Staying Competitive in the Global Economy

MOVING UP THE VALUE CHAIN

OECD

Staying Competitive in the Global Economy

MOVING UP THE VALUE CHAIN

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where the governments of 30 democracies work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The Commission of the European Communities takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

Also available in French under the title:
Comment rester compétitif dans l'économie mondiale
PROGRESSER DANS LA CHAÎNE DE VALEUR

Foreword

Globalisation raises many important challenges and is high on the policy agenda in many OECD countries. At the 2004 Ministerial Council Meeting, Ministers asked the OECD to shed light on issues related to the increased outsourcing and offshoring of production, since solid evidence to underpin policy discussion and formulation was scarce.

To help implement this mandate, the OECD Council decided at the end of 2004 on an allocation of the OECD's Central Priority Fund for a study including a systematic empirical overview of trends and developments on the globalisation of value chains.[1]

This volume brings together some of the evidence on the globalisation of value chains and identifies the most relevant policy issues in order to address concerns relating to globalisation. It has served as the basis for a report on main findings to the OECD 2007 Ministerial Council Meeting. A separate report, compiling the individual studies underlying this synthesis, will be finalised later this year.

1. The work funded by the OECD's Central Priority Fund is not the only work on globalisation that is under way at the OECD. A new OECD project on globalisation and structural adjustment was launched following the OECD Ministerial Meeting on Enabling Globalisation in May 2005, and a considerable amount of work is also under way in the OECD's regular Programme of Work and Budget.

Table of Contents

Executive Summary

Global value chains and globalisation

The pace and scale of today's globalisation is without precedent and is associated with the rapid emergence of global value chains as production processes become more geographically fragmented. Globalisation also increasingly involves foreign direct investment (FDI) and trade in services, as many service activities become internationalised. Another distinctive feature is that the current phase of globalisation is not restricted to OECD countries, but also involves large emerging global players such as China, India, Brazil and Russia.

The globalisation of value chains is motivated by a number of factors, of which enhancing efficiency is the most important. One way of achieving that goal is to source inputs from more efficient producers, either domestically or internationally and either within or beyond the firm's boundaries. Fragmentation of the production process has given rise to considerable restructuring in firms, including the outsourcing and offshoring of certain functions. The growth of international sourcing has also resulted in the relocation of activities abroad, sometimes involving total or partial closure of production in the home country and the creation of new affiliates abroad.

International sourcing

Trade in intermediates is growing and domestic production increasingly relies on foreign inputs. In 2003, 54% of the world's manufactured imports were classified as intermediate goods (these include primary goods, parts and components, and semi-finished goods). As a result of the rise in global linkages between countries, a decreasing share of production takes place within national borders.

High- and medium-high technology industries are on average more internationalised than less technology-intensive industries. Rapid advances in information and communication technologies (ICT) have increased the tradability of many service activities and created new kinds of tradable services, thereby facilitating the sourcing of services from abroad. Although the level of international outsourcing is still much lower in market services than in manufacturing, imported intermediates in services sectors have become more important.

The key role of multinationals

Within global value chains, multinational enterprises (MNEs) play a prominent role, as their global reach allows them to co-ordinate production and distribution across many countries and shift activities according to changing demand and cost conditions. Cross-border trade between MNEs and their affiliates, often referred to as intra-firm trade,

accounts for a large share of international trade in goods. The development of global value chains also offers small and medium-sized enterprises (SMEs) new opportunities by enabling them to expand their business opportunities across borders, although they often face difficulties in reaching international markets.

New centres of economic growth

Although OECD countries still dominate, manufacturing production in certain non-OECD countries has increased significantly and is expected to grow further in the near future. China, in particular, has become a major trading partner for most OECD countries and its market share in OECD export markets has risen significantly. Trade and FDI are still largely concentrated within industrialised countries, suggesting that the globalisation of value chains is not primarily a North-South issue. Globalisation is a two-way process, and trade and FDI between OECD and non-OECD countries flows in both directions.

The employment effects of globalisation

In the public mind, offshoring and relocation in particular are often perceived as the "exporting of jobs abroad", directly resulting in a loss to the country and its workers. The globalisation of value chains affects economic performance in various ways, however, including employment, productivity growth, prices and wages, and these impacts vary across activities, regions and social groups. In general, the process of globalisation has both positive (*i.e.* benefits) and negative (*i.e.* costs) effects, dispersed as well as concentrated, short-term as well as long-term. The visible, short-term costs often attract the most attention, as these are more easily measured, while the long-term indirect benefits may be much harder to calculate.

Several studies that provide estimates of the jobs (potentially) lost due to offshoring find a large absolute number of jobs lost because of offshoring, but a relatively small impact when compared with overall churning in the labour market. Furthermore, some of these jobs may have been lost owing to productivity enhancements and technological change, which are not necessarily linked to offshoring.

Over the long-term, globalisation primarily seems to affect the composition, rather than the level, of employment. Trade integration leads to changes in the international division of labour, resulting in employment losses in certain industries (*e.g.* manufacturing). Certain regions, sectors and groups of workers may lose out in the process, *e.g.* those in industries heavily exposed to international competition which have been unable to adjust to the competition. In OECD countries, globalisation is found to have disproportionate impacts on certain types of workers, particularly low-skilled workers who may also be concentrated in certain regions.

The productivity benefits of globalisation

Openness to trade and FDI raises productivity and hence average incomes and wages. Gains from trade typically arise from the exploitation of comparative advantages and economies of scale. At the same time, trade generally results in lower prices for imported goods and services (both final and intermediate) and increases product variety and quality in the home country. In addition, operating in a globally competitive market may force firms to become more engaged in innovative activities. Globalisation also offers an

important channel for flows of foreign technology which embodies significant innovations.

MNEs contribute significantly to productivity, but the productivity effects of globalisation spread beyond them. Their key role in the current globalisation process may be to generate additional positive effects on host countries' economies because of their typically superior performance. The inflow of FDI may spur domestic competition and result eventually in higher productivity, lower prices and more efficient resource allocation in host countries. Technology and knowledge may also spill over from foreign affiliates to domestic firms in host countries through the many interactions between them. MNEs are not the only firms to benefit from internationalisation. Internationally active firms, because they export or import and/or have affiliates abroad, tend to have higher productivity. Exports and direct investment abroad may provide helpful feedback to firms which can help them to improve productivity.

Structural change towards a knowledge economy

The integration of new players in the global economy challenges existing comparative advantages and the competitiveness of countries, forcing them to search for new activities in which they can excel and confront the competition. The main drive is for countries to move up the value chain and become more specialised in knowledge-intensive, high-value-added activities. Specialisation in more traditional cost-based industries and activities is no longer a viable option for most industrialised countries. The manufacturing sector is most strongly affected and in most OECD countries the process is accompanied by de-industrialisation, driven by rapid changes in productivity in the manufacturing sector and a shift in demand to services. Investment in knowledge is crucial for sustained economic growth, job creation and improved living standards and has increased in all OECD countries in recent years. At the same time, most OECD countries are shifting into higher-technology-intensive manufacturing industries and into knowledge-intensive market services. A considerable number of them still have a strong comparative advantage in medium-low-technology and low-technology industries.

Some non-OECD economies are also moving up the value chain. China has diversified from traditional industries into higher-technology-intensive industries. The strong growth of Chinese exports of more sophisticated electronics, furniture and transport goods is closely linked to China's growing imports of parts and components. An important question is whether China is merely assembling component parts or whether there are indications that the country has increased value added in higher-value-added ICT goods. China's trade surplus is not due to high-technology exports, but to large exports of lower-technology industries such as toys, textiles and footwear.

MNEs' R&D investments abroad have grown strongly as their strategies focus on global technology sourcing. This involves building global networks of distributed R&D in order to tap into local knowledge and develop sources of new technology. While most internationalisation of R&D still takes place within the OECD area, large increases in foreign R&D investment in Asia, in particular in China and India, have attracted much attention in recent years. This should be seen as an opportunity, as international R&D links can promote faster technological change and broader diffusion of technological advances worldwide.

Policy implications

Moving up the value chain implies a continuous process of change, innovation and productivity growth. Industrialised economies can only grow by inventing new technology, by innovations in products and processes, and by designing new management methods. To foster and support the innovation process, a strategy for innovation is needed in which several policy areas may be considered:

1. Innovation policies help increase the level of knowledge and technology embodied in production and exports. Policies aimed at strengthening creativity in business or at developing intangible assets as sources of value creation are closely related to these policies.
2. A more innovative and productive economy may require more highly skilled workers or a different mix of skills. Addressing this through education and training policies requires a growing focus on lifelong learning.
3. Policies might also aim at creating new areas of economic activity, by stimulating new firm creation and entrepreneurship or by stimulating innovation and technology in new areas.
4. International and local firms may be attracted to specific activities and skills which exist only in certain regions or locations. Policies aimed at the development of clusters and poles of excellence as well as regional policies may help capitalise on countries' strengths.
5. Understanding what determines national attractiveness, building on national strengths and addressing weaknesses to the extent possible can help extract greater benefits from the globalisation process.
6. Striking an appropriate balance between diffusion of technology and providing incentives for innovation remains an important consideration in policies relating to intellectual property rights (IPR). Moreover, more can be done to generate value from IPR, *e.g.* through licensing.
7. In several OECD countries, the current policy debate considers possible actions the government may undertake to strengthen firms' capacity to compete in the global market which complement efforts towards well-functioning and competitive markets. Such actions include the innovation and entrepreneurship policies that have become the core of industrial policy in the 21st century.

If countries are to realise the potential gains from openness, the factors of production (including labour) must shift from economic activities in which they are relatively less efficiently used towards activities in which the economy enjoys a comparative advantage. However, it can be hard for individuals to move between jobs, industries and regions, and workers losing jobs in firms in import-competing industries sometimes bear large adjustment costs; hence the need for complementary structural policies to help workers reallocate from lagging to more advanced industries and for policies to compensate potential short-term losers. Although globalisation benefits economies as a whole, the gains are unevenly distributed. Providing a balanced perspective on the benefits and costs of globalisation can help. The problem is that globalisation may generate highly visible costs for clearly identifiable groups of people, while some benefits may only come later and are widely diffused across society. A promising avenue may be to address more

directly the costs of globalisation by compensating those who may suffer a short-term decline in income.

There are concerns that globalisation may put some world regions at particular risk of being left behind. Other concerns relating to globalisation are linked to the potential environmental impacts in developing countries. Further trade liberalisation in sectors in which poorer countries have a comparative advantage (especially agriculture), complemented by efforts at capacity building and development policies, may help to spread the benefits of globalisation to a wider range of countries, including those most at risk of being excluded.

Protectionist measures (for example, that insulate countries from the impacts of globalisation through import barriers, that penalise firms that engage in offshoring, and that slow exposure to international competition) are likely to raise firms' costs and reduce their efficiency. This will have a detrimental impact on consumers who buy products from these firms; it may also make the countries adopting such policies a less attractive place to do business. Protectionist measures also have detrimental effects on other, often poorer, countries, by denying them the chance to trade and raise living standards.

Chapter 1

The Challenge of Globalisation

This chapter discusses the driving forces behind economic integration and shows that, although the process of globalisation started decades ago, in its current form globalisation displays some distinctive features, in particular the emergence of global value chains, the key role of multinational enterprises, the increasing outsourcing/offshoring of services and the rapid integration of large countries such as China and India.

Introduction

The rapid pace of globalisation has attracted much attention in recent years, although the current wave started as early as the 1950s. Globalisation, or international economic integration, is, however, not a totally new phenomenon. The period from 1870-1913 also witnessed a significant increase in international trade, accompanied by important cross-border flows of financial capital and labour. This phase of international economic integration became the victim of a backlash following the First World War, which resulted in protectionist measures in many countries.

After the Second World War, international economic integration took off again, largely facilitated by more open economic policies. Policies to gradually eliminate the obstacles to international trade were adopted, resulting in drastic reductions of duties levied on manufactured products (Table 1.1). In addition to tariff reductions, the gradual lowering of non-tariff barriers also facilitated international trade of goods and services. Reductions in trade barriers have been even larger in regional blocs such as the European Union (EU) and the North American Free Trade Agreement (NAFTA). The liberalisation of capital movements further facilitated international integration by gradually eliminating the restrictions on foreign direct investment (FDI) imposed after the Second World War. In recent years, the opening of the former Communist-bloc countries and increasing liberalisation in developing countries has further contributed to globalisation.

Table 1.1. Duties as a percentage of the value of manufactured goods

	1913	1950	1990	2004
Germany	20	26	5.9	3.6
Japan	30	25	5.3	3.9
Italy	18	25	5.9	3.6
United States	44	14	4.8	4.0

Source: UNCTAD (1994) and WTO (2004) in Acocella (2005).

Technical progress, which has sharply lowered transport and communication costs in recent decades, is the second driving force behind globalisation. The decline in these costs has helped reduce economic distances and facilitated economic interaction among countries (Table 1.2). In recent years, technological advances in information and communication technologies (ICT) have particularly benefited economic globalisation not only by lowering communication costs but also by enlarging the number of goods and services that can be traded internationally and by allowing the fragmentation of production across countries.

Table 1.2. Changes in transport and communications costs, 1930-90

	1930	1950	1960	1970	1990
Air transport costs per passenger-mile	100	44	56	24	16
Cost of three-minute telephone call between London and New York	100	22	19	13	1.4
Cost of using a satellite				100	8

Source: IMF (1997) in Acocella (2005).

While economic policies and technological progress have traditionally been the driving forces of international economic integration, the current phase of globalisation displays a few distinctive features. First, the pace and scale of today's globalisation process is without precedent. The growth in world exports and imports has been accelerating since the 1980s, far exceeding the growth in world gross domestic product (GDP). Since the second half of the 1990s, globalisation has been especially boosted by the strong increase in FDI. Moreover, current economic integration is no longer restricted to the Triad – the United States, Europe and Japan – but extends to new large global players like China, India, Brazil and Russia.

Second, the current phase of globalisation is characterised by the globalisation of value chains. Production processes are increasingly geographically fragmented, as ICT has made it possible to slice up the value chain and to move activities previously executed in one place to any location that helps to reduce costs. Intermediate and final production can be outsourced abroad, thus giving rise to increased trade through exports and imports. Within such a global value chain, multinational firms (MNEs) play a prominent role owing to the global reach that allows them to co-ordinate production and distribution across many countries and shift activities according to changing demand and cost conditions.

Third, while manufactured goods still account for the largest share of international trade, globalisation increasingly extends to FDI and trade in services. Many service activities are increasingly internationalised, as ICT makes it possible to dissociate the production of services from their location. Improvements in technology, standardisation, infrastructure and decreasing data transmission costs have all facilitated the sourcing of services from abroad. Rapid advances in ICT have also increased the tradability of many service activities and created new kinds of tradable services. In particular, "knowledge work", such as data entry and information processing services and research and consultancy services, can easily be carried out via the Internet and e-mail, and through tele- and video-conferencing. Increasingly, activities such as call centres are off-shored.

While the globalisation process brings considerable benefits overall, it invariably leads to winners and losers because of the changing allocation of production and value added. In this respect, the current stage of economic integration is no different from previous ones. Globalisation, and in particular the emergence of global value chains, has significant effects on nations' economies and results in changes in comparative advantage and export specialisation, job reallocations, job losses in some areas and job gains in others, the relocation of strategic activities, etc. As in the past, social concerns about rapid economic integration have emerged, often driven by the distributional impacts of changes in the pattern of production.

The Spring 2005 Eurobarometer (European Commission, 2005) indicates, for example, that Europeans are more aware of the costs of globalisation than of the potential benefits (Table 1.3). The largest share of respondents views the globalisation of trade negatively in terms of outsourcing by firms to countries where labour is cheaper. Positive consequences, such as greater opportunities for domestic firms or increased inflows of FDI, are cited less often. In the United States, globalisation is often interpreted as the outsourcing abroad or offshoring of service jobs to low-wage countries, especially India and China. These concerns about globalisation point to feelings of economic insecurity, which are nurtured by a combination of economic and social factors, not all of them related to globalisation.

Weak economic and employment growth in several OECD regions in recent years has exacerbated fears of job losses owing to globalisation and outsourcing, without necessarily any direct link. Indeed, most evidence suggests that the real causes of poor labour market performance are primarily rigidities in the labour market.

Most industrialised countries are also in a process of de-industrialisation and thus job losses in manufacturing industries. Globalisation and the outsourcing of activities to low-wage countries are often considered the most important factors in job losses in manufacturing. While globalisation has contributed to some extent, strong productivity growth and a growing demand for services are the main driving forces behind the de-industrialisation process (Wölfl., 2005).

Not only manufacturing jobs are perceived as endangered, however, as the offshoring of services increasingly threatens services jobs that previously seemed protected from international competition. India, in particular, has specialised in ICT-enabled services and increasingly affects services markets in OECD countries. Services offshoring implies that not only low-skilled manufacturing jobs but also high-skilled service jobs are affected (Van Welsum and Vickery, 2006). The rapid integration of new large players such as China and India has further reinforced fears of job losses in developed countries.

Table 1.3. EU25 views on trade and globalisation

There are multiple consequences of the globalisation of trade.
When you hear the word "globalisation" what comes to your mind first?

	Percentage of replies
Delocalisation of some companies to countries where labour is cheaper	38
Increased competition for (*nationality*) companies	18
Opportunities of (*nationality*) companies in terms of outlets	16
Don't know	14
Foreign Investment in (*our country*)	12
Other (spontaneous)	3

Source: European Commission, *Eurobarometer Spring 2005*.

The globalisation of value chains

The globalisation of value chains is central to today's rapid globalisation process. The phenomenon is also referred to in the literature as international production sharing, global production, and slicing up the value chain. The globalisation of value chains refers to the

growing vertical integration of production and is closely linked to the growth of global production networks. In this context, the value chain is the sequence of productive (value-adding) activities that leads to final production and end use (Sturgeon, 2001), while production networks refer to the relationships that link firms together. The globalisation of value chains leads to the physical fragmentation of production, in which the various stages are located in different sites as firms find it advantageous to source inputs globally.

The globalisation of value chains is motivated by a number of factors, as evidenced by surveys such as those of AT Kearney (2004) and Accenture (2004). The first is the search for greater efficiency as growing competition in domestic and international markets forces firms to become more efficient and lower costs. One way of achieving that goal is to source inputs from low-cost or more efficient producers, either domestically or internationally, and either within or outside the boundaries of the firm.

The second major motivation is entry into new markets. Demographic shifts and rapid growth in several large non-OECD economies mean that an increasing part of global economic activity is taking place outside the OECD area. If firms wish to benefit from these growth centres, they need to be present in them. This does not necessarily involve the offshoring of existing production; in many cases, it involves expansion abroad.

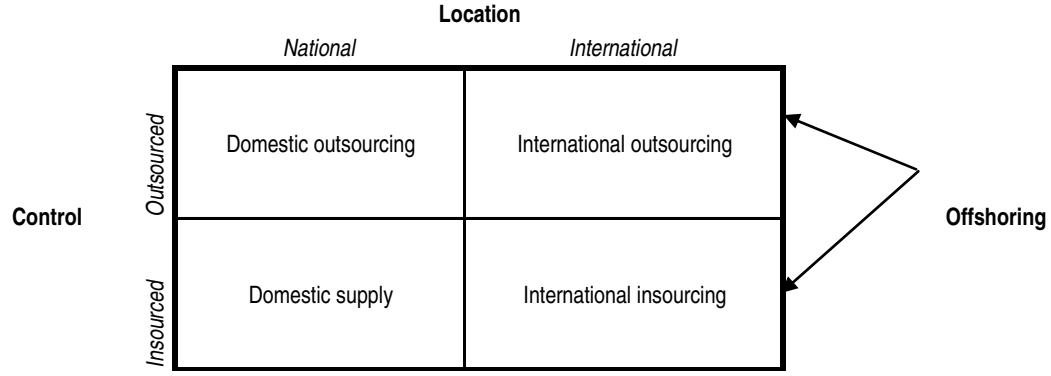
Third, firms may move some activities offshore to gain access to so-called strategic assets, whether skilled workers, technological expertise, the presence of competitors and suppliers, or the possibility of learning from their experience. Tapping into foreign knowledge has become especially important in the internationalisation of R&D activities (OECD, 2006).

Notwithstanding these anticipated benefits, global value chains also involve costs and risks for firms. Starting up operations abroad and managing them efficiently in spite of differences in language, culture and communication results directly in higher operating costs. Furthermore, there are potential risks, such as goods and services of inadequate quality, failure to meet delivery times, political instability, less reliable civil infrastructure, less developed legal and regulatory systems, and risks to intellectual property.

