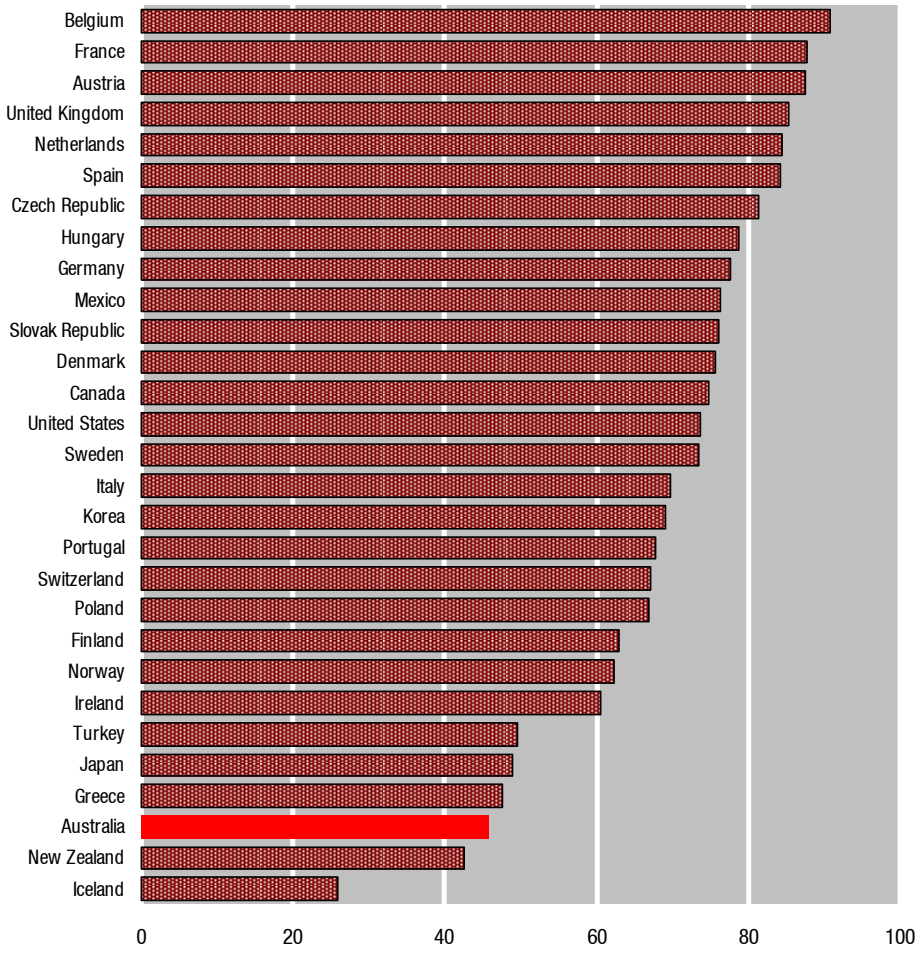
They are among a number of developing countries experiencing rapid growth in exports of ICT and related IT-enabled business services (van Welsum and Rief 2006).

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).

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



Source: OECD, Author's analysis

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 (ie 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 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 (eg Lenovo's acquisition of IBM's PC manufacturing division) and India (eg 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 (eg 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

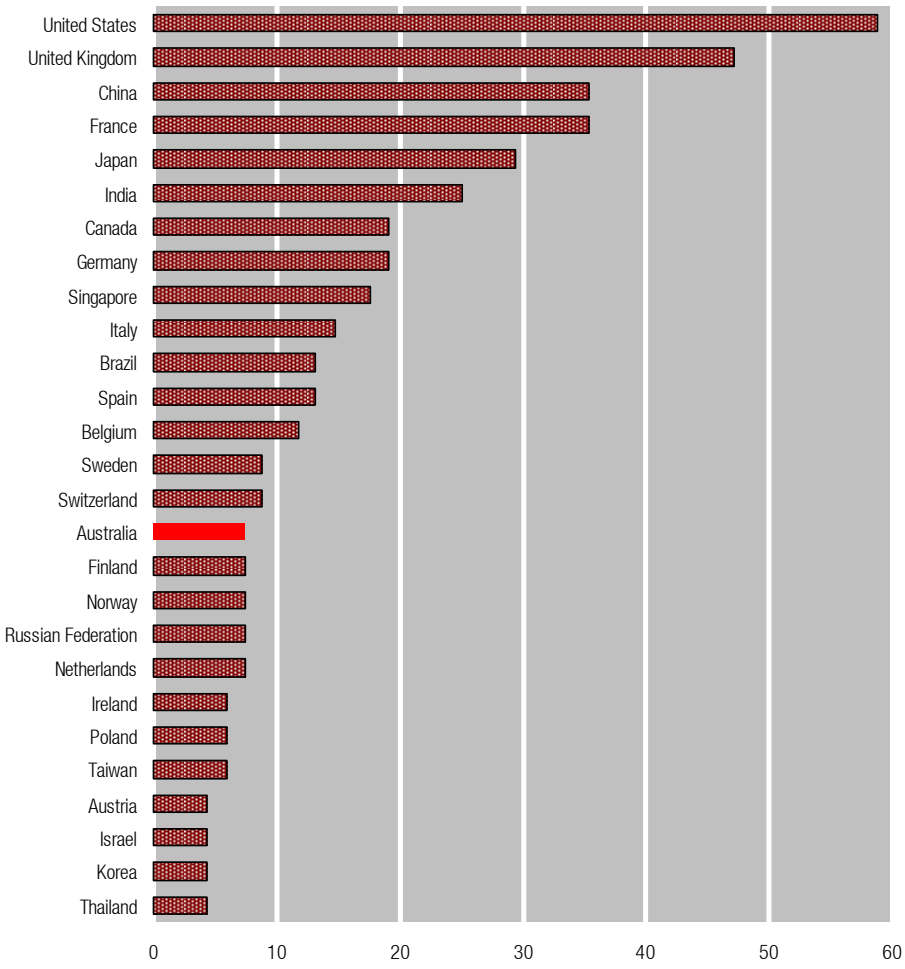
services centre projects. Almost all (98 per cent) of the IT services projects were within the IT services and software industry (UNCTAD 2004), suggesting that they were focused on the rationalisation of IT and IT-enabled services production (OECD 2006).