The fragmentation of the production process across various countries has given rise to the restructuring of firms to include outsourcing and offshoring. To clarify the differences between these concepts, outsourcing can be defined as the purchasing of intermediate goods and services from outside specialist providers at arm's length. Offshoring refers to purchases by firms of intermediate goods and services from foreign providers at arm's length or the transfer of particular tasks within the firm to a foreign location (Kirkegaard, 2004). Offshoring includes both international outsourcing (where activities are contracted out to independent third parties abroad) and international in-sourcing (to foreign affiliates). The cross-border aspect is the distinguishing feature of offshoring, *i.e.* whether goods and services are sourced within the domestic economy or abroad, not whether they are sourced from within the same firm or from external suppliers (Figure 1.1).

In this report outsourcing and offshoring refer to the sourcing of both goods and services, in contrast to some studies that relate outsourcing and offshoring almost exclusively to the sourcing of services (*e.g.* Bhagwati *et al.*, 2004). Manufacturers have sourced components from other countries for many years, while the international sourcing of business support services and ICT-enabled services more generally is a relatively recent phenomenon.

Figure 1.1. Outsourcing and offshoring



Source: Van Welsum and Vickery (2004).

Decisions on which activities to source outside the firm (and potentially across borders) and which ones to keep internally (but possibly in a foreign affiliate) are driven by several factors (see also Olsen, 2006). For instance, a firm may be interested in relocating high-volume production that requires low skills or standard technologies to external providers that may have cheaper or more efficient production capabilities. This would allow the firm to focus its activities on areas in which it has a comparative advantage, or allow it to engage in new, often high-value-added business activities. Firms may also outsource certain activities for which they lack in-house expertise or the appropriate technology. Firms may be more reluctant to source more complex or high-value-added activities externally, as these are often considered strategic to a firm's core business.

The theoretical literature on the firm's decision to produce in house or outsource through market contracts is extensive and dates back to Coase's theory of the firm. Recently, however, attention to the foreign aspects of the phenomenon has increased (*e.g.* Antràs and Helpman, 2004; Antràs *et al*., 2005, Grossman and Helpman, 2002). The two most common explanations are:[2]

- *Transaction costs – weighing costs and expected benefits*. According to this theory, outsourcing is desirable only as long as the transaction costs of the necessary investments, contracts and uncertainties surrounding these contracts, and the search to find appropriate partners are lower than the expected cost advantages.
- *Agency theory – increasing the control of outcomes*. According to this theory, conflicting goals and interests between the firm and its employees may lead to productivity losses. To reduce inefficiencies linked to this problem, the firm can outsource some of its activities to an external provider and control the provider's output or effort through an outcome-based contract.

Both theories suggest that firms carefully weigh the costs and benefits of outsourcing some of their production to another firm, either domestically or abroad, or to a foreign

2. A recent overview of theoretical developments related to outsourcing is available in Spencer (2005).

affiliate. Understanding the costs and benefits is therefore of crucial importance to help project the future development of outsourcing and globalisation.

Demand and cost conditions are the essential factors in deciding where to locate activities abroad. Location factors may differ substantially between different units of a firm. Firms may decide to place some of their production abroad while retaining core units at home. For example, a 2003 survey showed that many of the firms surveyed had outsourced some of their information technology (IT) services, while few had outsourced human resource functions, accounting, engineering or marketing (Conference Board, 2003).

International sourcing has resulted in important relocations of activities abroad (known as "delocalisation" in French). The different uses of this term add to the complexity and confusion that surround the discussion of outsourcing and offshoring and globalisation more generally. In a strict sense, relocation implies the total or partial closure of production in the home country and the creation of new affiliate(s)/expansion of existing affiliate(s) abroad to produce the same goods and services. It implies the substitution of domestic stages of production by activities performed in foreign sites, and the exportation of goods and services from the host country to the home country. However, relocation is not always interpreted in such a strict sense and often encompasses different forms of internationalisation such as the opening of a new affiliate abroad for reasons of market presence. While this does not directly result in an effective substitution of activities at home by production abroad, it may imply some substitution of home activities by foreign activities in that the investment abroad creates employment in the host country rather than expands employment in the home country.

While the different concepts may be defined theoretically, empirical measurement of the different phenomena is a difficult exercise. The lack of clear empirical evidence has often led to diverse and sometimes contradictory discussions on the size and effects of the different phenomena, owing for example to the interpretation of globalisation as pure relocation and closure of activities. Most concerns in public debate focus on the relocation of economic activities abroad but neglect the broader view and the positive effects of globalisation. A clearer picture of the dimensions and effects is necessary in order to develop and implement appropriate policies.

Given the sensitivities surrounding these phenomena, firms are often reluctant to offer details on their outsourcing/offshoring and especially relocation decisions. Official data typically provide some insight into outsourcing and offshoring but not a complete picture (US Government Accountability Office, 2004). Trade and FDI data, for example, are typically used to gauge the importance of global value chains and the corresponding outsourcing and offshoring, but both are too broad. Import data, for example, show that firms have purchased goods and services offshore but do not indicate whether these firms had previously purchased these goods and services from domestic sources.

As the globalisation of value chains implies the import and export of intermediates, data on trade in intermediate goods and services may give a more accurate picture. However, this information also has shortcomings; for example, most countries do not distinguish between international outsourcing through arm's-length relationships and international insourcing through affiliates. Moreover, data on trade in services are far less detailed than data on trade in goods, and trade data do not identify whether services are destined for final consumption or for intermediate use. The availability of input-output (I-O) tables combined with trade data can, however, help solve this problem.

Likewise, FDI data encompass all foreign investments, and these are not necessarily linked to offshoring and relocation (at least in a strict sense). Data on the activities of multinational firms provide insights into the importance of foreign affiliates abroad but again, they do not relate exclusively to offshoring. Moreover, FDI data do not give information on international outsourcing, *i.e.* on outsourcing through arm's-length contracts with foreign firms.

Given the unavailability of exact figures at the aggregate level, firm-level surveys have increasingly been used to analyse the globalisation of value chains. While these surveys may give qualitative and quantitative information on outsourcing and offshoring by firms, they may not always prove representative, in which case they may also be of limited value in understanding the phenomenon.

Box 1.1. Analytical work carried out in the context of the project on global value chains

The OECD work on global value chains covers various issues:

- **Study on global linkages**. This work uses OECD trade data and updated input-output tables for OECD and key non-OECD countries (China, India, Russia, Brazil, Indonesia, etc.) to identify industries most likely to be affected by outsourcing and the globalisation of production. A number of working papers have already been published and more work is under way (Wixted *et al.*, 2006).
- **Firm-level studies** on the impacts of offshoring on productivity, carried out by interested countries. This work follows on a 2005 OECD workshop on globalisation, and is based on detailed firm-level data available in member countries. The work focuses on the productivity impacts of globalisation, and also investigates the determinants of firms' decisions on FDI in OECD countries and the effects that such investment has on domestic production. Results of this work include papers by Criscuolo *et al.* (2006).
- **Study on offshoring and employment dynamics**. This work examines the impacts of offshoring on employment. It is based on detailed firm-level evidence and will be published separately in 2007.
- **Study on the changing nature of manufacturing.** This study examines the changing nature of the manufacturing sector, including the trend towards greater interaction with the services sector. A working paper was published (Pilat *et al.*, 2006).
- **Study on the productivity impacts of foreign affiliates.** This study examined the role of foreign affiliates in aggregate productivity growth and was published (Criscuolo, 2005).
- **Work on enhancing the role of small and medium-sized enterprises (SMEs) in global value chains**, carried out by the Working Party on SMEs and Entrepreneurship. This work will be published separately in 2007.
- **Work on ICT-enabled globalisation of services and offshoring** by the Working Party on the Information Economy (Van Welsum and Vickery, 2006).
- **Work on the globalisation of R&D and innovation** carried out by the Working Party on Technology and Innovation Policy. This work will be published separately in 2007.

Outline of the report

This report summarises work on global value chains carried out by several OECD bodies and covering various aspects of the globalisation process (see Box 1.1). Chapter 2 reports on the key globalisation patterns and the globalisation of value chains, based on OECD data. The discussion centres on the broad concept of globalisation and, where possible, on the specific phenomena of outsourcing/offshoring and relocation. The contributions of trade, FDI and labour migration to current globalisation are discussed, together with the crucial role of MNEs in the globalisation of value chains. Empirical evidence is presented on the growing fragmentation of production, on trade in imported intermediate inputs and on the increasing global linkages between country-based input-output tables.

As not all countries and industries are affected to the same extent, Chapter 2 also discusses the geographical and industrial dimension of globalisation. More specifically, trade and FDI data are analysed to identify the geographical orientation of globalisation and to assess the emergence of new players in the global economy, such as China and India. The impact of globalisation on specific manufacturing industries is discussed, along with the recent offshoring of service activities.

Chapter 3 discusses the costs and benefits of globalisation in OECD countries, by looking specifically at employment and productivity effects. Apart from the very visible negative short-term effects of relocation, for example, the analysis also explicitly takes into account the longer-term (typically positive) effects of globalisation. The overall effect on national economies is discussed but attention is also devoted to the most affected actors, as globalisation invariably results in winners and losers. Some empirical evidence is presented on the differential effects that globalisation may have on high- and low-skilled workers.

Chapter 4 relates globalisation to the competitiveness of countries by discussing the need for OECD countries to move up the value chain in order to stay competitive in the global economy. It pays special attention to the contribution of globalisation to de-industrialisation in OECD countries. Issues relating specifically to opportunities and challenges for SMEs are addressed. Empirical evidence is presented on how OECD countries, faced by the challenges of countries like China and India, are evolving in the direction of the knowledge economy. Special attention is devoted to China's apparent transition towards high-technology activities, with an analysis of how the globalisation of value chains in Asia has facilitated this evolution. A final section discusses the internationalisation of R&D as these activities are also globalising rapidly and are increasingly performed in developing countries, nurturing concerns about hollowing out in the home countries of MNEs.

Chapter 5 discusses policies that can help countries realise greater benefits from the globalisation process and draws some conclusions.

References

Accenture (2004), "Driving High-Performance Outsourcing: Best Practices from the Masters' Executive Survey Results", Technical Report.

Acocella, N., (2005), *Economic Policy in the Age of Globalisation*, Cambridge.

Antràs, P., L. Garicano and E. Rossi-Hansberg (2005), "Offshoring in a Knowledge Economy", NBER Working Paper, No. 11094.

Antràs, P. and E. Helpman (2004), "Global Sourcing", *Journal of Political Economy*, Vol. 112, No. 3.

AT Kearney (2004), "What to Move Offshore?", Research Report 2004, Chicago, IL.

Conference Board (2003), "Outsourcing Trends", Research Report R-1332-03-RR, New York.

Criscuolo, C. (2005), "The Contribution of Foreign Affiliates to Productivity Growth: Evidence from OECD Countries", STI Working Paper 2005-8, OECD, Paris.

Criscuolo, C., A. Hanley, E. Hagsten and P. Karpaty (2006), "A Cross-Country Analysis of Services Offshoring Firms: Evidence from Ireland, Sweden and the U.K", internal OECD working document, OECD, Paris.

European Commission (2005), *Eurobarometer Spring 2005*, Brussels.

Grossman, G. and E. Helpman (2002), "Managerial Incentives and the International Organization of Production", NBER Working Paper No. 9403.

International Monetary Fund, Balance of Payments Database, IMF, Washington

Olsen, K.B. (2006), "Productivity Impacts from Offshoring and Outsourcing – A Review", STI Working Paper, 2006-1, OECD, Paris.

Pilat, D., A. Cimper, K. Olsen and C. Webb (2006), "The Changing Nature of Manufacturing in OECD Countries", STI Working Paper 2006-9, OECD, Paris.

Spencer, B.J. (2005), "International Outsourcing and Incomplete Contracts", NBER Working Paper Series, WP 11418, Cambridge, Massachusetts.

Sturgeon, T. (2001), "How Do We Define Value Chains and Production Networks", *IDS Bulletin*, Vol. 32, No. 3.

UNCTAD (1994), *World Investment Report 1994*, New York.

United States Government Accountability Office (US GAO) (2004), "International Trade: Current Government Data Provide Limited Insight into Offshoring of Services", GAO-04-932.

Van Welsum, D. and G. Vickery (2004), "Potential Offshoring of ICT-intensive using Occupations", DSTI/ICCP/IE(2004)19/FINAL, OECD, Paris.

Van Welsum, D. and G. Vickery (2006), "Potential Impacts of International Sourcing on Different Occupations", available at: www.oecd.org/document/31/0,2340,en_2649_33757_36928671_1_1_1_1,00.html.

Wixted, B.L., N. Yamano and C. Webb (2006), "Input-Output Analysis in an Increasingly Globalised World: Applications of OECD's Harmonised International Tables", STI Working Paper 2006-7, OECD, Paris.

World Trade Organisation (2004), *Annual Report*, Geneva.

Chapter 2

The Growth of Global Value Chains

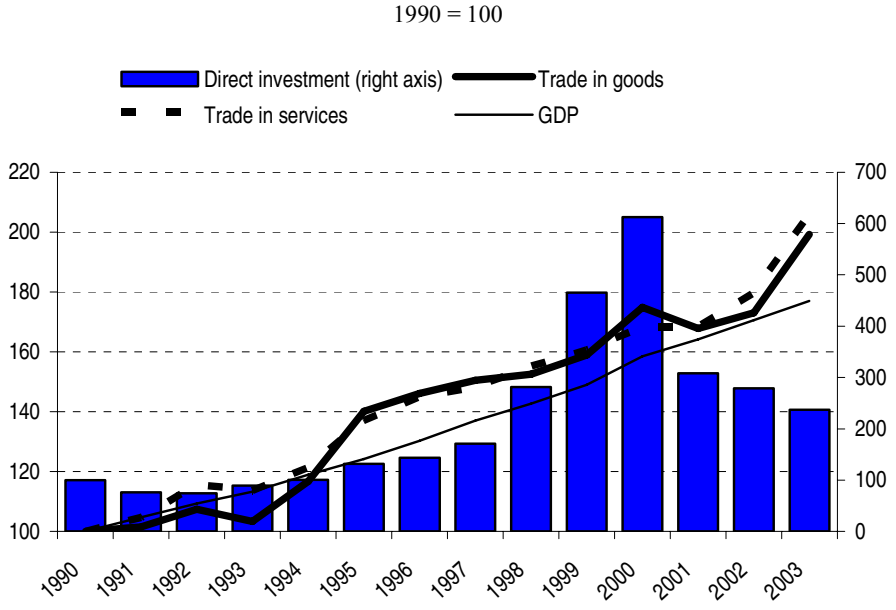
This chapter offers a broad range of empirical evidence which shows the increasingly global integration of OECD countries and discusses the economic importance of emerging countries. New evidence based on input-output tables is developed to demonstrate global linkages among countries. In an analysis of differences among industries, the increasing outsourcing/offshoring of services is discussed. The chapter also highlights the key role of multinational enterprises in the current globalisation.

Trade and foreign direct investment drive present globalisation

The current process of economic globalisation is mainly driven by strong growth in trade and foreign direct investment (FDI), the two key channels for international economic integration across borders. These economic linkages between countries are not new, but the scale and complexity of transactions has substantially increased over the past decade as both trade and FDI have grown at a faster pace than gross domestic product (GDP). The emergence of global value chains has increased FDI flows and intra-firm trade in a complementary manner. Vertical specialisation has made trade and FDI increasingly interdependent, as production has become more fragmented across borders and import and export flows of intermediates have grown.

Data for OECD countries indicate that foreign direct investment has been the fastest-growing segment of international transactions over the past decade, with a strong upsurge in the second half of the 1990s (Figure 2.1). Although FDI flows have slowed since 2000, recent data show that FDI has risen since 2004. Since the second half of the 1980s, FDI has played a fundamental role in furthering international integration and industrial restructuring at the global level. That being said, the largest part of FDI concerns acquisitions (*i.e.* a change of ownership through mergers or takeovers) rather than the creation of new business firms (greenfield investments) or capacity increases in existing firms.

Figure 2.1. Trends in international trade[1] and foreign direct investment,[2] OECD[3]



1. Average imports + exports
2. Average assets + liabilities.
3. Excludes the Czech Republic 1990-92, Greece 1998 and the Slovak Republic 1990-92 and 2001.

Source: OECD (2005a), *OECD Economic Globalisation Indicators*.

At the same time, the lowering of tariff and non-tariff barriers has contributed to a steady rise in international trade, not only in goods but also in services. Since the 1990s, goods and services trade have evolved in a broadly similar way, with both growing around 5% a year on average. Within free trade areas such as the European Union, the North American Free Trade Agreement (NAFTA) and the Association of South East Asian Nations (ASEAN), trade of manufactured goods has increased even much faster. While the growth patterns of trade in goods and services display a similar evolution, international trade of goods is still more than four times international trade of services.

A first rough indication of countries' integration into the world economy is derived from the ratio of international trade in goods and services to GDP. Small countries are generally more integrated, as they tend to specialise in a limited number of sectors and need to import and export more goods and services to satisfy domestic demand than larger countries (Figure 2.2). Size alone, however, does not determine the level of countries' trade integration because the emergence of global value chains and the presence of MNEs increasingly affect trade volumes (see below).

Figure 2.2. Average of exports and imports of goods as a percentage of GDP

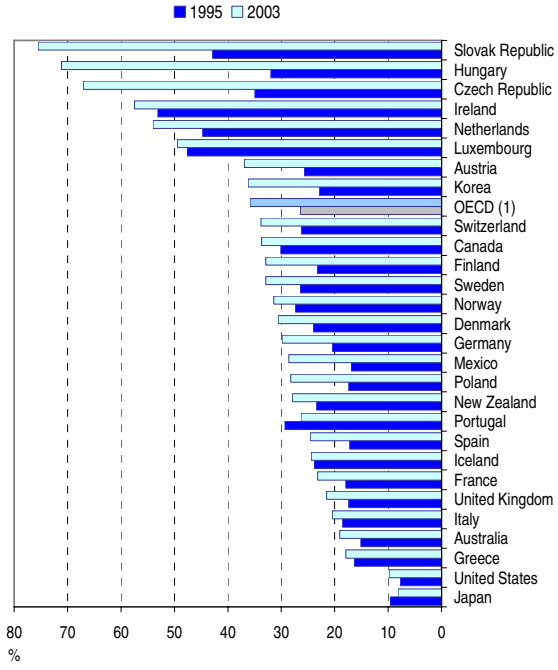
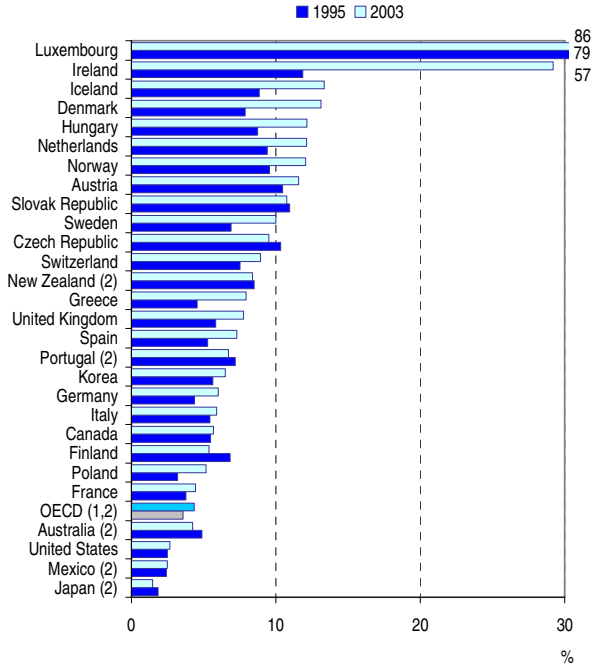


Figure 2.3. Average of exports and imports of services as a percentage of GDP



1. Figures for Belgium and Turkey not available; the average figure for the OECD excludes these countries.

2. Data for Australia, Japan, Mexico, New Zealand and Portugal are for 2002.

Source: OECD, Annual National Accounts Database.

The average ratio of exports and imports to GDP, in constant prices of 2000, increased between 1995 and 2003 in all OECD countries. In 2003, the average trade-to-GDP ratio of goods in the OECD area was 35.8%, up from 26.4% in 1995. It was close to 80% in the Slovak Republic and very high in Hungary and the Czech Republic, as well as

in Ireland, the Netherlands and Luxembourg. In contrast, it was less than 10% in the United States and Japan, owing in part to their larger size.

As a share of GDP, average trade in services in the OECD area only accounted for around 4.4% of GDP in 2003. Luxembourg and Ireland had the highest values. In Luxembourg, financial services played a dominant role in exports, and in Ireland, technology payments were a very important component of total imports (Figure 2.3).

FDI positions measured as a percentage of GDP provide a second structural indicator of the relative interdependence of economies. Overall, the relative share of outward FDI positions of G7 countries as well as most OECD countries is greater than their inward investments, indicating that OECD countries are net exporters of FDI, in the form either of mergers and acquisitions or of greenfield (new) investments.

In terms of absolute amounts, the United States ranks first among OECD members as both the largest home and the largest host economy for direct investment. However, the relative importance of FDI for the United States is less significant than for some other OECD countries (Figure 2.4). Among G7 countries, the United Kingdom had the highest ratio for outward FDI positions in 2002 as well as for inward investments (Figure 2.5). The outward FDI position of Japan represented only 7% of its GDP while direct investment by foreigners was less than 2%, the lowest ratio among all OECD countries.

Figure 2.4. Outward FDI stocks of OECD countries as a percentage of GDP, 2002

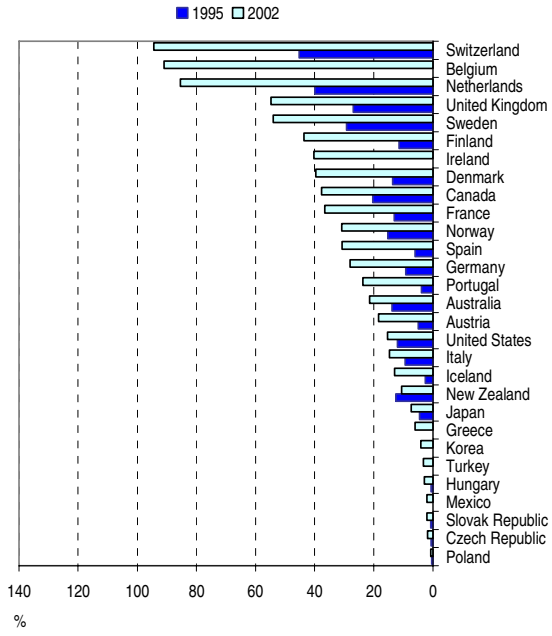
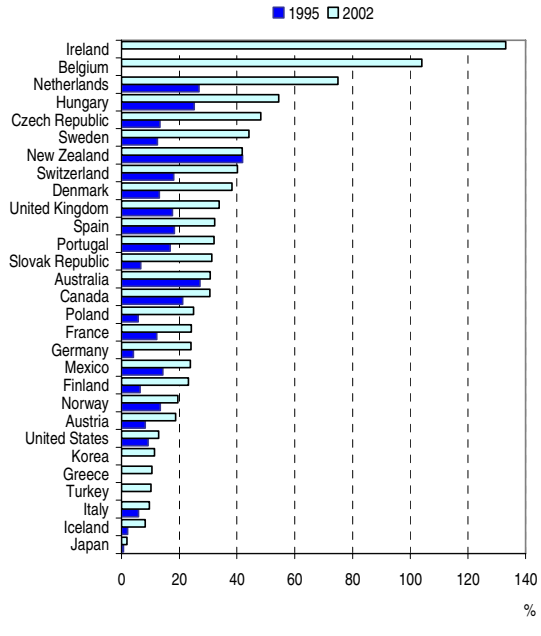


Figure 2.5. Inward FDI stocks of OECD countries as a percentage of GDP, 2002



Note: 1995 data not available for Belgium, Greece, Ireland and Korea.

Source: OECD, International Direct Investment Database and Annual National Accounts Database.

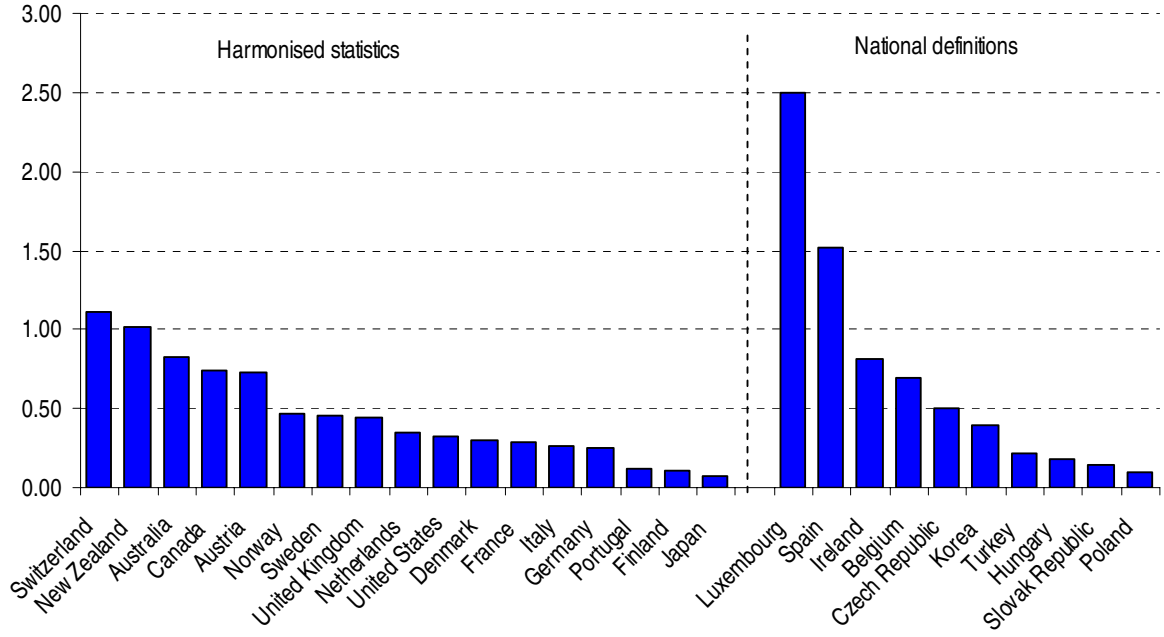
Some OECD countries have relatively high ratios for both inward and outward stocks of FDI. In the Benelux countries, for example, some of the FDI is largely due to the activities of special purpose entities and holding firms established by multinationals to

finance and manage their cross-border investment. The direct investment positions of the Nordic countries – Finland, Norway, Denmark and Sweden – measured as a share of their respective GDP, are quite high compared to those of other OECD countries. These countries also act as hosts to direct investment even though the relative share of investment in domestic firms by non-resident investors is lower.

The current process of globalisation benefits less from labour migration

Apart from trade (the transfer across borders of goods and services) and FDI (the transfer across borders of capital), the movement of labour across borders is another channel contributing to economic globalisation. Labour flows have, however, been less important over the past decade, although they have augmented. Recent OECD data indicate that inflows of foreign nationals have increased especially in Australia, Canada, Italy and the United Kingdom, with approximately 3.75 million foreigners entering OECD countries in 2004 (Figure 2.6). The United States displays high absolute levels of legal migration, but on a per capita basis, the amount of long-term legal immigration is modest compared to other countries. Switzerland, New Zealand, Australia and Canada are the OECD countries with the highest relative level of long-term legal migration. At the other end of the spectrum, Finland and Japan have the lowest relative levels.

Figure 2.6. Inflows of foreign nationals and inflows of foreign nationals as a percentage of the total population, 2004



Note: Some countries do not report harmonised statistics but statistics based on national definitions which may differ between countries.

Source: OECD (2006a), *Recent Trends in International Migration*.

Table 2.1. Foreign-born persons with tertiary attainment in OECD countries, circa 2000

As a percentage of all residents

	Immigrants from other OECD countries	Emigrants to other OECD countries	Net migration within the OECD zone	Immigrants from the rest of the world	Total "net" foreign-born persons with tertiary attainment
	A	B	A-B	C	A-B+C
	As a percentage of all residents with tertiary attainment				
Australia	16.8	2.4	14.4	12.1	26.5
Austria	9.1	13.8	-4.7	5.2	0.5
Belgium	5.9	6.4	-0.5	4.2	3.7
Canada	10.3	5.4	4.9	15.5	20.4
Czech Republic	4.1	8.7	-4.5	2.2	-2.3
Denmark	4.4	7.3	-2.9	3.2	0.3
Finland	0.9	6.8	-5.9	1.3	-4.6
France	4.2	4.4	-0.2	8.2	8.0
Germany	2.7	8.9	-6.2	2.3	-3.9
Greece	4.8	9.4	-4.6	7.3	2.7
Hungary	1.4	9.7	-8.3	4.5	-3.8
Ireland	14.0	26.1	-12.1	4.0	-8.1
Italy	2.8	7.3	-4.5	3.3	-1.2
Japan	0.2	1.1	-0.9	0.5	-0.4
Korea	0.2	1.4	-1.2	0.2	-1.0
Luxembourg	43.1	15.4	27.7	5.8	33.5
Mexico	0.8	6.9	-6.1	0.5	-5.6
Netherlands	3.3	8.9	-5.6	4.4	-1.2
New Zealand	14.6	24.4	-9.8	10.0	0.2
Norway	5.2	4.9	0.3	3.0	3.2
Poland	0.4	10.2	-9.8	2.3	-7.6
Portugal	4.1	11.2	-7.0	11.2	4.1
Slovak Republic	3.3	16.0	-12.8	0.9	-11.9
Spain	2.7	2.3	0.5	3.8	4.2
Sweden	6.9	5.4	1.5	7.3	8.8
Switzerland	20.0	10.8	9.1	7.3	16.4
Turkey	3.4	4.9	-1.5	2.7	1.2
United Kingdom	6.5	14.9	-8.4	9.4	1.0
United States	4.2	0.7	3.5	9.2	12.7
Average (simple)	6.9	8.8	-1.9	5.2	3.3
OECD zone	4.0	4.0	-	6.0	6.0

Note: Data are largely from the 2000 round of population censuses in OECD countries. Tertiary attainment is classified according to the International Standard Classification of Education (ISCED). The education in question may not have been received in the country of origin. "Net" appears in quotes in the fifth column heading because emigration to non-OECD countries is not included. This would have required collecting census data from these countries. For more details, see Counting Immigrants and Expatriates in OECD Countries: A New Perspective. See Trends in International Migration, 2004 (pp.115-149) (www.oecd.org.els/migration).

Source: OECD (2006a), *Recent Trends in International Migration*.

Immigrant workers represent a significant and increasing component of the total labour force in host OECD countries, with numbers of foreign-born persons increasing by over 10% over the past five years in almost all OECD countries. In view of current demographic trends and because the age structure of immigrants (particularly recent arrivals) tends generally to be younger than that of the native population, their share in the labour force can be expected to continue to rise. In 2004, foreign-born workers accounted for less than 1.5% of the labour force in Korea, Japan and the central European OECD countries, but for close to 25% in Switzerland and Australia. In Canada, the United States and New Zealand, at least 15% of the working population was born abroad, slightly above the 12% observed in European OECD countries such as Austria, Sweden, Germany and Belgium.

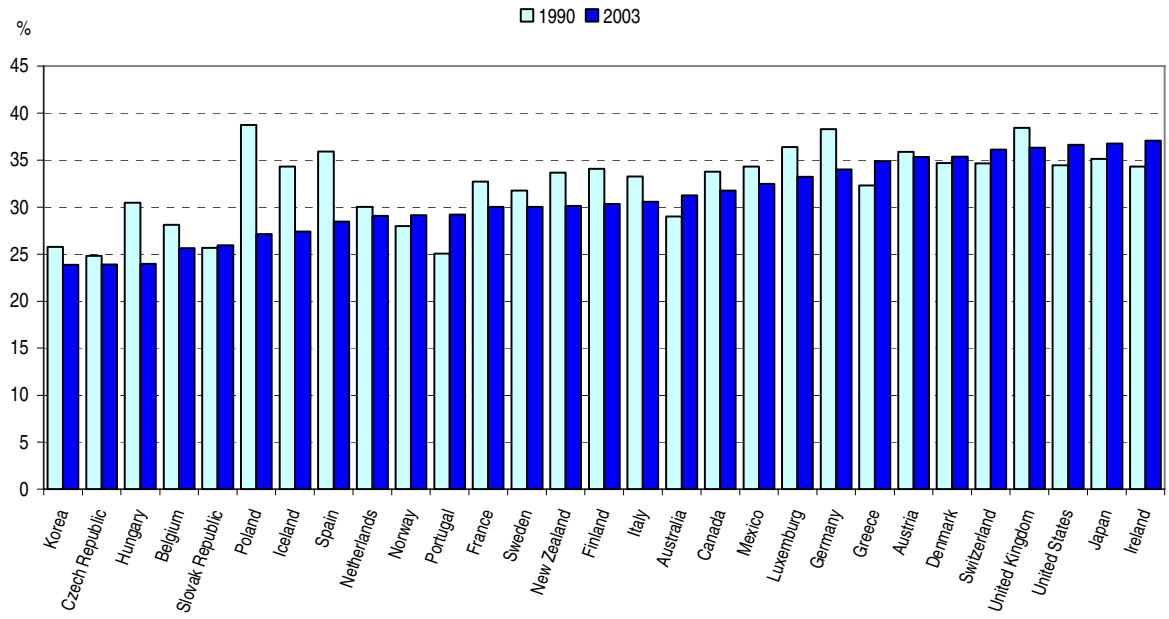
The mobility of highly skilled persons and the brain drain out of countries has recently attracted a good deal of attention in policy discussions. In most countries the percentage of immigrants with tertiary education exceeds the corresponding percentage in the native-born population. However, not every country benefits from movements of international skills. Some countries receive more tertiary graduates than they lose to other (OECD and non-OECD) countries, while others are in the opposite situation. Table 2.1 indicates that movements of the highly educated from the rest of the world exceed those from OECD countries. Within the OECD area in 2000, most countries had lost more graduates than they had gained or showed only a small net balance, although Australia, Canada and the United States, Luxemburg and Switzerland had gained significantly from migration of the highly educated. Factoring in immigration from the rest of the world substantially reduces the negative balances, however, or makes them strongly positive in many countries. The worldwide flow of skilled migrants seems to be clearly directed towards the more developed countries and away from the developing world.

The growth of global value chains and global linkages

Despite common perceptions that global value chains and outsourcing/offshoring have become much more important, it is difficult to quantify their growth exactly as relevant information is often not available. Instead, trade and FDI statistics are generally used to describe these phenomena, but overall trade and FDI figures are imperfect measures of the globalisation of value chains. Basically, while global value chains imply the existence of trade flows and FDI, not all trade and FDI is related to the development of global value chains and international production networks. For example, not all FDI activities are associated with firms' decisions to fragment the production chain, and not all offshoring is done within multinational firms (MNEs). Likewise, not all exports and imports (especially of finished products) are associated with global value chains and offshoring.

Several empirical trends in trade and FDI show indirectly the increasing importance of the globalisation of value chains. First, in most OECD countries there has been a decline in the "production depth" in favour of greater use of intermediates as the share of manufacturing value added in production decreases (Figure 2.7). In Australia, Ireland, Japan, Norway, Portugal, Switzerland and the United States, however, value added per unit of output increased, although only slightly. The falling ratio of value added to production is the direct result of greater use of intermediate inputs in the production process and can be due to outsourcing, whether domestically (for example from manufacturing to services sectors, see below) or internationally.

Figure 2.7. Production depth (value added as a percentage of production), 1990 and 2003



Note: Australia: 1990 and 1999; Canada Switzerland, Spain, Ireland, Iceland, Sweden: 1990 and 2002; Czech Republic: 1993 and 2003; Germany: 1991and 2003; Greece: 1995 and 2003; Hungary: 1992 and 2003; Korea: 1994 and 2003; New Zealand: 1993 and 2001; Poland: 1992 and 2002; Slovak Republic: 1997 and 2001.

Source: OECD STAN Database.

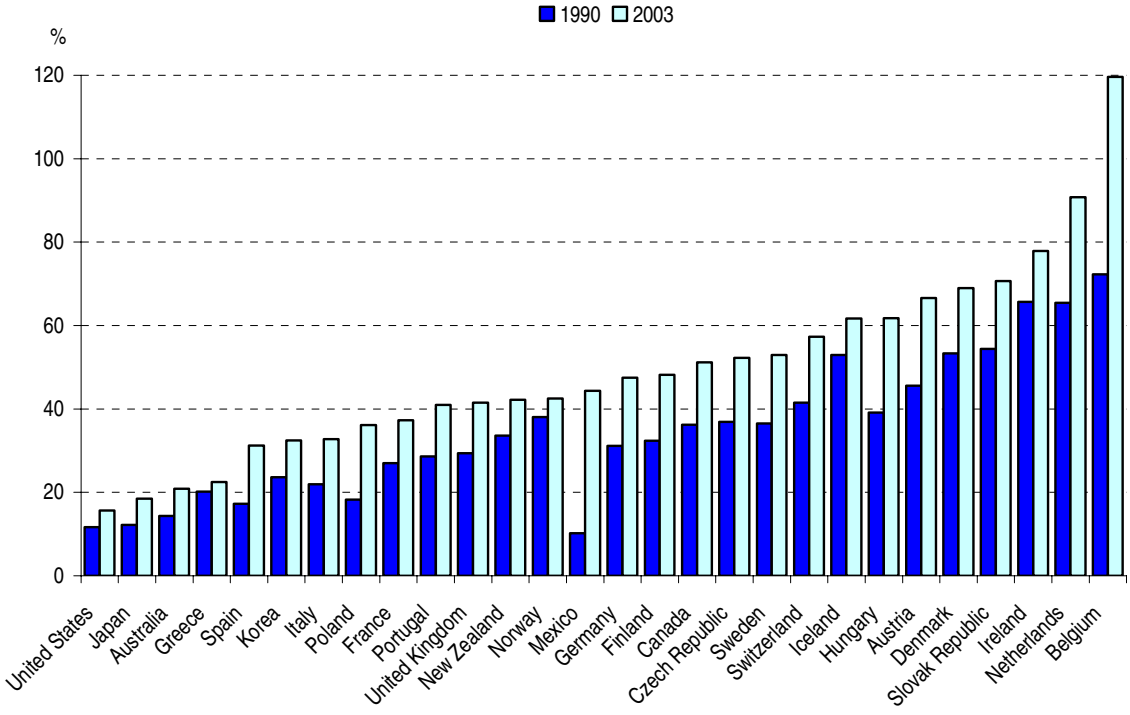
Second, manufacturing exports and imports of individual countries move together more and more and are growing much faster than production, a sign that international interaction through trade between countries is rising very rapidly (Figure 2.8). Growing vertical integration and international production sharing result in the manufacturing in one country of (parts of) products, which are then exported to (imported by) other countries as inputs in the next steps of production. Very high growth in exports and imports was recently recorded in Mexico, Hungary and Poland as well as in some other countries that have become more integrated in the global economy. The high export/production ratios of Belgium and Netherlands are to some extent biased by re-exports; recent research indicates that 40% of total exports in the Netherlands should be considered as re-exports, *i.e.* the re-export of imported goods that are not significantly processed (CBS, 2006).

Third, much manufacturing trade occurs within the same industry or even within a firm, owing to the integration of manufacturing production throughout the value chain. These simultaneous exports and imports within the same industry are generally labelled intra-industry trade and typically occur among geographically close rich countries with similar levels of development; they are often regarded as a corollary of smooth economic integration. This (horizontal) intra-industry trade concerns trade in similar, but often highly differentiated, finished products.

Recently, however, intra-industry trade has become increasingly vertical, indicating that it increasingly involves trade in goods of different quality and trade in intermediate goods at various stages of production. Vertical specialisation of production across countries is mainly driven by comparative advantage; examples include the use of cheap

unskilled labour for assembly purposes or the availability of specialised personnel for research and development (R&D).

Figure 2.8. Share of exports in manufacturing production, 1990 and 2003



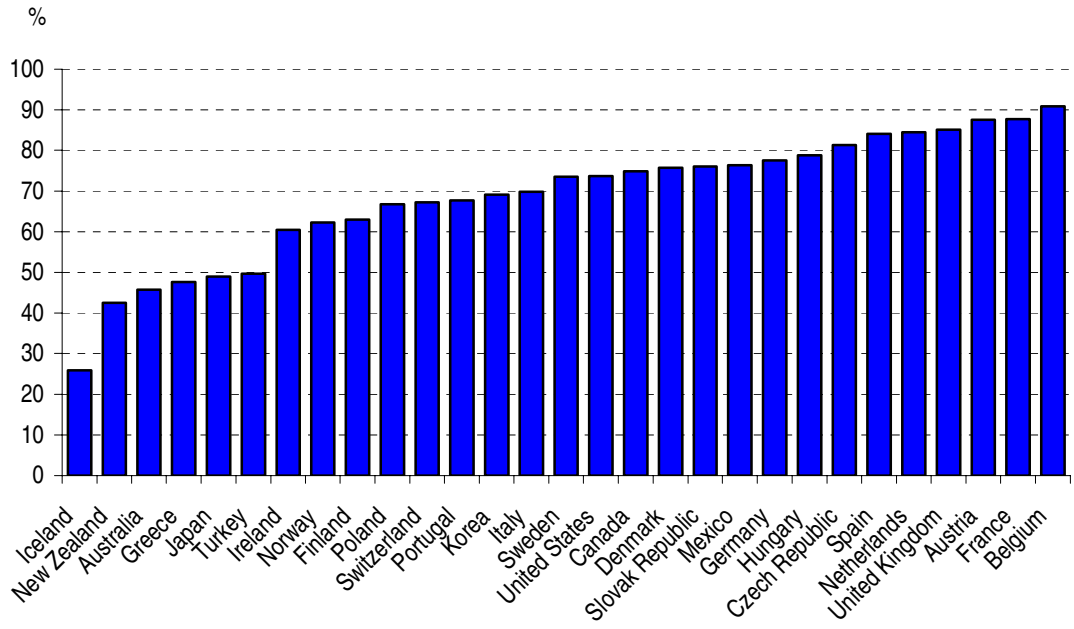
Note: Australia: 1990 and 1999; Canada Switzerland, Spain, Ireland, Iceland, Sweden: 1990 and 2002; Czech Republic: 1993 and 2003; Germany: 1991 and 2003; Greece: 1995 and 2003; Hungary: 1992 and 2003; Korea: 1994 and 2003; New Zealand: 1993 and 2001; Poland: 1992 and 2002; Slovak Republic: 1997 and 2001.