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).

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



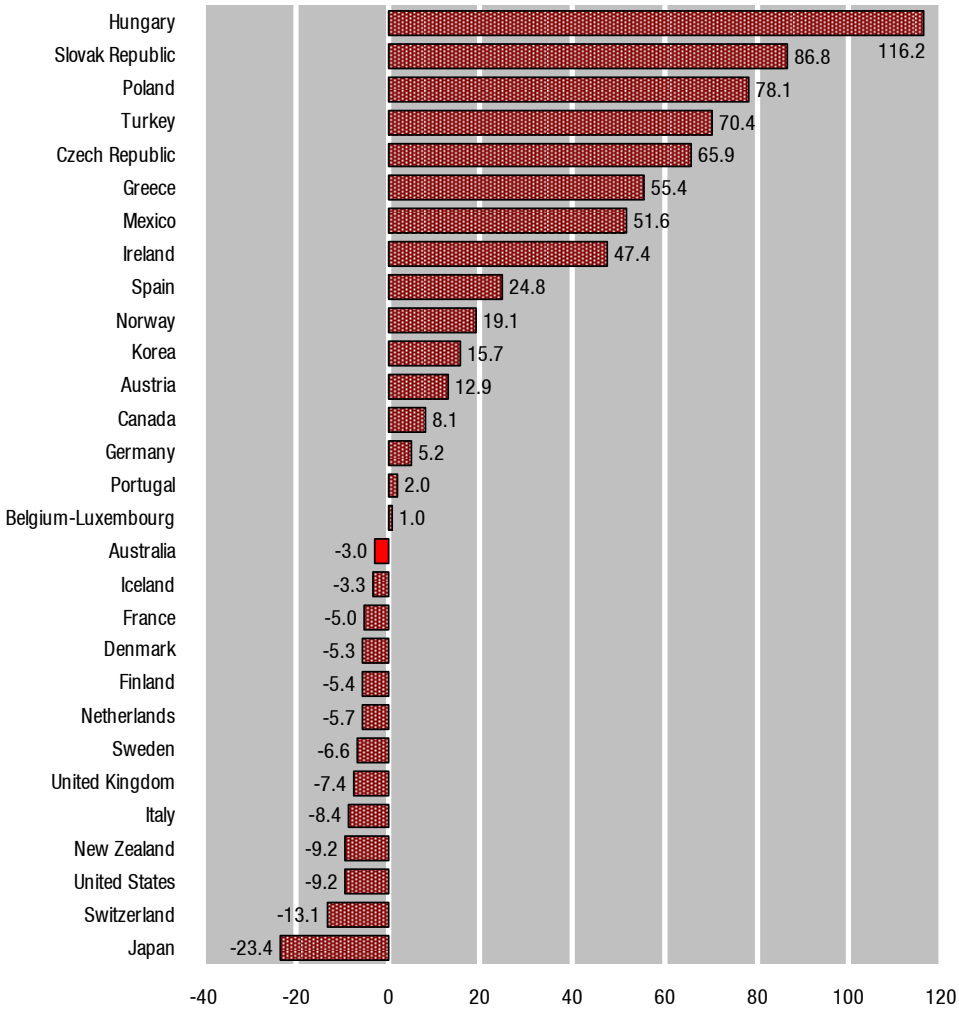
Note: Percentage of respondents citing locations by country, UNCTAD survey (2004).
Source: UNCTAD (2005) *World Investment Report 2005: Transnational corporations and the internationalisation of R&D,* United Nations, New York and Geneva, p133

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?