Source: OECD STAN Database.

The Czech Republic, Hungary and Portugal are countries with high intra-industry trade in relation to aggregate manufacturing trade (over 70%) which has increased in recent years (Figure 2.9). In France, Canada, Austria and Switzerland, such trade remains fairly important but has not increased significantly. Increases in intra-industry trade are often accompanied by large FDI inflows (see below), as MNEs locate parts of their production process in different countries.

Fourth, the globalisation of value chains leads to greater complexity in global trade flows, owing to the growing integration of countries' production systems and the growing importance of inter-firm and inter-industry trade. Using trade data and input-output data, the value chain and production system of the aerospace industry in 1995 is presented in Figure 2.10. These production networks are particularly complex and their complexity is growing for high-technology industries, since the goods produced by these industries require a broad range of inputs.

Figure 2.9. Manufacturing intra-industry trade as a percentage of total manufacturing trade, average 1996-2003



Note: The extent of intra-industry trade is commonly measured by the Grubel-Lloyd index. This index takes the minimum value of zero when no products in the same class are both imported and exported, and the maximum value of 100 when all trade is intra-industry. For the industry k of a country i with the rest of the world, this index is:

$$IIT^k = \left[1 - \frac{\sum_i \left|\left(X_i^k - M_i^k\right)\right|}{\sum_i \left(X_i^k + M_i^k\right)}\right] \bullet 100$$

with X_i^k being the exports from country i in industry k, and M_i^k the imports in country i in industry k.

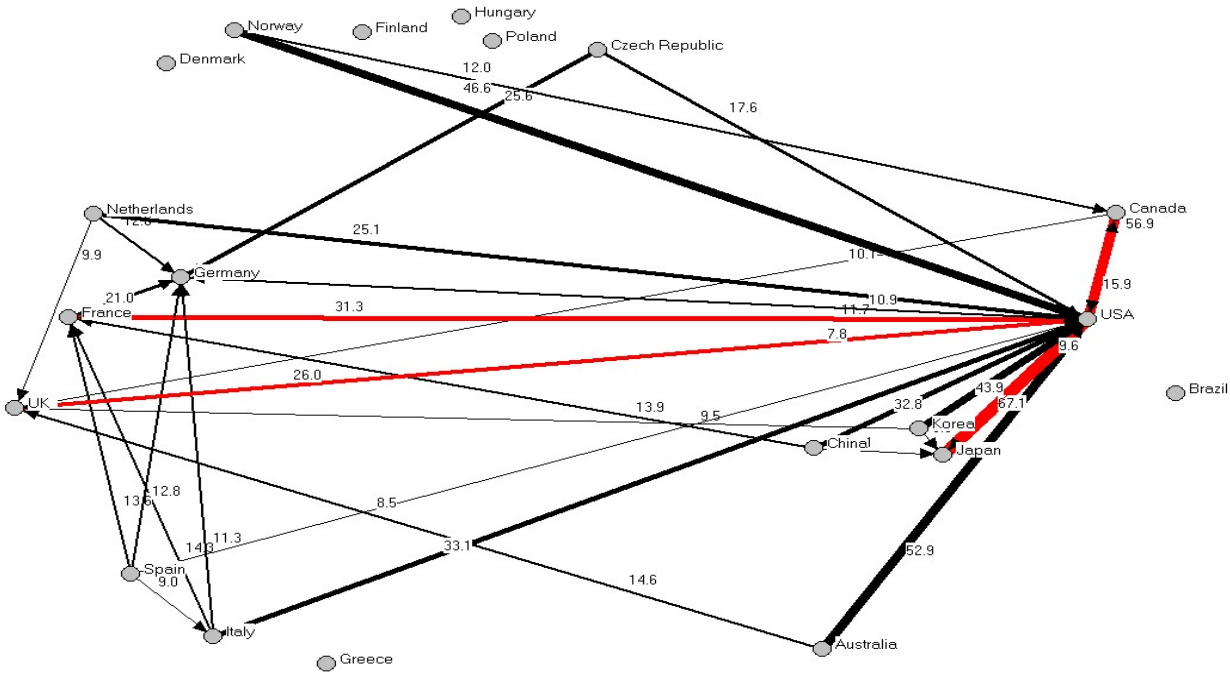
Source: OECD STAN Database.

Finally, international sourcing within economies has grown rapidly, as evidenced by the increasing share in production of imported intermediate inputs. Global value chains have resulted in an ever-growing volume of exchanges of intermediate inputs between different countries. Based on the BEN (Broad Economic Indicators) classification of the United Nations, 54% of world manufactures imports in 2003 can be classified as imports of intermediate goods (including primary goods, parts and components and semi-finished goods). China and countries in south-east Asia have reported especially high growth in imports of intermediates at the expense of the Triad (the United States, Europe and Japan).

Input/output (I/O) tables are another source of information on the value of intermediate goods and services imported from outside the country. A key advantage of I/O tables is that they classify goods according to their use (as input into another sector's production or as final demand) rather than according to their characteristics. Another key advantage of I/O tables is that they also include information on (domestic and international) inputs by services sectors, which makes it possible to monitor the rapidly growing sourcing of services activities.

Figure 2.10. A simplified production network for the aerospace industry, 1995

Flows in USD millions

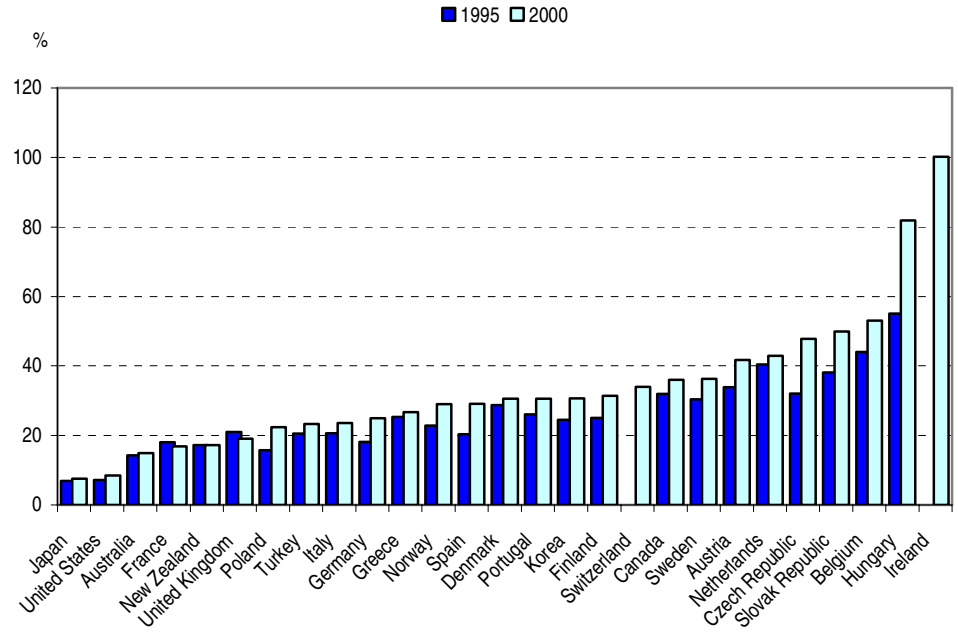


Source: Wixted (2005).

Figure 2.11 shows average ratios for the total economy of imported to domestic sourcing of inputs for the mid-1990s and 2000, based on information in I/O tables. The ratio of imported to domestic inputs increased in almost all countries from 1995 to 2000, thus showing the growing importance of intermediate inputs in international trade and of international outsourcing (through arm's-length contracts or within MNEs). Consistent with their typically greater international orientation owing to their limited size, smaller countries are found to import more intermediates from abroad. In Ireland, domestic and international sourcing is reported to be equally important, as in other smaller countries that have received a large inflow of FDI. This suggests that sourcing within multinational networks has become especially important in recent years (see also below).

Based on earlier work by Feenstra and Hanson (1996, 1999), input-output tables are also used to compute the level of offshoring (*i.e.* outsourcing abroad) as the share of non-energy imported intermediate inputs in total non-energy intermediate inputs. Figure 2.12 clearly indicates that offshoring has grown in almost all OECD countries, with significant increases in the sourcing of intermediates abroad in some countries. Smaller countries, notably Ireland, Belgium and Hungary, typically report higher offshoring indicators. Japan and the United States offshore relatively little compared with other countries.

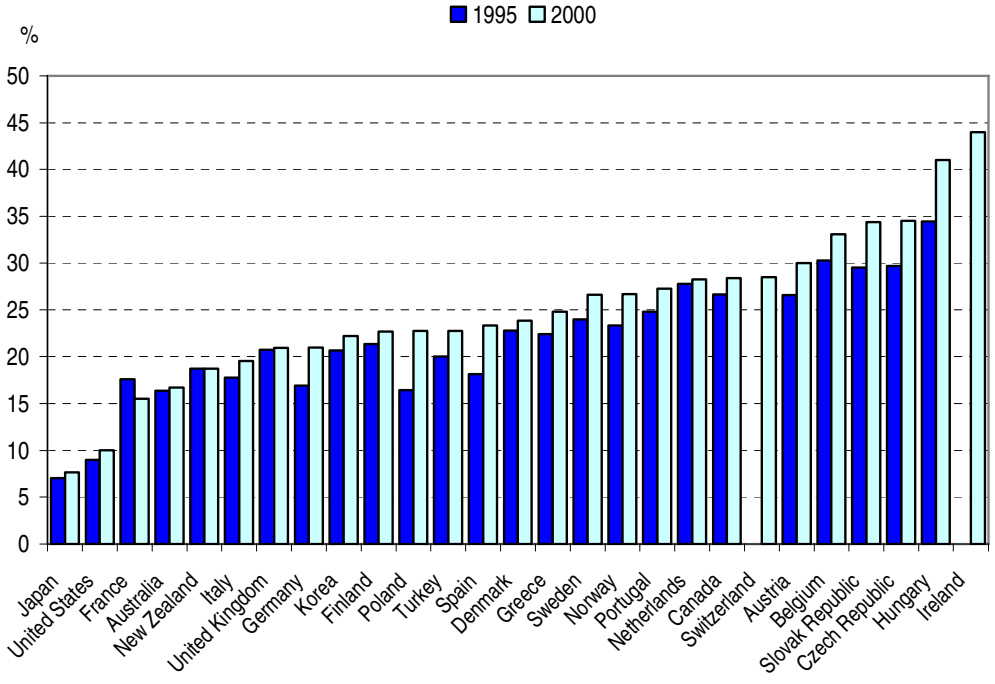
Figure 2.11. Ratio of imported intermediates to domestic intermediates, 1995 and 2000



Note: Australia: 1995 and 1999; Canada: 1997 and 2000; Greece: 1995 and 1999; Hungary: 1998 and 2000; Norway: 1995 and 2001; Portugal: 1995 and 1999.

Source: OECD, Input-Output Tables Database.

Figure 2.12. Offshoring/outsourcing abroad,[1] total economy, 1995 and 2000[2]



1. Calculated as the share of non-energy imported intermediates in total non-energy intermediate inputs.

2. Australia: 1995 and 1999; Canada: 1997 and 2000; Greece: 1995 and 1999; Hungary: 1998 and 2000; Norway: 1995 and 2001; Portugal: 1995 and 1999.

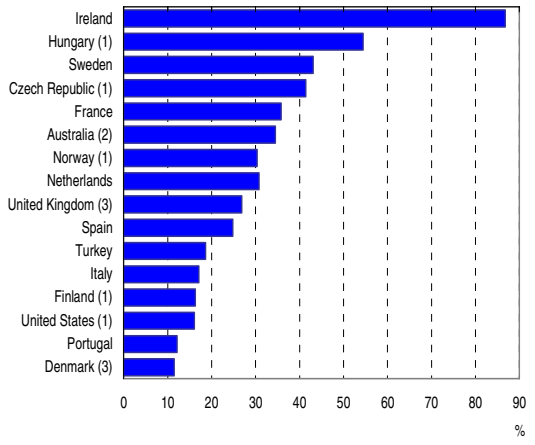
Source: OECD, Input-Output Tables Database.

The key role of multinational enterprises

The growth of offshoring is attributable to the sourcing of inputs abroad through arm's-length relationships (international outsourcing) and increasingly within MNEs (international insourcing). MNEs are central to the globalisation of value chains because they can change the location of both finished and intermediate goods and services within their multinational networks and shift production across borders between their affiliates. In today's global economy MNEs are able to use a range of knowledge-based assets, such as management and intellectual property, to take advantage of profitable opportunities in foreign markets by setting up subsidiaries and affiliates abroad.

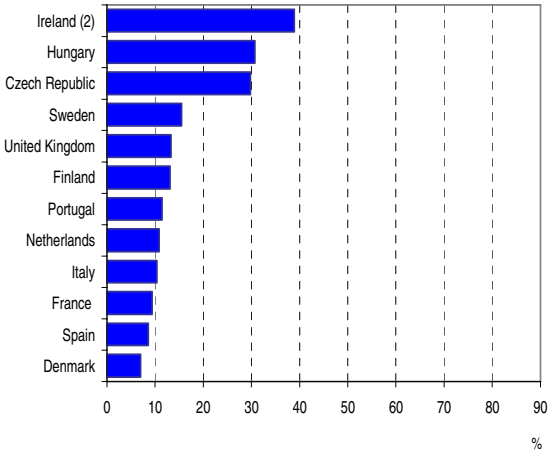
The literature often makes a distinction between "vertical" and "horizontal" MNEs. The former fragment the production process across different countries, with the location of the different stages depending on where the factors of production they use intensively are relatively cheap. In general, their activities take place in a few locations, or even a single one, depending on endowments and factor prices. The latter are multi-plant firms that produce similar outputs in both home and host countries, thereby economising on the costs of exporting. They are more likely to occur when the host countries are similar in size (to avoid the costs of costly capacity in small markets), have similar factor endowments, and there are positive costs to international trade (Brainard, 1997).

Figure 2.13. Foreign controlled affiliates' share in manufacturing value added, 2001



1. 2002.
2. 2000.
3. 1999.

Figure 2.14. Foreign controlled affiliates' share in services value added, 2001



1. Finland, France, Italy, the Netherlands and Portugal: 2001; Sweden: 2000; Denmark: 1999; the United Kingdom: 1997.
2. Firms with at least 20 employees.

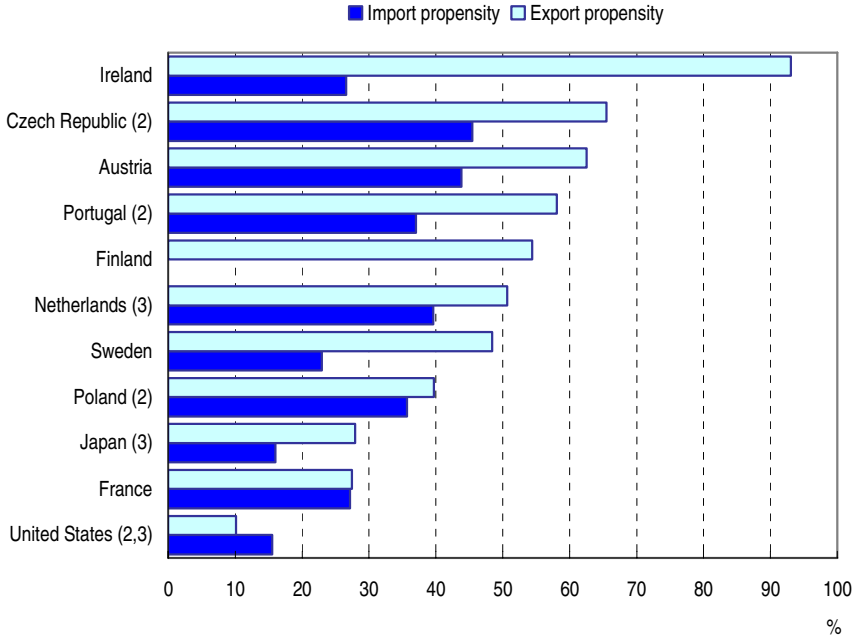
Source: OECD (2005a), *OECD Economic Globalisation Indicators*.

It is clear that the phenomenon of offshoring and the globalisation of value chains is more closely linked to vertical MNEs. However, the theoretical distinction between horizontal and vertical multinationals is rarely clear-cut in reality, as most firms have complex integration strategies, involving a mixture of both kinds of outward investment (Yeaple, 2003). Most empirical evidence on the activities of multinational firms thus

covers both types of MNEs. Reflecting the strong increase in FDI, foreign affiliates have become increasingly important in host countries and account for a growing share of turnover, value added, employment and R&D. The importance of foreign affiliates is especially important in Ireland, Hungary and the Czech Republic. In contrast to the growing importance of the services sector in current FDI flows, the activities of foreign affiliates still appear to be much more important in manufacturing industries (Figures 2.13 and 2.14).

Affiliates under foreign control are engaged not only in serving the local market in the host country but have become essential links in global value chains as they serve other (neighbouring) markets and produce inputs for other affiliates in the multinational network. Data for US MNEs show that 65% of the total output of US firms' foreign affiliates goes to the local market, while 11% goes to the United States and another 24% goes to third countries. In consequence, export and import intensities of foreign affiliates are in many cases higher than those of the average domestic firm, especially in manufacturing. In Ireland, for example, over 90% of the manufacturing output of foreign affiliates is exported; in Austria and Finland the proportion is over half (Figure 2.15).

Figure 2.15. Export and import propensity[1] of affiliates under foreign control in the manufacturing sector, 2001



1. Exports and imports as a percentage of turnover (or production for Ireland).

2. 2002.

3. Trade in goods only.

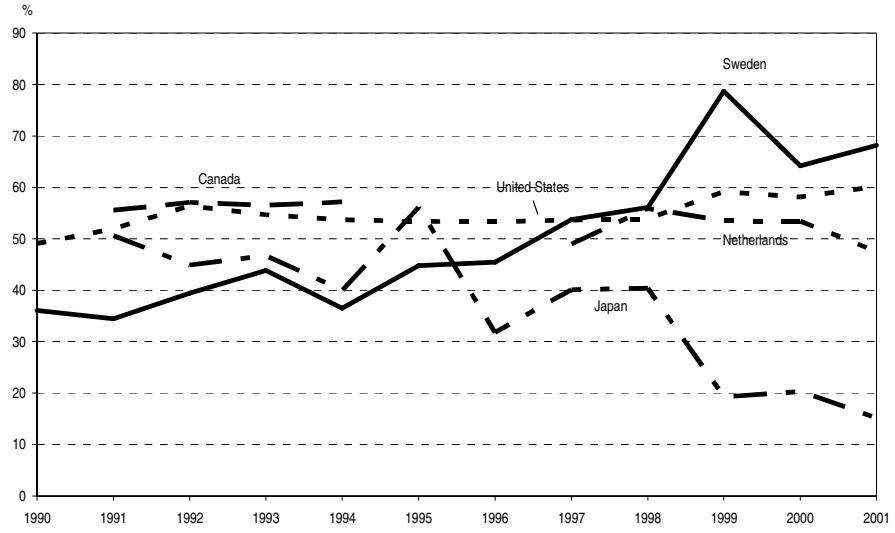
Source: OECD (2005a), *OECD Economic Globalisation Indicators*.

As part of foreign affiliates' production is used as intermediate inputs by parent firms or other affiliates within the multinational network, the importance of intra-firm trade is increasing. The share of intra-firm exports in total exports of manufacturing affiliates under foreign control ranges between 15 and 60% in the OECD countries for which data are available (Figure 2.16). This intra-firm trade involves the export and import of nearly

finished goods destined for affiliate firms that mainly undertake marketing and distribution with little additional processing. However, another and growing part of intra-firm trade concerns exports and imports by foreign affiliates that manufacture (part of) products destined for other markets. This is directly related to the globalisation of value chains and has been increasing in host countries such as China, Korea, Mexico, Chinese Taipei and some eastern European countries.

These intra-firm trade flows also affect the interpretation of trade deficits (OECD, 2005a). Although the exact figures are debated, Farrel *et al.* (2005) calculate that about one-third of the current account trade imbalance of the United States is due to US-owned affiliates abroad. Morgan Stanley estimates that 60% of the US trade deficit with China is due to imports from subsidiaries of US firms. Bardhan and Jaffee (2005) report that imports from US affiliates abroad accounted for more than two-thirds of all US imports of high-technology intermediate inputs in 2002.

Figure 2.16. Share of intra-firm exports in total exports of affiliates under foreign control, 1990-2001



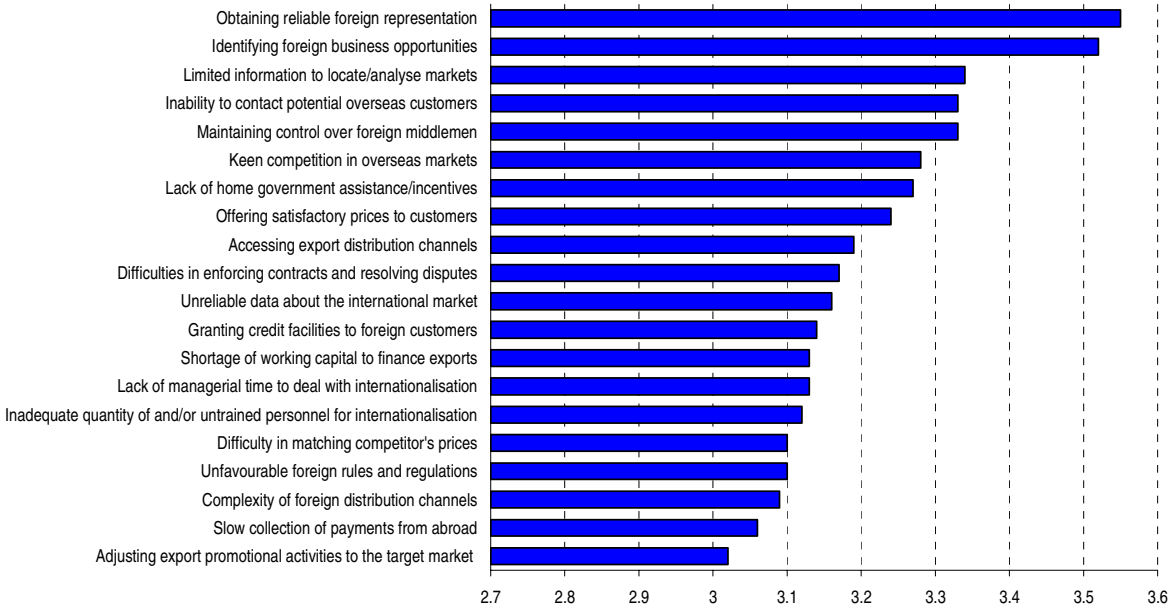
Source: OECD (2005a), *OECD Economic Globalisation Indicators*.

Small and medium-sized enterprises and global value chains

The development of global value chains offers SMEs new opportunities by enabling them to expand their business opportunities across borders, although reaching international markets is generally problematic for SMEs. In a recent OECD APEC (Asia-Pacific Economic Co-operation) survey on their barriers to accessing international markets (Figure 2.17), SMEs consider their internal capabilities and resources as inadequate. Furthermore they seem to lack confidence in approaching international markets, especially in terms of identifying foreign business opportunities, maintaining control over foreign middlemen and accessing export distribution channels.

The use of ICT and related services and improved transport facilities has eased small firms' access to markets beyond their national boundaries. Previous OECD work, which analysed the extent of diffusion and uptake of ICT technologies among SMEs, highlighted their benefits in terms of extending their network of business partners and reaching new customers more easily and at lower costs (OECD, 2000, 2005b).

Figure 2.17. Barriers to Internationalisation as perceived by SMEs in OECD and APEC economies, 2006



Note: SME survey carried out between January and July 2006. Responses received from a total of 978 SMEs in OECD and APEC economies, with a high degree of concentration in Canada, Greece, Switzerland, Turkey, Japan, Spain and New Zealand. Barriers are ranked using the Likert-Scale ranking method, from 5 (very significant) to 1 (not significant).

Source: OECD WPSME, "Removing Barriers to SME Access to International Markets", forthcoming.

In addition, the fragmentation of production together with the development of ICT is creating new entrepreneurial possibilities for SMEs. New niches for the supply of novel products and services continuously emerge and allow SMEs to exploit their flexibility and their ability to move quickly (Box 2.1). In manufacturing sectors, such as automotive and precision and scientific instruments, small firms specialised in multipurpose technologies have reinvented their role and secured their position in the market by becoming specialised suppliers in global value chains (OECD, 2006b).

In another relevant trend, globalisation has made outsourcing, and in particular offshoring, a viable option for small firms. While difficult to measure, recent SME surveys point to increased use of outsourcing by SMEs (2003 Observatory on European SMEs and Japan's 2004 White Paper on SMEs). Field work indicates that more SMEs increasingly externalise activities in the same way as large firms and may thus gain from rationalisation of production and optimisation of resources.

In seizing these increased opportunities, SMEs face serious challenges in terms of managerial and financial resources and the ability to upgrade and protect in-house technology. SMEs point to a lack of the scale necessary to support the costs of adequate R&D, training of personnel, and fulfilment of the strict requirements of product standards and quality (OECD, 2006b). Insufficient working capital is another barrier, in particular with respect to delayed payments from international partners. Moreover, if upgrading a small firm's position in the value chain is possible, it is typically linked to the take-up of a larger and more complex set of tasks. Small suppliers may also have also to contribute to product development, to organise and monitor a network of sub-suppliers, to

implement internal systems of quality control and ensure compliance with a broader set of standards, and to ensure delivery and quality at competitive prices. Existing surveys indicate that lack of awareness of the complexity of these issues impinges on the activities of SMEs in global value chains.

Box 2.1. SMEs gain stability when participating in global value chains

Although it is difficult to establish common trends in the diversified universe of SMEs, in-depth case studies conducted in 2006 in 11 OECD countries and five non-OECD economies[1] provide some insights into the performance of SMEs in global value chains. The case studies covered five sectors (automotive, precision and scientific instruments, software, tourism, and film production and distribution) which were selected to illustrate emerging patterns in manufacturing and service sectors in which the value chain shows a significant presence of independent or affiliate SMEs acting as contractors or suppliers.

One result that stands out from the findings across sectors is that participation in global value chains brings stability: small firms that are able to remain in the value chain despite keen global competition or that succeed in "jumping on board" normally gain in stability and even expand their business. This is often accompanied by upgrading of technological and human capital, as a result of the greater exposure and facilitated access to information, business practices and technologies. Indeed, co-operation within the network appears a key factor. Case studies in the automotive and tourism sectors clearly indicate that location in a cluster and co-ordination of work with upstream and downstream partners increase small firms' chances of success as part of the value chain. This seems related to substantial benefits in terms of status, information flows and learning possibilities. Successful SMEs in global value chains acquire more autonomy from their larger counterparts and increase opportunities to grow further by leveraging their access to an extended network of partners and to superior technology and their improvement of staff skills.

1. The case studies were carried out in the following OECD countries: Austria, Australia, Germany, Japan, Korea, Mexico, Poland, Spain, Switzerland, Turkey and the United States. The case studies on non-OECD economies involved Colombia, Egypt, India, Jordan, Nigeria, South Africa and Chinese Taipei.

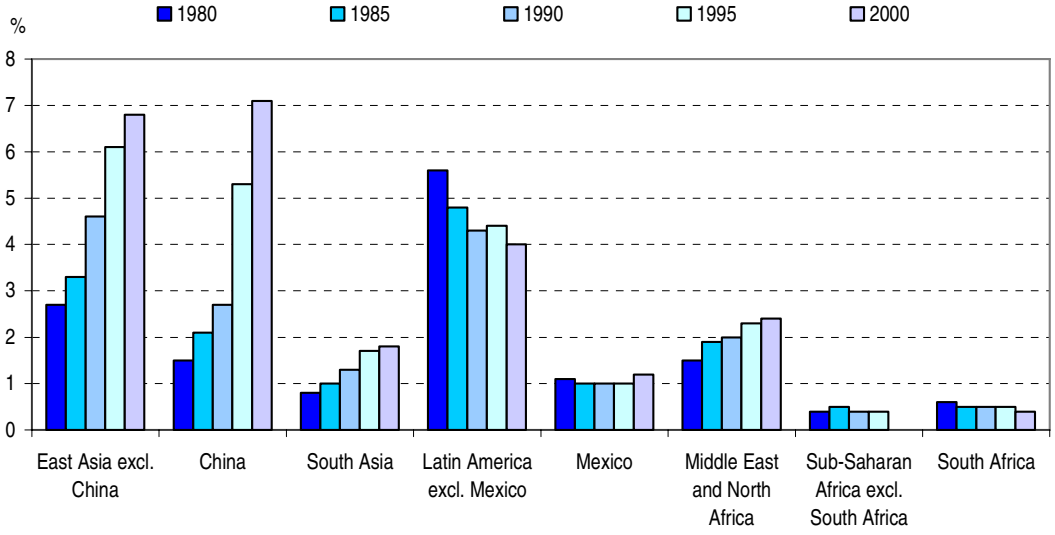
The emergence of new centres of economic growth

A growing share of global production is accounted for by emerging countries such as China

The development of global value chains has often been associated in recent years with the increasing integration of emerging countries in the global economy. Offshoring is typically narrowly interpreted as directed disproportionably towards these low-cost countries because of differences in relative production costs. Accordingly, globalisation is believed to be limited to increased economic relations between industrialised countries and low-cost developing countries.

The growing importance of emerging countries is reflected in the rapid growth of manufacturing production in certain non-OECD economies (Figure 2.18). Strong growth has occurred in East Asia and in China, but also in South Asia and the Middle East. At the same time, the share of Latin America has declined and that of Africa has remained at a very low level.

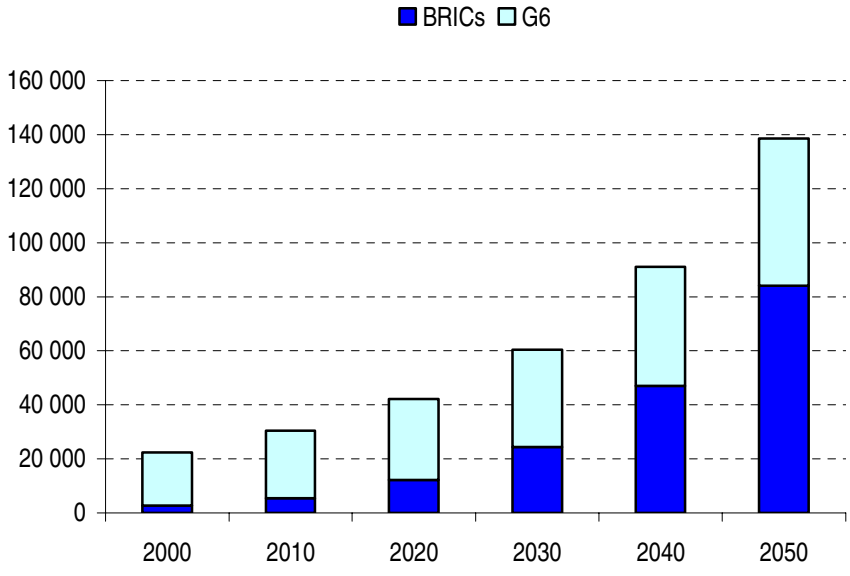
Figure 2.18. Share of major developing regions in global manufacturing value added



Source: UNIDO (2004) in Pilat *et al*. (2006), "The Changing Nature of Manufacturing in OECD Countries".

New centres of economic growth are increasingly expected to emerge in the near future. Growth projections point to emerging economies' greatly increased share in world GDP in the coming decades. Goldman Sachs for example indicated that in less than 40 years the BRICs (Brazil, Russia India and China), taken together, could be larger than the G6 in GDP (the United States, Japan, Germany, the United Kingdom, France and Italy), yet in 2000 they accounted for less than 15% of the GDP of the G6 (Figure 2.19).

Figure 2.19. Projected GDP of BRICs and G6 (USD billions of 2003)

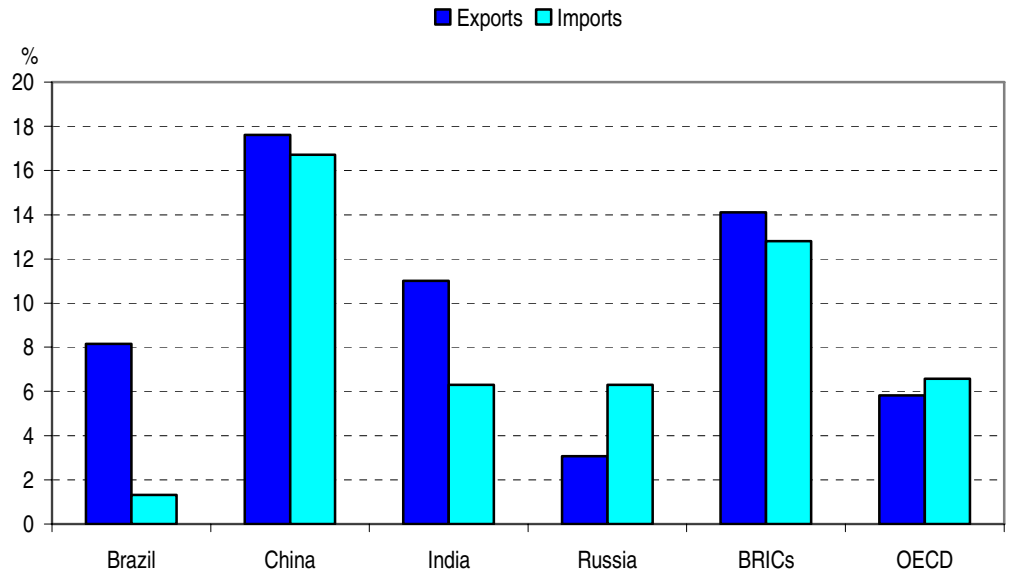


Source: Goldman Sachs (2003).

Between 1996 and 2004, the BRICs, taken together, reported annual growth of 14.1% in manufactured exports, compared to 5.8% for the OECD as a whole, although from a very low base in 1996 (Figure 2.20). Exports have grown more strongly than imports in the BRICs, resulting in an improvement of their trade surplus, while in the OECD area, the reverse has occurred, with an increasing trade deficit in manufactures.

Within the BRICs, China has recorded much higher growth rates in manufactured exports; the trade performance of the other countries in manufactured goods has been less impressive. India is especially active in services, specifically exports of ICT services (see below). As a result, China has a rapidly increasing market share in world goods trade, more than doubling from 4.2% in 2001 to 8.8% in 2004. In 2005, China surpassed Japan to become the world's third-largest trading economy after the United States and Germany. In terms of exports, the OECD (2005a) predicts that China will overtake Germany in 2008 and could overtake the United States by 2010, making it the world's largest exporter. The overall export market shares of the other BRIC economies remain much smaller (around 1% for India and Brazil and 0.7% for Russia), below the level that of most OECD countries.

Figure 2.20. Annual growth in manufacturing exports and imports, BRICs and OECD countries, 1996-2004



Source: OECD, Bilateral Trade Database.

China's strong growth in goods trade has resulted in trade surpluses with the United States and the EU, but trade deficits with Japan and ASEAN countries continue, reflecting China's assembly activities in production sharing within the Asia region (see below). China has become one of the major trading partners for a majority of OECD countries and its market share in OECD export markets has risen dramatically, especially in Japan, the United States, Korea, Australia, the EU15 and New Zealand (Table 2.2).

Table 2.2. China's share in major markets (% of total imports)

Partner	1990	2000	2001	2002	2003	2004
Japan	5.2	14.5	16.6	18.3	19.7	20.8
United States	3.1	8.6	9.3	11.1	12.5	13.8
Korea	2.1	8.1	9.5	11.6	12.4	13.4
Australia	2.7	7.9	9.0	10.3	11.3	13.0
EU15	2.5	6.2	6.8	7.7	9.1	10.7
New Zealand	1.2	6.3	7.0	8.0	9.0	10.2
Canada	1.0	3.2	3.7	4.6	5.5	6.8
Russia[1]	1.6	2.1	3.9	5.7	5.7	6.3
Mexico	0.8	1.7	2.4	3.7	5.5	na
Turkey	1.1	2.4	2.3	2.7	3.9	4.8

1. 1990 refers to 1996.

Source: UN Commodity Trade Statistics Database (COMTRADE); EU data derived from OECD International Trade Statistics in OECD (2006b), "China's Trade and Growth: Impact on Selected OECD Countries".

China's emergence is also apparent in recent FDI figures. Inflows estimated at USD 72 billion in 2005 make it the world's largest recipient of FDI flows among developing countries. Even when taking into account that some of these flows are commonly considered linked through flows of intra-China investment through Hong Kong (China), China is clearly among the world's most important recipients of direct investment. In terms of FDI inflows per capita, China ranks below all OECD countries save one, and even ranks relatively low among developing countries. Additionally, the quantitative leap has not been fully matched by a qualitative leap. Much of China's FDI seems until now to be rather short-term, in labour-intensive manufacturing, with foreign investment in high-technology and services sectors lagging behind. China is encouraging FDI in high-technology manufactures as a way to encourage domestically owned firms to move up the value chain.

Emerging countries' attraction of FDI and economic activity is expected to increase in the near future, according to surveys such as AT Kearney's Offshore Location attractiveness ranking. Within this list, India and China are the two most-often named locations in MNEs' future investments plans, but countries such as Malaysia, Singapore, Philippines and Brazil also feature high on this list (Table 2.3). The ranking also includes information on specific location factors for (re)location of activities and indicates that low cost is only one factor among others, such as the size of the market and the availability of people.

Global value chains: not a pure North-South phenomenon but a two-way process

Notwithstanding high growth in (some) emerging economies, OECD countries still dominated global manufacturing in 2002, accounting for just under 80% of value added in worldwide manufacturing. Figure 2.21 shows that out of the top ten global manufacturing countries, nine belong to the OECD, and that US and Japanese manufacturing are substantially larger than that of any other country. In 2002, China's manufacturing value added was about the same as that of Germany. In light of recent

trends, China has now clearly become the world's third-largest manufacturing country. Other non-OECD economies, including Brazil, India and the Russian Federation, only accounted for a small share of global manufacturing in 2002.