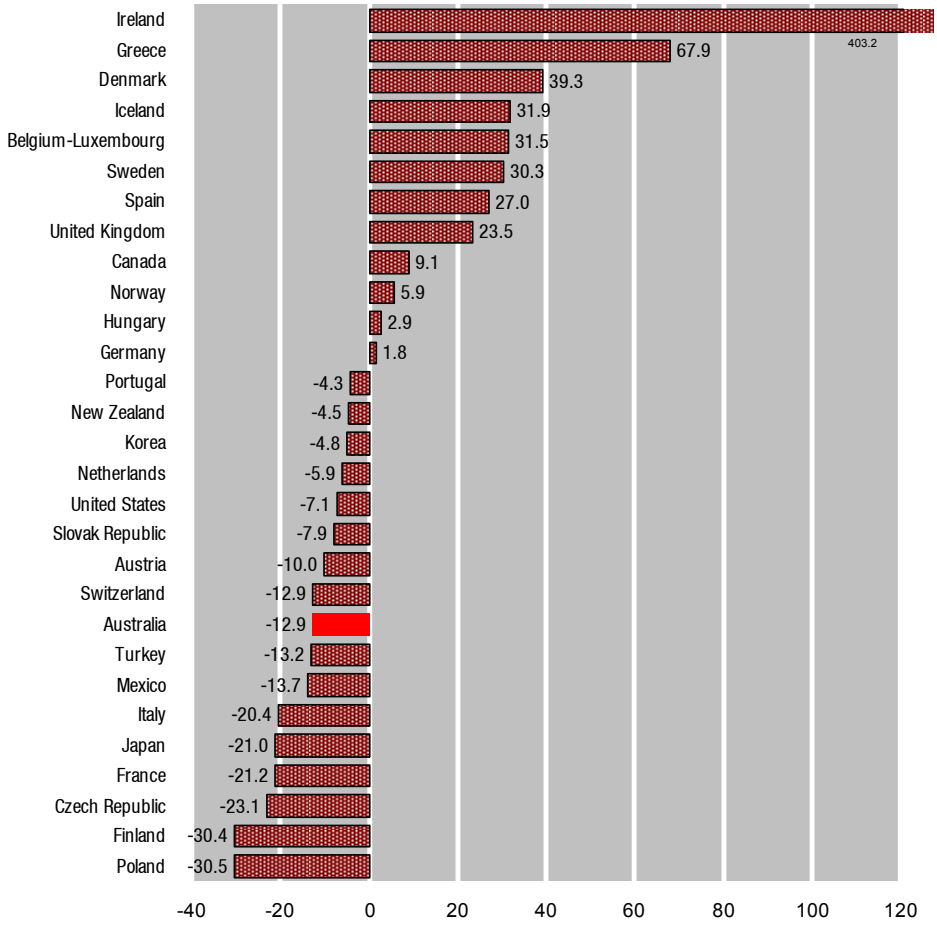
On many of the indicators of globalisation, Australia scores relatively low (ie is less globalised and less integrated into global production systems than most other OECD countries). One obvious question is whether this is affecting Australia's economic performance.

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

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 competitiveness. 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 (eg 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 (eg 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 (eg 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 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 (eg e-commerce, supply chain management and e-business solutions), the capacity for scale in specialisation (eg 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 (eg 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 re-assessing 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 (eg 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 (eg 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 (eg information provided via call centres) or at a different time (eg 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).

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 (eg research reports, statistical updates, images, etc) and services that can be standardised and ordered via the internet (eg 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 (eg 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

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).[1]

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 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 (eg 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 (eg 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.

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[1] This section on the implications of offshoring is drawn from that by the same author appearing in OECD (2004) *Information Technology Outlook 2004*, OECD, Paris, pp97–98.

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

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" (ie 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 (ie 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 (eg 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 (eg 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).

Annex tables

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	1 769	7 987	8 902	12.2
FDI Outward Stock	601	1 785	8 731	9 732	12.9
Cross border M&As	..	151	297	380	6.8
Sales of foreign affiliates	2 765	5 727	16 963	18 677	8.8
Gross product of foreign affiliates	647	1 476	3 573	3 911	7.2
Total assets of foreign affiliates	2 113	5 937	32 186	36 008	13.7
Exports of foreign affiliates	730	1 498	3 073	3 690	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	2 398	4 905	7 853	8 869	4.3
Royalties & Fees receipts	9	30	93	98	8.8
Exports of goods and non-factor services	2 247	4 261	9 216	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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