Table 2.3. Foreign direct investment flows in selected non-member economies, 2001-05

USD billions

	Inward FDI					Outward FDI				
	2001	2002	2003	2004	2005	2001	2002	2003	2004	2005
Argentina	2.2	2.2	1.7	4.3	4.7	0.2	-0.6	0.8	0.4	1.2
Brazil	22.5	16.6	10.1	18.1	15.1	-2.3	2.5	0.2	9.8	2.5
Chile	4.2	2.5	4.3	7.2	7.2	1.6	0.3	1.6	1.5	2.4
China	46.9	52.7	53.5	60.6	72.4	6.9	2.5	-0.2	1.8	…[1]
Estonia	0.5	0.3	0.9	1	2.9	0.2	0.1	0.2	0.3	0.6
Hong Kong, China	23.8	9.7	13.6	34	35.9	11.3	17.5	5.5	45.7	32.6
India	5.5	5.6	4.6	-5.3	6.6	1.4	1.7	1.3	2.3	1.4
Latvia	0.1	0.3	0.3	0.7	0.6	0	0	0	0.1	0.1
Lithuania	0.4	0.7	0.2	0.8	1	0	0	0	0.3	0.3
Israel	3.6	1.8	3.9	1.7	6.1	0.7	1	2.1	3.4	2.3
Romania	1.2	1.1	2.2	6.5	6.4	0	0	0	0.1	0
Russia	2.7	3.5	8	15.4	14.6	2.5	3.5	9.7	13.8	13.1
Singapore	15	5.7	9.3	24	33.4	17.1	3.7	3.7	14.3	9.2
Slovenia	0.5	1.6	0.3	0.8	0.5	0.1	0.2	0.5	0.6	0.6
South Africa	6.8	0.8	0.7	0.8	6.4	-3.2	-0.4	0.6	1.4	0.1

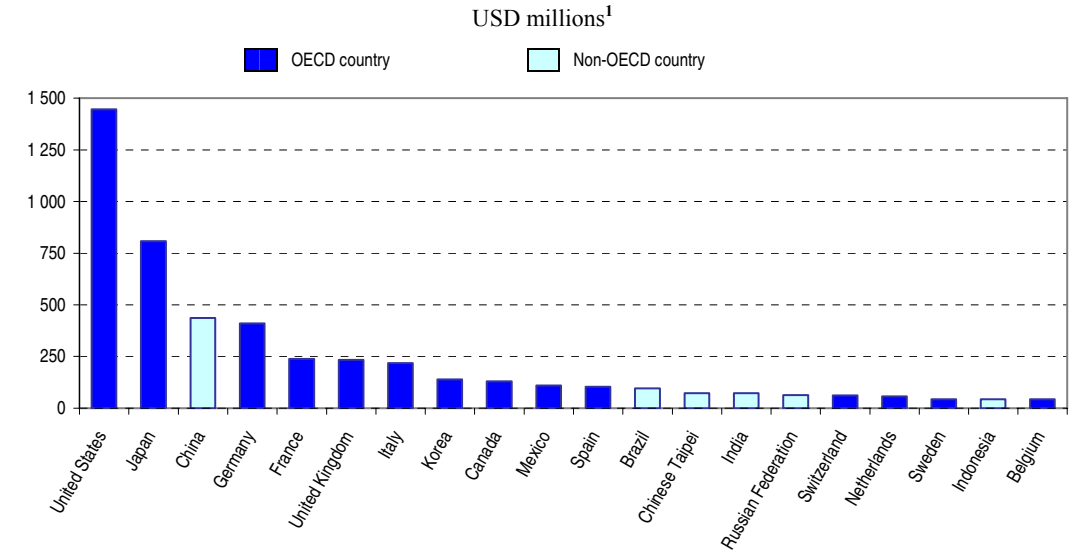
1. According to the Chinese Ministry of Commerce, 2005 outflows were USD 6.9 billion. However, the figures released by the Ministry have generally not been consistent with the data reported elsewhere in the table.

Source: OECD (2006c), "Trends and Recent Developments in Foreign Direct Investment".

Trade and FDI data for OECD countries show that the current globalisation process and the emergence of global value chains are not overwhelmingly directed to developing countries. Trade and FDI are still largely concentrated within the group of industrialised countries, and this suggests that the globalisation of value chains is not primarily a North-South issue. The largest part of overall OECD trade and FDI remains oriented towards OECD countries: in 2004 almost 78% of all OECD exports of manufactures went to other OECD countries, and 75% of manufacturing imports in OECD countries came from within the OECD area. The corresponding figures for 1990 were 80% and 83% respectively, which does indicate that imports from non-OECD countries are on the rise and have grown more strongly than total world imports in OECD countries.

Likewise, the majority of FDI stocks from OECD countries are held in other OECD countries (Figure 2.22). For most OECD countries, the outward investment position in non-OECD countries is lower than 40%, with some smaller countries reporting higher figures. Within the OECD area, the United States and the United Kingdom are still the main destinations for FDI, followed by some of the large continental European economies.

Figure 2.21. Top 20 manufacturing countries in terms of value added, 2002

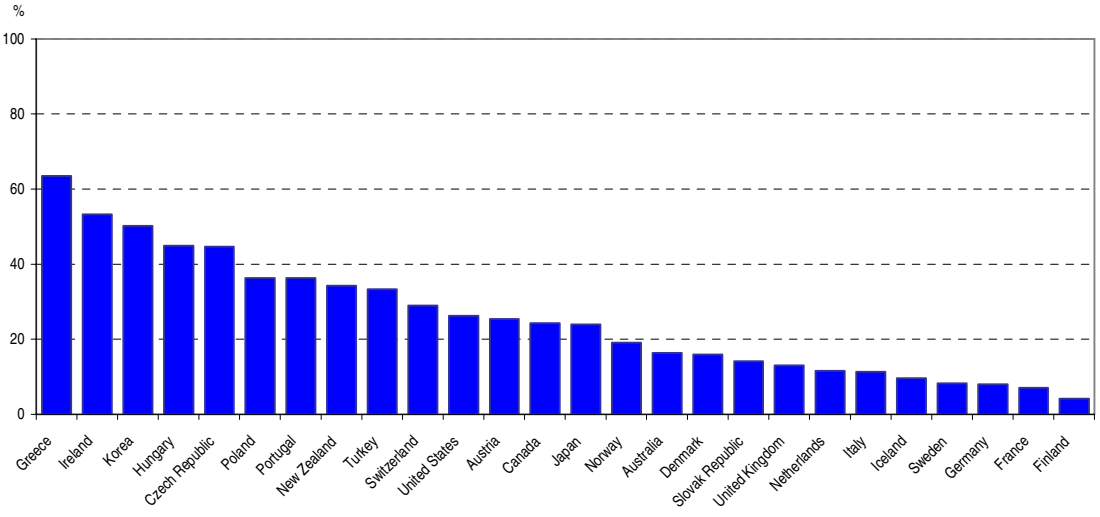


1. Data on value added are converted at exchange rates. The estimates should be interpreted with caution.

Source: OECD STAN database, UNIDO and National Statistical Offices in Pilat *et al.* (2006), "The Changing Nature of Manufacturing in OECD Countries".

Figure 2.22. OECD outward investment to non-OECD countries

As a percentage of total outward FDI stocks, 2002



1. Breakdown not available for Belgium, Mexico and Spain.

2. 2001 for Korea and Norway.

Source: OECD (2005a), *OECD Economic Globalisation Indicators.*

In addition to their predominantly OECD orientation, overall trade and FDI figures also show that globalisation is clearly a two-way process. While trade and FDI between OECD countries has traditionally been intertwined, giving rise to flows in both directions,

the recent relocation and offshoring of production by firms have also resulted in growing two-way trade flows between developed and developing countries.

Not only have exports of manufactures from the BRICs been rising rapidly, imports in these countries have increased as well. As these countries export more they also import more as their domestic markets grow and demand for intermediate products increases to the benefit of other countries. The share of intermediate imports in total imports is typically higher in China than in the United States and the EU. The same is true of trade of services: Amiti and Wei (2005) demonstrate that India and China are large insourcers, but at the same they are also important outsourcers of business services. Likewise, while the United States and the United Kingdom may be important outsourcers of services, they also attract activity in these services through insourcing (see below).

FDI data show that developing countries have started to invest abroad, although outward investment remains small (Table 2.3). However, China's increasingly active role as outward investor may not be fully reflected in internationally comparable FDI statistics. There is evidence of widespread evasion by Chinese firms of the burdensome approval and registration procedures, particularly in the non-state-owned sector, using funds parked abroad in subsidiaries and special purpose entities in low-tax jurisdictions as well as retained foreign earnings (OECD, 2006c). China's Ministry of Commerce has announced that total outward FDI in 2005 approached USD 7 billion, a figure that is almost certainly an underestimate. However, over the last six years, the Chinese government has made a concerted effort to increase its outward investments. Augmenting outward FDI became a declared policy goal of the Chinese government in March 2000.

The industry dimension of globalisation

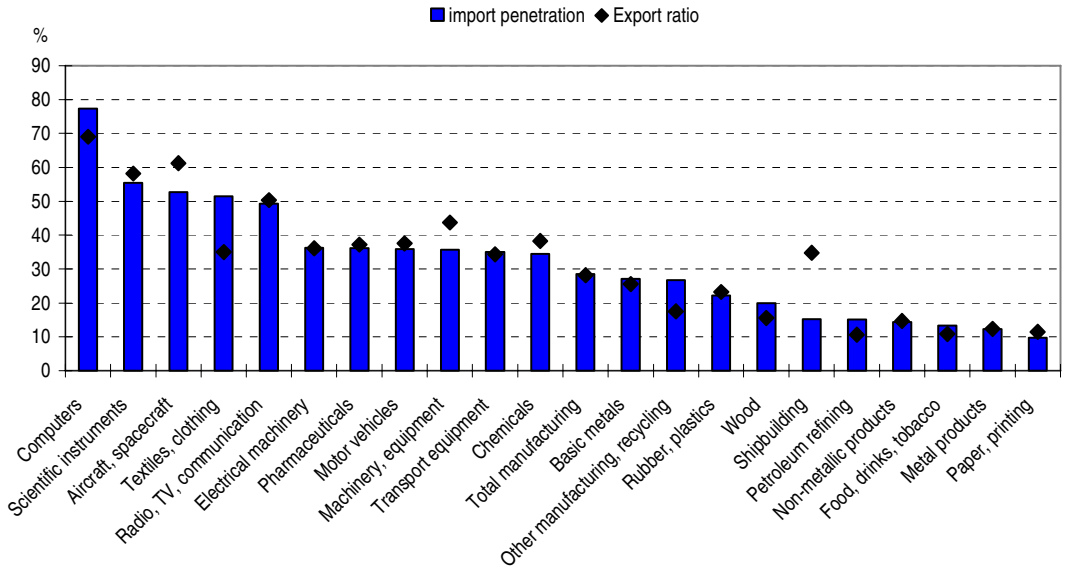
Increasing globalisation in certain manufacturing industries

Overall over the past decade, economic globalisation has resulted in increased openness in manufacturing, as reflected by rising export ratios and import penetration in all manufacturing industries. The export ratio indicates the share of manufacturing production that is exported, while import penetration corresponds to the share of domestic demand that is met by imports. The export ratio within the OECD area has increased from 20.7% in 1992 to 28.2% while import penetration has increased from 19.4% to 28.6%.

Not all manufacturing industries are affected to the same extent by global economic integration. High- and medium-high-technology industries are generally more internationalised than less technology-intensive industries. High-technology products in particular have become more complex, and because firms no longer have all the necessary knowledge in house, they have to buy it from others. Export ratios and import penetration are highest – and have generally risen fastest – for computers, scientific instruments, aircraft and spacecraft, radio/TV/communications equipment and pharmaceuticals, but also for more traditional industries like textiles (Figure 2.23). The ranking of openness in industries has generally remained stable over the years as structural characteristics such as high transport costs and the degree to which production can be fragmented make some industries become more globalised than others.

The simultaneous occurrence of high export ratios and import penetration generally reflects the high level of internationalisation of an industry, through the sourcing of intermediate goods, intra-industry trade and intra-firm trade. The globalisation of value chains and international sharing of production explains the strong correlation between export and import volumes, especially in higher-technology industries.

Figure 2.23. Import penetration and export ratio[1] in selected OECD countries,[2] 2003



1. The export ratio measures the share of production that is exported (*i.e.* X/Y); the import propensity shows to what degree domestic demand is satisfied by imports M (*i.e.* M/(Y-X+M)).

2. OECD includes Austria, Canada, Denmark, Finland, France, Germany, Italy, Japan, Korea, Netherlands, Norway, Portugal, Spain, Sweden, United Kingdom, and the United States.

Source: OECD (2005a), *OECD Economic Globalisation Indicators*.

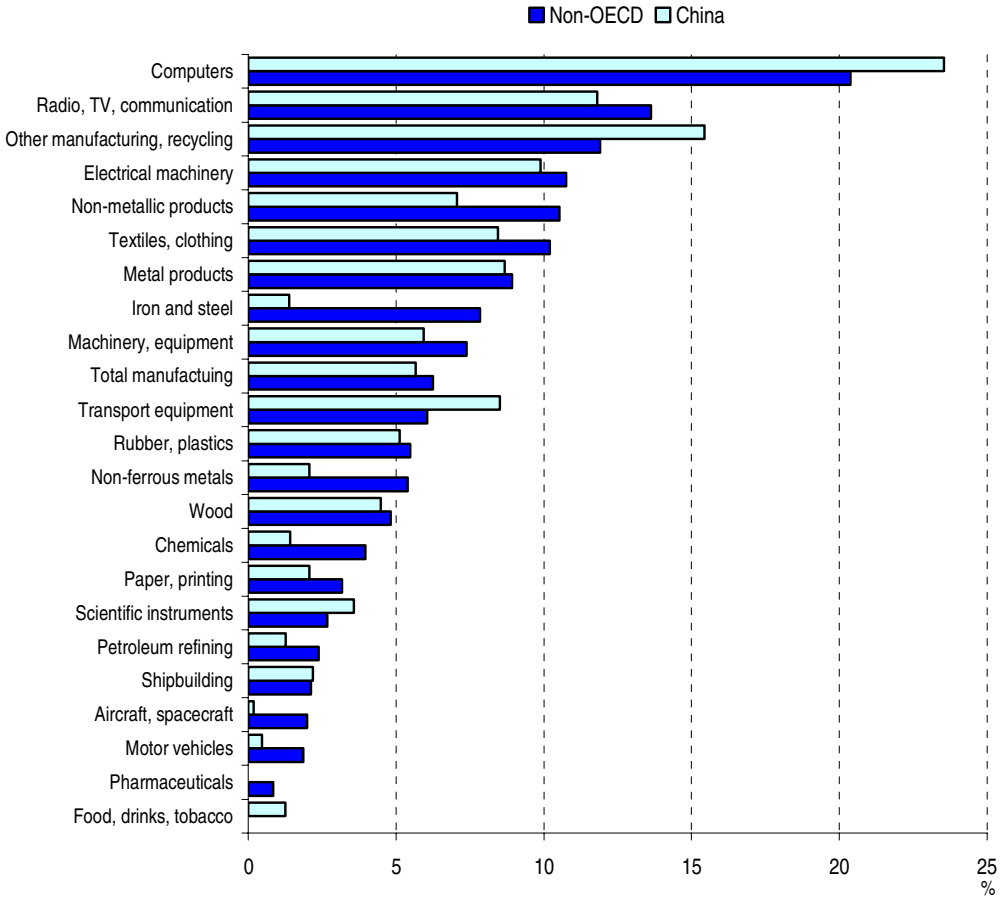
The more traditional textiles sector shows somewhat different characteristics in OECD countries. While the increase in import penetration and to a lesser extent in the export ratio also indicates this industry's increasing internationalisation, the strong differences between them also reveal national specialisation and competitiveness patterns. The integration of low-cost countries in the global economy has resulted for most OECD countries in declining competitiveness in this industry, which is reflected in their much strong import penetration than export ratios.

The increase in import penetration within the OECD area is due to rising imports by OECD countries, and in some industries to the strong export performance of non-OECD countries. The market share of non-OECD countries in total manufacturing imports increased from 19.1% in 1995 to 24.4% in 2004. The share of non-OECD imports has increased in almost all industries, although large differences between sectors exist, not necessarily related to the technological character of the industry. Non-OECD imports increased the most in computers, radio/TV/communications equipment, electrical machinery, non-metallic products and textiles (Figure 2.24). In these industries the share of non-OECD imports in total imports in OECD countries increased by 10% or more between 1995 and 2004.

China is largely responsible for the increasing presence of non-OECD imports, as the growing non-OECD share is very closely matched by the rising share of Chinese imports in OECD countries. In computers, China's share is even higher than that of total non-OECD indicating that other non-OECD countries have lost market share. Chinese imports in the OECD area increased most strongly in computers, radio/TV/communications equipment, electrical machinery, metal products and textiles. China's share in total OECD imports more than doubled from 1995 to 2004: from 4.1% to 9.7%. China thus

accounts for almost 40% of non-OECD imports of manufactures in OECD countries; in some sectors China accounts for more than half of non-OECD imports. In a short time, China has built a strong position on international markets, not only in more traditional industries (*e.g.* textiles) but also in higher-technology industries (*e.g.* computers and radio/TV/communications equipment).

Figure 2.24. Growth in import market share in OECD countries between 1995 and 2003



Source: OECD, Bilateral Trade Database.

Offshoring – outsourcing abroad

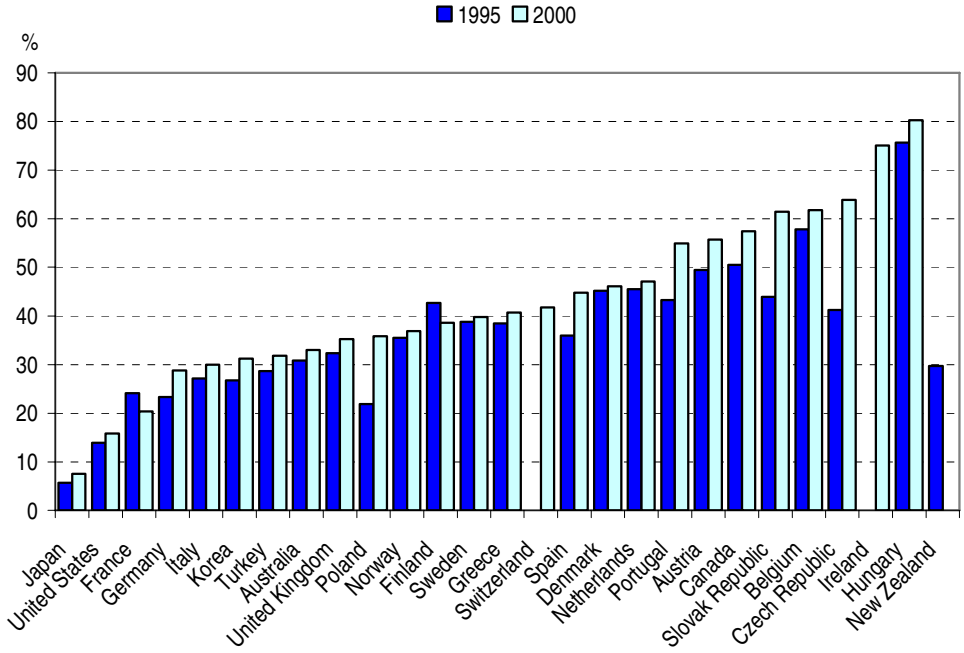
The sourcing of intermediates abroad is more prominent in higher-technology than in lower-technology industries (higher-technology industries are defined as high- and medium-high-technology industries, while lower-technology industries are defined as medium-low- and low-technology industries). In most OECD countries, the offshoring indicator is higher in the group of higher-technology industries than in the group of lower-technology industries (Figure 2.25). The level of offshoring has increased almost in all OECD countries, in the higher-technology as well as in the lower-technology-intensive manufacturing industries, but sourcing of intermediates abroad seems to have grown more strongly in higher-technology industries in most OECD countries.

Figure 2.26 presents the offshoring indicator for the highly internationalised industries of computers, radio/TV/communications equipment and textiles. The offshoring of activities is somewhat higher in the high-technology industries of computers

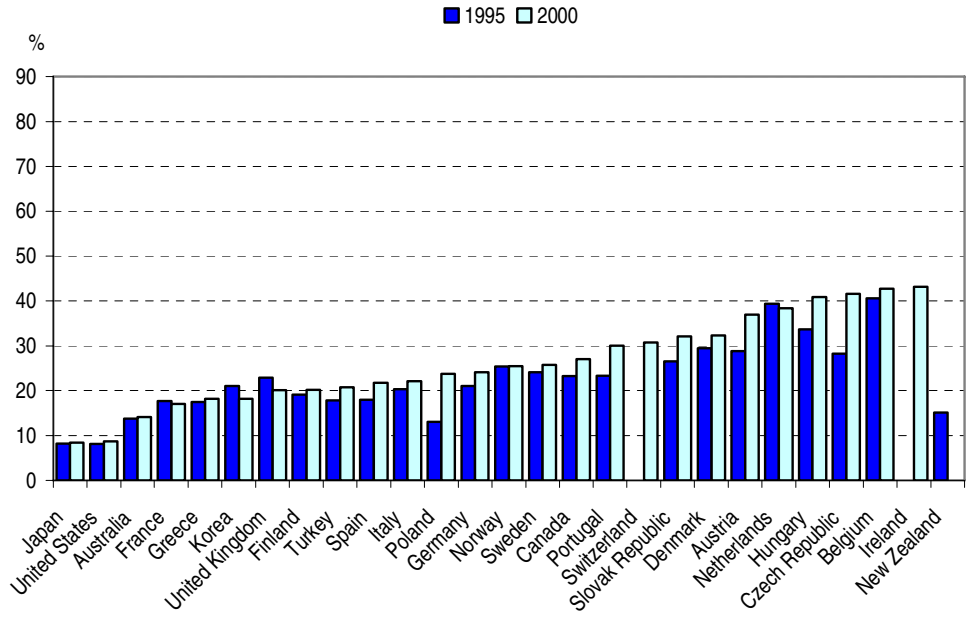
and TV/radio/communications equipment than in the low-technology sector of textiles. Smaller countries, especially those with a high presence of multinational firms, source relatively more internationally.

Figure 2.25. Offshoring/outsourcing abroad,[1] manufacturing industries, 1995 and 2000[2]

Higher-technology-intensive



Lower technology-intensive



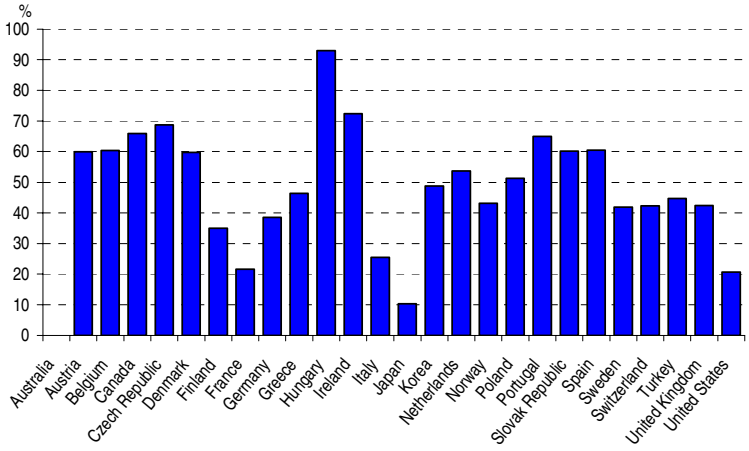
1. Calculated as the share of non-energy imported intermediates in total non-energy intermediate inputs.

2. Australia: 1995 and 1999; Canada: 1997 and 2000; Greece: 1995 and 1999; Hungary: 1998 and 2000; Norway: 1995 and 2001; Portugal: 1995 and 1999.

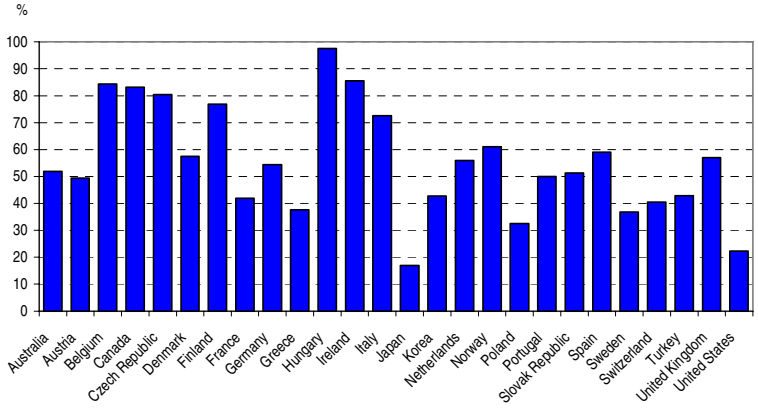
Source: OECD Input Output Tables Database.

Figure 2.26. Offshoring/outsourcing abroad,[1] some selected manufacturing industries, 2000[2]

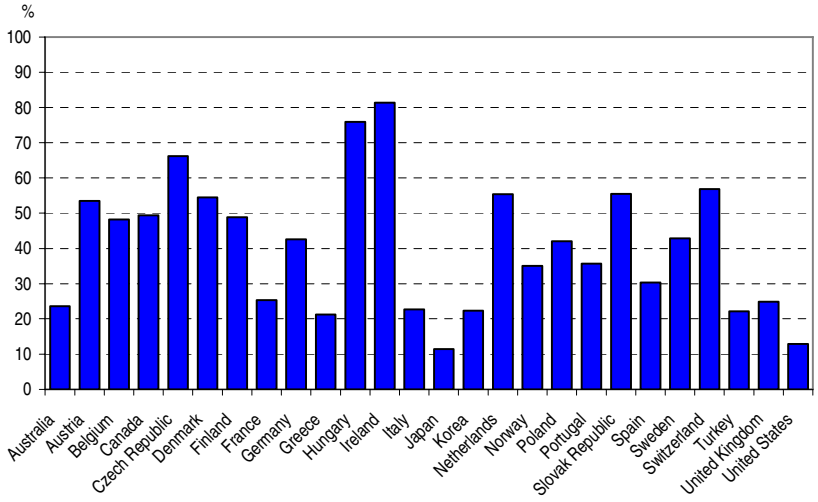
Radio, television & communication equipment



Office, accounting & computing machinery



Textiles, textile products, leather and footwear



1. Calculated as the share of non-energy imported intermediates in total non-energy intermediate inputs.
2. Australia: 1995 and 1999; Canada: 1997 and 2000; Greece: 1995 and 1999; Hungary: 1998 and 2000; Norway: 1995 and 2001; Portugal: 1995 and 1999.

Source: OECD, Input-Output Tables Database.

Increasing globalisation of services industries

While globalisation traditionally concerned manufacturing industries, there has been increasing internationalisation and offshoring of services in recent years. Services now account for around two-thirds of FDI in most developed countries and up to 20-25% of total international trade. The importance of international trade in services remains comparatively modest because many services remain non-tradable. One of the main channels through which services are traded is commercial presence via affiliates, as demonstrated by the increasing importance of foreign affiliates in the services sector in the late 1990s.

Services offshoring first began to take off in the United States in the late 1980s when ICT firms increasingly outsourced ICT functions to external service providers abroad in search of cost advantages. Rapid advances in ICTs and the increasing digitalisation of information and standardisation of business activities have enabled the production of services to be increasingly independent of their location (UNCTAD, 2004). Today the trend is most apparent in ICT-related and business service industries. Technological advances in information technology (IT) together with the ongoing liberalisation of trade and investment in services have increased the tradability of many services and created new kinds of tradable services: IT support, R&D functions, back office, call centres and software programming.

The globalisation of services activities and the ICT-enabled offshoring of services have led to major changes in trade and cross-border investment in service activities. The share of FDI in the services sector, already strong in the early 1990s, has increased significantly in recent years. The share of outward OECD direct investment in services sectors represented 50% of total outward FDI in 1992 and increased to over 67% in 2002. Services industries accounted for more than 75% of total outward investments for Greece, the Czech Republic, Poland, France, Germany and Austria. Inward direct investment of OECD countries exhibit a similar trend. The relative share of the services sector in total inward investment increased from 52% in 1992 to 64%. In Germany, Switzerland, Denmark, France, Austria and the Slovak Republic, the share of services in inward investment represented 70 to 88% of total investments (Figures 2.27 and 2.28).

In contrast with data on manufactures trade, information on international transactions in services trade is much more limited because of the small number of categories and the very recent increase in the number of reporting countries. Services trade has increased especially since the second half of the 1990s, with exports growing more strongly than imports and thus a trade surplus in services for the OECD area. The growth is primarily driven by the broad category of "other" services, with a yearly increase of almost 10%, while growth in transport and travel services averaged 3-4% over the period 1995-2003 (Figure 2.29).

As a result of these differential growth performances, services trade now accounts for more than half of "other" services in the OECD area; the most important categories are financial services, information and computing services and other business services (including professional/technical services, consulting services and R&D). Technological advances in ICT have facilitated trade in information and computing services and other business services. In most OECD countries, exports and imports of business and computer and information services account for a large and rapidly increasing share of services trade (Table 2.4).

Figure 2.27. Share of the service sector in total outward FDI stocks of OECD countries,[1] 2002

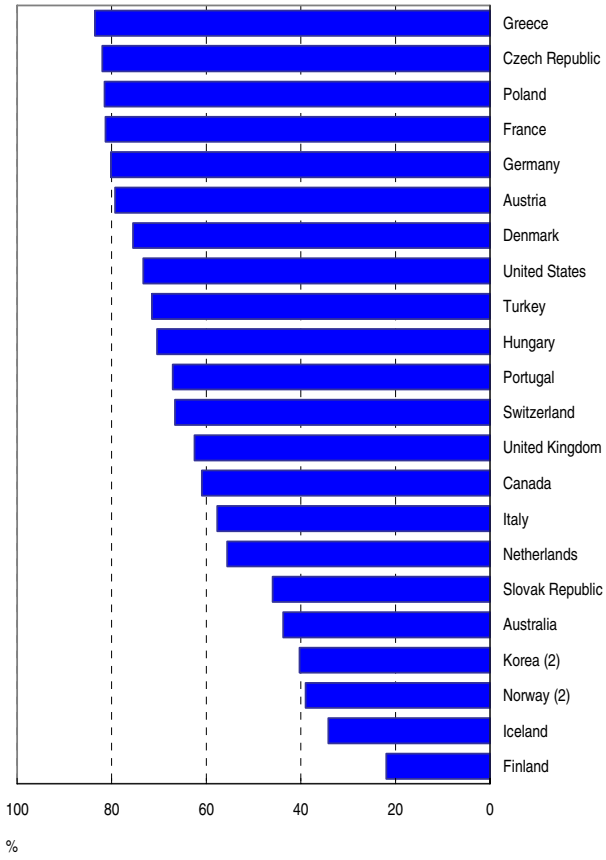
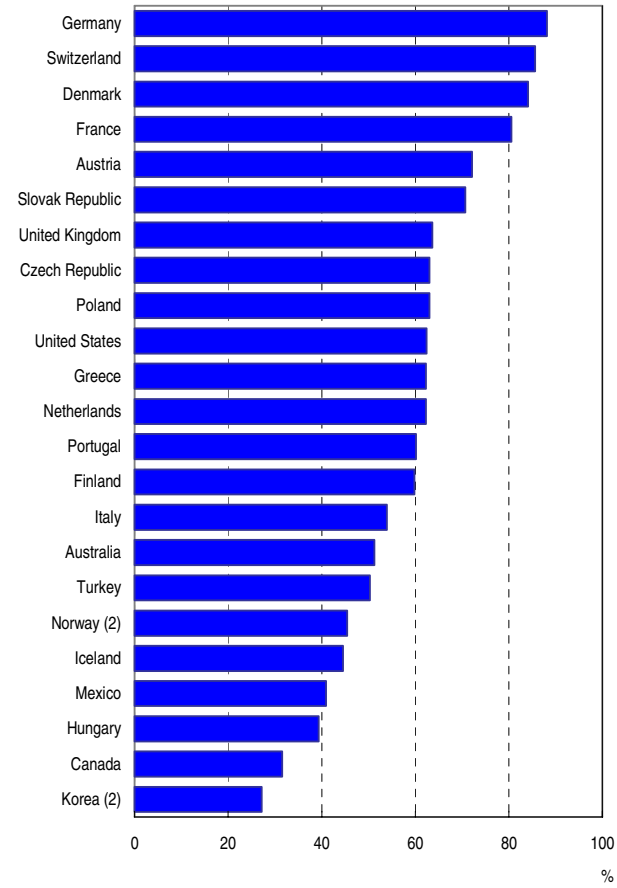


Figure 2.28. Share of the service sector in total inward FDI stocks of OECD countries,[1] 2002

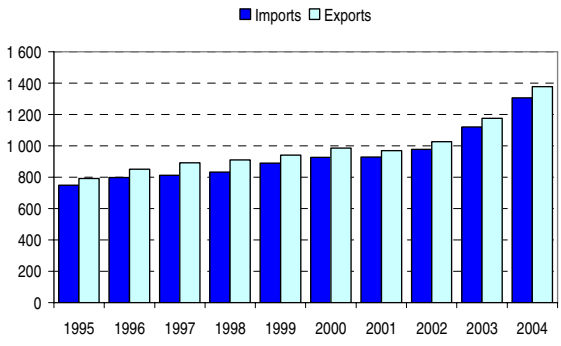


1. The breakdown is not available for Belgium, Ireland, Japan, Luxembourg, Mexico, New Zealand, Spain and Sweden.
2. 2001 instead of 2002.

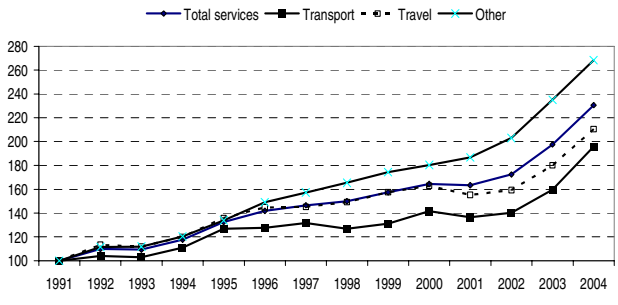
Source: OECD (2005a), *OECD Economic Globalisation Indicators*.

Figure 2.29. Growth in services trade, OECD countries, 1995-2004

USD billions



1994 = 100



Source: OECD Statistics on International Trade in Services.

Table 2.4. Share of other business services and information and communication services in total services trade

Percentages

	Exports		Imports	
	1995	2003	1995	2003
Australia	7.3	14.3	12.3	14.2
Austria	37.0	37.5	36.9	47.1
Canada	26.3	31.8	20.0	22.5
China	19.6	39.6	27.5	20.6
Denmark	30.8	39.1	24.0	33.9
Finland	40.1	34.0	40.4	33.8
France	28.6	25.7	27.1	29.8
Germany	26.7	32.2	20.9	27.3
India	31.3	59.7	26.4	34.0
Ireland	27.7	55.6	40.2	43.3
Italy	21.6	30.0	30.3	34.6
Sweden	16.4	42.9	14.8	41.1
United Kingdom	23.4	34.8	14.8	18.8
United States	14.5	22.9	13.0	17.8

Note: For some countries, such as India, it is not possible to isolate other business services and computer and information services. As a consequence, for India, the category includes total services, minus travel, transport and government services (*i.e.* including construction, insurance and financial services as well as other business services and computer and information services). However, Indian firms are now extensively exporting ICT-enabled services and business process services and the remaining services included in the category are likely to be small in comparison. Furthermore, data on overseas revenues from annual reports of top Indian export firms show patterns similar to the IMF data.

Source: Van Welsum and Vickery (2005).

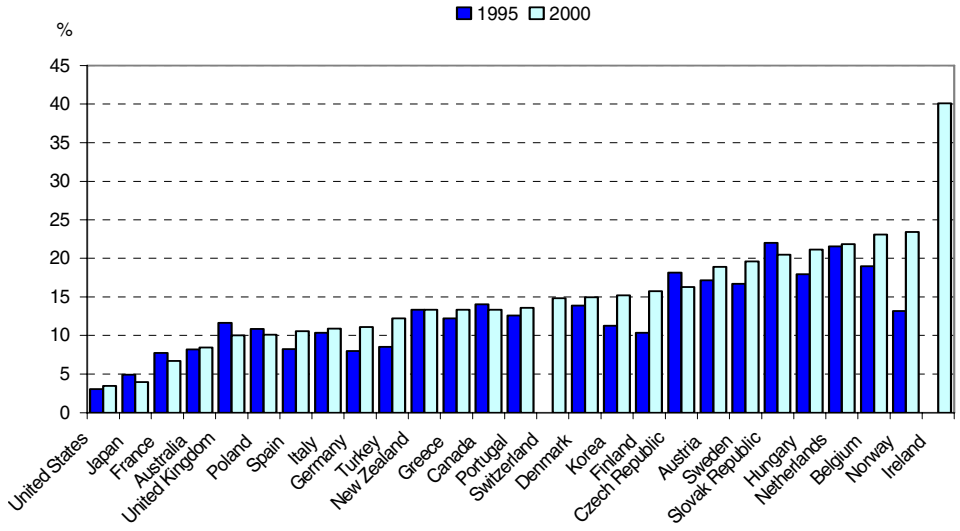
Trade in business services and information and communication services has also grown substantially in non-OECD countries, especially India, with exports in both categories growing from a share in total services trade of 31.3% in 1995 to 59.7% in 2004. Like China in manufacturing, India has rapidly increased its market share in software and IT-enabled services (including call centres, software design, and business process outsourcing). These sectors now represent around one-third of services' output in India, due, among other things, to the availability of highly qualified professionals and proficiency in English. Furthermore this skilled labour is cheap, as salaries in India are around one-tenth those in the United States.

While the increasing globalisation of services has significantly benefited India, several OECD countries also report a growing trade surplus in business services (Table 2.4). The United States and the United Kingdom have largest surpluses in services and information and communication services trade, while Germany and Japan run a deficit. The United States and the United Kingdom are the top recipients of global outsourcing in services (*i.e.* insourcing) in absolute terms, followed by France and the Netherlands. In 2002, India and China ranked 6th and 14th, respectively, but as a percentage of GDP, India and China are slightly ahead of the United Kingdom and the United States. At the same time, India and China are also significant international

outsourcers of business services; as a share of GDP, India imports a larger amount of business services than the United States and the United Kingdom (Amiti and Wei, 2005).

The increase in services offshoring is also reflected in the offshoring indicators for the group of market services. As in manufacturing, the sourcing of intermediates abroad in market services has increased in almost all countries (Figure 2.30). Nonetheless, the level of offshoring is still much lower in market services than in total manufacturing industries (Figure 2.31).

Figure 2.30. Offshoring/outsourcing abroad,[1] market services, 1995 and 2000[2]

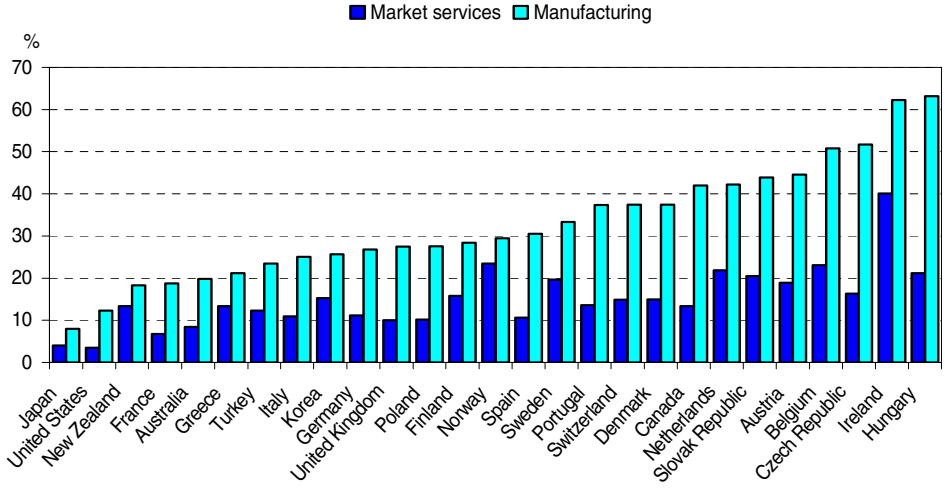


1. Calculated as the share of non-energy imported intermediates in total non-energy intermediate inputs.

2. Australia: 1995 and 1999; Canada: 1997 and 2000; Greece: 1995 and 1999; Hungary: 1998 and 2000; Norway: 1995 and 2001; Portugal: 1995 and 1999.

Source: OECD, Input-Output Tables Database.

Figure 2.31. Offshoring/outsourcing abroad,[1] manufacturing and market services, 2000[2]



1. Calculated as the share of non-energy imported intermediates in total non-energy intermediate inputs.

2.Australia: 1995 and 1999; Canada: 1997 and 2000; Greece: 1995 and 1999; Hungary: 1998 and 2000; Norway: 1995 and 2001; Portugal: 1995 and 1999.

Source: OECD, Input-Output Tables Database.

References

Amiti, M. and S. Wei (2005), "Fear of Service Outsourcing: Is it Justified?", *Economic Policy*, April, CEPR, London.

Bardhan, A.D. and D. Jaffee (2005), "On Intra-firm Trade and Manufacturing Outsourcing and Offshoring" in *The Role of Foreign Direct Investment and Multinational Corporations in Economic Development* (ed. Edward Monty Graham), Palgrave, London.

Brainard, S.L. (1997), "An Empirical Assessment of the Proximity-Concentration Trade between Multinational Sales and Trade", *American Economic Review*, Vol. 87.

CBS (Centraal Bureau voor de Statistiek Nederland) (2006), "Forty Percent of Dutch Exports Are Re-exports", unpublished document.

Farrell, D., S. Ghai and T. Shavers (2005), "A silver lining in the US trade deficit", *McKinsey Quarterly*, March, pp. 1-8.

Farrel, D. and A. Grant (2005), "Addressing China's Looming Talent Shortage", McKinsey Global Institute, San Francisco.

Feenstra, R.C. and G.H. Hanson (1996), "Globalisation, Outsourcing and Wage Inequality", *American Economic Review*, Vol. 86, No. 2.

Feenstra, R.C. and G.H. Hanson (1999), "The Impact of Outsourcing and High-Technology Capital on Wages: Estimates for the United States, 1979-1990", *Quarterly Journal of Economics*, Vol. 114, Issue 3.

Goldman Sachs (2003), "Dreaming with BRICs: The Path to 2050", Global Economic Paper No. 99.

OECD (2000), *OECD Employment Outlook 2000*, OECD, Paris.

OECD (2005a), *OECD Economic Globalisation Indicators*, OECD, Paris.

OECD (2005b), *SME and Entrepreneurship Outlook 2005*. OECD, Paris.

OECD (2006a), *International Migration Outlook 2006*, OECD, Paris.

OECD (2006c), "China's Trade and Growth: Impact on Selected OECD Countries", available at: www.oecd.org/LongAbstract/0,2546,en_2649_201185_37780930_1_1_1_1,00.html.

OECD (2006d), "Trends and Recent Developments in Foreign Direct Investment", available at: www.oecd.org/dataoecd/37/39/32230032.pdf.

OECD (forthcoming), *Removing Barriers to SME Access to International Markets*, OECD, Paris..

Pilat, D., A. Cimper, K. Olsen and C. Webb (2006), "The Changing Nature of Manufacturing in OECD Countries", STI Working Paper 2006-9, OECD, Paris.

UNCTAD (1994), *World Investment Report 1994*, New York.

Van Welsum, D. and G. Vickery (2005), "The Share of Employment Potentially Affected by Offshoring – An Empirical Investigation", DSTI/ICCP/IE(2005)8/FINAL, OECD, Paris.

Wixted, B.L. (2005), "Systems of Innovation Beyond Borders", Ph.D. Thesis, University of Western Sydney, February.

Yeaple, S.R. (2003), "The Complex Integration Strategies of Multinationals and Cross-Country Dependencies in the Structure of Foreign Direct Investment", *Journal of International Economics*, Vol. 60.

Chapter 3

The Costs and Benefits of Globalisation

This chapter discusses the costs and benefits of economic globalisation for OECD countries. Because of the diversity of the effects of globalisation and the complexity of analysing them, the discussion centres on the employment and productivity effects of globalisation. Based on empirical evidence, short-term losses in employment are weighed against more long-term effects on productivity as well as employment. The chapter specifically discusses the impact multinational enterprises may have given their key role in the current phase of globalisation.

A complex discussion

The globalisation of value chains has various impacts on economic performance. It affects employment, productivity growth, prices, wages, terms of trade, etc., and these impacts may vary across activities, regions and social groups. Concerns about the employment impacts of globalisation abound in many OECD countries and have almost exclusively focused on the possible consequences of outsourcing and offshoring. In the public mind, offshoring and especially relocation are often perceived as the exporting of jobs abroad and a pure loss to the country and its workers (Deardorff, 2005).

Since offshoring is now no longer limited to manufacturing jobs but also increasingly extends to services jobs, affected workers are no longer simply low-skilled production workers but also higher-skilled clerical and service employees (Van Welsum and Vickery, 2006). The boundary of what can and cannot be traded is increasingly blurred and the global economy encompasses a growing number of goods and services. Important advances in information and communication technology (ICT) have enabled the offshoring of certain productive services. Nevertheless, some categories of services will always be difficult to trade because of the necessity of face-to-face contact (Bhagwati *et al*., 2004).

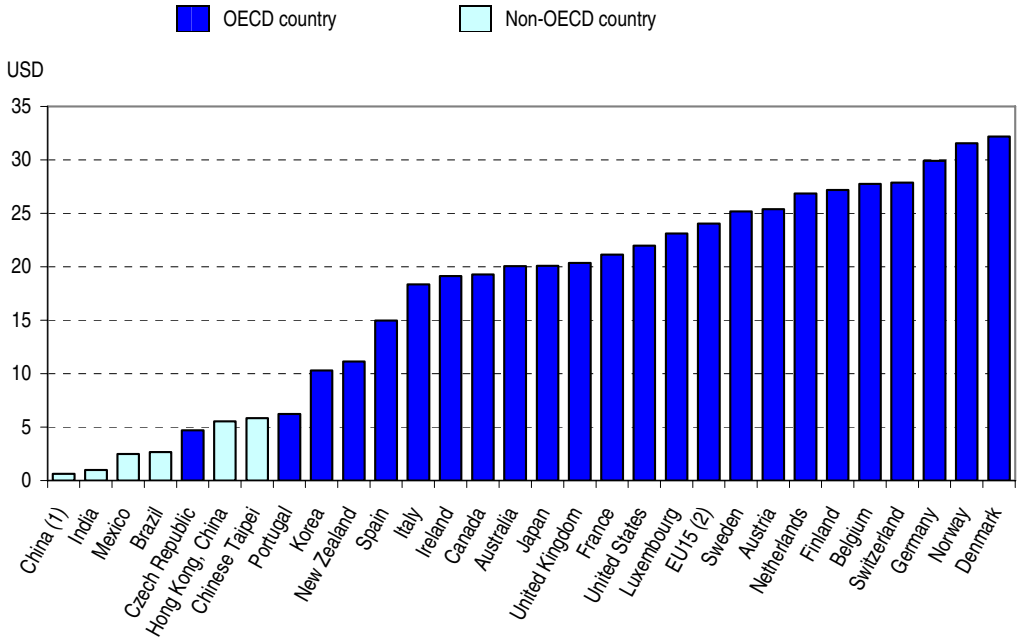
Recently, the nature of services outsourcing has evolved. The United Nations Conference on Trade and Development (UNCTAD) (2004) reports that at first most work was in rather low-skilled IT-enabled services such as data entry, but that firms in India that first set up back-office functions in the mid-1990s are now also outsourcing higher-value-added activities, although these higher-skilled and design activities seem to generate fewer jobs than less skilled activities such as data entry. In software development, average employment per USD 1 million of exports is reported to be around 30 persons, while for IT-enabled services the figure is 68 persons.

Fears of employment losses in industrialised countries are fuelled by the large differences in wage costs between these countries and countries such as India, China and Brazil, developing countries with large populations and an increasing presence in global markets. The argument is that large wage differentials motivate firms to shift production to lower-wage countries and to fragment and optimise their value chain globally. Import competition from these lower-wage countries will make firms and industries in developed countries less competitive, resulting in job losses, downward pressures on wages and declining working conditions. All of this could provoke changes in these economies and result in substantial adjustment costs.

Labour costs, which are affected by domestic labour market conditions, are indeed an important factor in determining the location of productive activities in different countries. Comparisons of manufacturing labour costs are published on a frequent basis by the US Bureau of Labor Statistics and cover 25 OECD countries and six non-OECD economies (Brazil; Hong Kong, China; Israel; Singapore; Sri Lanka; Chinese Taipei). China and India are not included in these estimates and were added to the figures below based on

estimates by Oxford Economic Forecasting.[3] Figure 3.1 shows labour costs ranging from just over USD 0.6 per hour in China and USD 1 an hour in India,[4] to over USD 30 an hour in Norway and Denmark. Major OECD countries such as the United States, Japan, Canada, France and the United Kingdom all have hourly labour costs around USD 20 an hour; Germany had the highest level of hourly labour costs among major OECD countries in 2003, at over USD 30 an hour. Large wage differentials also exist within the OECD, *e.g.* between central and eastern European and western European countries, and between Mexico and the United States. Furthermore, it should be noted that these figures are averages and that wages for high-skilled jobs in China for example might be substantially closer – in relative terms – to those in OECD countries.

Figure 3.1. Hourly labour costs in manufacturing, 2003, in USD



1. Estimates of Chinese labour compensation may be underestimated as Chinese workers may benefit from various types of non-monetary compensation, including subsidised accommodation.

2. Trade-weighted estimates, as shown in statistics of the Bureau of Labor Statistics.

Source: Estimates from Bureau of Labor Statistics (2004); China and India from Oxford Economic Forecasting in Pilat *et al*. (2006), "The Changing Nature of Manufacturing in OECD Countries".

Widespread anxieties about a "race to the bottom" may be unwarranted and are based on only part of the reality of globalisation. For example, simple wage-level comparisons make no allowance for differences in labour productivity between countries, and such adjustment is required to assess the competitiveness of OECD-area manufacturing industry and the vulnerability of jobs. High labour costs can only be supported if they

3. Since the estimates are converted to a common currency using exchange rates, these have a considerable influence on the estimates.

4. The estimates for China are confirmed by a recent BLS study on manufacturing compensation in China which finds hourly compensation of about USD 0.57 in 2002 (Banister, 2005).

coincide with a high level of labour productivity; countries with lower levels of labour costs typically have lower levels of labour productivity. Moreover, labour costs make up only one part (sometimes quite a small one) of the total costs of a product and are thus only one factor in a firm's decision to source some production abroad. More importantly, focusing solely on employment effects, and in particular on wage costs, narrows the discussion of the economic impact of globalisation and risks ignoring other effects.

The process of globalisation has a variety of effects: positive (*i.e.* benefits) as well as negative (*i.e.* costs), dispersed as well as concentrated, short-term as well as longer-term. But it is typically the negative, visible, short-term effects (*e.g.* employment losses) that receive the most media attention and reach the public, as they are easily measured while longer-term indirect benefits are much harder to calculate. Short-term costs are often transitory or one-off in nature while long-term effects are frequently permanent gains. However, the gains from globalisation only indirectly concern the people whose jobs are affected.

Globalisation and offshoring (including relocation) may lead in a first phase to short-term employment losses if certain activities are moved offshore or decline in importance. However, this does not necessarily mean that in the absence of offshoring there would be no job losses, as some or all of the offshored jobs might also be lost owing to other measures (productivity enhancements, automation, etc.) taken in a search for greater efficiency. Low-wage countries are thus not necessarily taking jobs away from high-wage countries, as such jobs would not be maintained in a high-wage country where they are not economically viable.

At the same time globalisation also leads to in-shoring, *e.g.* through increased exporting from OECD countries and/or when foreign affiliates of multinational firms (MNEs) expand their activities in OECD countries. Globalisation is a two-way process and job losses from offshoring should be considered against job gains that accrue from the outsourcing activities of other countries to the home country. Furthermore, offshoring may allow firms to focus on their core activities and may enable them to expand employment in other areas.

Globalisation has also positive impacts on productivity (see below) and may thus reduce costs and prices, both in the activity directly affected and in activities that use the products of that activity downstream. Productivity effects will not only increase real incomes and wealth for consumers but may also contribute to job creation in other parts of the economy. Bhagwati *et al.* (2004) emphasise that even if offshoring lowers employment and wages in certain occupations, it probably helps to create new jobs in the home country in others. This is because the supply of cheaper lower-skilled labour abroad can mean that an activity using more highly skilled labour at home becomes economically viable. Offshoring jobs thus allows some businesses to remain profitable and preserve jobs in the home country. Firms may also use the savings from offshoring to lower prices, to offer better products and services and/or to invest in new technologies.

Economic theory predicts that offshoring will improve average living standards not only by lowering prices through productivity but also by providing access to a wider range of goods and services than would otherwise be available. It has long pointed to the overall positive effects of increasing economic integration, explicitly acknowledging however that the positive effects are not spread evenly and consequently that there will be winners and losers from globalisation. A large number of studies has confirmed these theoretical predictions by offering empirical evidence for different countries (see below).

The overall impacts of globalisation as well as its diffusion across activities, regions and social groups depend on many factors that are not easily summarised. The evidence is currently scattered across a broad spectrum of studies and is based on a wide range of data sources and methodological approaches. The McKinsey Global Institute has tried to compute the economic benefits accruing to the host and home country from offshoring services from the United States to India (see Box 3.1). Without aiming to review all of the impacts of globalisation, two issues are of particular interest here, namely the impact on employment (and more broadly on the labour market) and on productivity.

Box 3.1. Calculating the economic benefits of offshoring
The McKinsey approach

The McKinsey Global Institute (MGI) (2003) looked at savings incurred by offshoring customer services to India and the overall economic benefits enjoyed by the United States from such investments. MGI estimated a base cost saving of USD 0.58 per corporate dollar invested in offshoring, and a directly related benefit to the US economy of USD 0.09 per dollar due to additional exports to India and repatriated profits by India-based US providers. Estimating additional benefits of USD 0.45 to 0.47 stemming from re-employment of workers who lost their jobs in the process, they estimate an overall economic benefit to the United States of between USD 1.12 and USD 1.14 per corporate dollar spent (updated with 2005 figures the benefit is estimated at between USD 1.14 and USD 1.17). Benefits to the Indian economy are estimated at USD 0.33 per dollar, leaving the global economic benefit between USD 1.45 and USD 1.47.

According to more recent research by MGI (2004, 2005) the economic benefits of offshoring in the United States are not the same as those in Europe. In Germany (MGI, 2004), for instance, it is estimated that the economic benefits are only USD 0.80 per corporate dollar spent on offshoring. This result is largely driven by lower firm savings stemming from the fact that the major German offshore location is eastern Europe rather than India where wages are much lower. The economic benefit from re-employment is also considered lower owing to the lesser flexibility of the German labour market. France is estimated to be in a similar situation to Germany but with a slightly higher return of USD 0.86 to the economy per corporate dollar spent on offshoring (MGI, 2005).

Employment effects

Short-term employment losses: large in absolute numbers but modest in relative terms

The studies that have received the most attention are those that have presented concrete figures on the jobs (potentially) lost owing to offshoring and international production sharing. As they focus on the short-term, negative and concentrated effects of globalisation, they typically report the loss of a large absolute number of jobs following the offshoring of activities. Results of such studies may not be directly comparable as the level of analysis differs (*e.g.* manufacturing, services or total economy, different countries) and the status of the job losses ("potentially" lost, "likely to" be lost, "effectively" lost). The US National Academy of Public Administration's publication *Offshoring: An Elusive Phenomenon* (2006) gives a detailed overview of the different results and the methodologies used.

One approach followed in several studies is to estimate the potential employment impacts of offshoring. Table 3.1 summarises analysts' estimates of the numbers of jobs potentially at risk of being offshored. In the context of their work on offshoring of ICT-enabled services, Van Welsum and Vickery (2005) estimate the share of persons employed who mainly perform the type of functions that can potentially be carried out

anywhere, using data on employment by occupation and by industry. Occupations were selected by examining detailed occupational and task descriptions in terms of four criteria to determine whether a task could potentially be offshored: *i)* intensive use of ICT; *ii)* an output that can be traded/transmitted when enabled by ICT; *iii)* high and codifiable knowledge content; and *iv)* no face-to-face contact necessary. The analysis suggests that around 20% of total employment in OECD countries concerns functions that can potentially be affected by offshoring. A high share of such employment is in business services (*e.g.* accounting, consulting), financial services and R&D. In a following analysis, van Welsum and Vickery (2006) distinguish between professional and clerical-type occupations and show that the simplest tasks are at greatest risk of offshoring; the more complicated the mix of tasks, the more difficult to offshore the job. This is in line with evidence presented by Grossman and Rossi-Hansberg (2006), Hillberry and Hummels (2005) and Levy and Murnane (2004).

Using a similar methodology based on the characteristics of occupations, both Bardhan and Kroll (2003) and Garner (2004) report a share of around 10% of total employment that is "potentially" affected by services offshoring in the United States. Jensen and Kletzer (2005) use the location of production instead of occupation characteristics and estimate the number of jobs in tradable services at 13.7% of total employment in the United States. "Tradable" occupations are considered to be occupations in geographically concentrated industries. The results indicate the more tradable character of manufacturing jobs: 86.3% versus 32.6% for services. Furthermore, there are important differences among industries, with 100% of jobs being tradable in computer and mathematical occupations to only 4% in food preparation.

Table 3.1. Jobs "affected" by offshoring, alternative estimates

Jobs potentially at risk of being offshored		
Van Welsum and Vickery (2005)	In 2002, 18.1% of total employment in 2002 in United States, 13% in Korea In 2003, 19.2% in EU15, 18.6% in Canada, 19.4% in Australia	OECD
Jensen and Kletzer (2005)	13.7% of total employment in 2002	United States
Garner (2004)	14 million services jobs or 10% of total employment in 2000	United States
Bardhan and Kroll (2003)	15 million services jobs or 11.7% of total employment in 2003	United States
Blinder (2006)	28 to 42 million service jobs, 20 to 25% of total employment in 2004	United States
McKinsey Global Institute (2005)	160 million jobs worldwide or 11% of the global workforce in 2003	World
Jobs likely to be offshored		
McKinsey Global Institute (2005)	4.1 million jobs worldwide in 2005-08	World
Forrester Research (2004a)	3.3 million service jobs in 2005-15	United States
Forrester Research (2004b)	1.16 million service jobs in 2005-15	Europe
Goldman Sachs (2003)	6 million jobs in 2003-13	United States
Jobs effectively offshored		
Schultze (2004)	72 000 jobs in 2002-03	United States
European Restructuring Monitor (2005)	78 267 jobs in 2002-04	Europe
Garner (2004)	218 000 jobs in 2000-02	United States
McKinsey Global Institute (2005)	565 000 jobs in 2000-02	Worldwide

Source: Based on National Academy of Public Administration (2006).

McKinsey Global Institute (2005) arrives at a worldwide estimate for 2003 of 160 million jobs or 11% of the global workforce that could potentially be at risk of offshoring. McKinsey also reported significant differences between industries with only 3% of retail jobs and 8% of health-care jobs potentially offshorable, compared to almost 50% in packaged software and information technology (IT) services. All these different estimates provide an upper boundary to jobs that could be "potentially" offshorable and concern jobs at risk both of foreign offshoring and domestic outsourcing. The obvious drawback of the approach outlined above is that it looks at the potential impacts of offshoring and not at measured impacts as they occur in practice. The gap between the potential for jobs to be offshored and the number likely to be actually offshored is affected by cost pressures, competition for resources, size of the firm and the legal, regulatory, social and political environment in the receiving country.

Taking these factors into account, McKinsey Global Institute moved from 160 million "potentially affected" jobs to 4.1 million jobs "likely to be offshored" worldwide by the end of 2008. Goldman Sachs (2003) used information gathered from interviews with industry experts to project that up to 6 million services and manufacturing jobs worldwide could be offshored over the next decade. Another widely cited study on offshoring by Forrester Research (2004a), based on interviews and business surveys, estimated that up to 3.3 million services jobs in the United States are likely to move offshore by 2015. For Europe, Forrester Research (2004b) estimated that by August 2004 81 000 IT and other services sector jobs had been sent outside Europe and that the number would reach 1.16 million by 2015.

These estimates and the increasing importance of (services) offshoring are argued to have major repercussions on developed economies (Friedman, 2005; Blinder, 2006). However, while the number of jobs likely to be offshored is large in absolute terms, the direct employment impact is relatively small as compared to the overall churning in the labour market due to technological development, changing consumer demands, etc. (Baily and Farrel, 2004; Brown and Spletzer, 2005). The often-quoted Forrester Research estimate for the United States of 3.3 million white-collar jobs likely to move overseas by 2015 would equate to a quarterly job loss rate of 55 000, a relatively small figure compared to the average of 7 million jobs lost in the United States every quarter over the last decade due to normal job churning (Kirkegaard, 2004). Authors such as Bhagwati *et al.* (2004) have also shown that the outflow of service jobs due to outsourcing has been relatively small, *i.e.* around 1% of jobs created and destroyed each year in the United States. The same seems to apply to Europe, as the 1.16 million IT and other services sector jobs likely to be offshored by 2015 implies that only around 2% of European service jobs are potentially vulnerable (Kirkegaard, 2005).

The apparently modest importance of offshoring in total employment losses is also reflected in the small share of offshoring in the total numbers of jobs lost to date. As no official statistics exist in most countries on the extent of offshoring, indirect evidence has to be used to illustrate the role of offshoring in jobs effectively lost (in contrast to potentially lost or likely to be lost). Schultze (2004) examined the US Department of Labor's Mass Layoff Statistics (MLS), which tracks sustained US layoffs of more than 50 people and which also report on the reasons for the layoffs. These actions concerned about 900 000 persons in 2002-03, but only about 4% are attributed to "import competition" or "relocation overseas". Over the period 1996-2003 "overseas relocation" would have been responsible for 0.9% of all layoffs reported in the MLS data (US GAO, 2004). From 2004 a new methodology was used to analyse the reasons for mass layoffs: preliminary results indicate that for 2004 and the first half of 2005, only 1.6% of job

losses was attributed to out-of-country relocations (Brown and Spletzer, 2005; Mankiw and Swagel, 2006).

This largely corresponds to the results of the European Restructuring Monitor (ERM) which covers the daily and business press for the EU15 since 2002 and records European corporate restructuring that affects at least one EU15 country with an announced/actual destruction of at least 100 jobs or at least 10% of the workforce at establishments with more than 250 employees. In the ERM data, "outsourcing" and "relocation abroad" accounts for (only) about 7% of total jobs lost. The results for the United States and the EU15 may underestimate to some extent the exact number of jobs lost because of the thresholds used for inclusion in the two databases: for example, smaller-scale layoffs are excluded. Furthermore, the estimates do not pick up any effects on employment that do not show up as employment losses, such as a reduction of hiring by offshoring firms that would otherwise have recruited.

Another important point is that most estimates of potential/likely/effective employment losses do not distinguish according to the destination of the offshoring. Some recent econometric studies have estimated employment impacts, using detailed firm-level data in combination with data on bilateral trade patterns. The firm-level evidence, in particular work for the manufacturing sector in France (Aubert and Sillard, 2005), clearly shows that offshoring may involve moves from one OECD country to another OECD country, for example because firms are rationalising or concentrating their production. As such, jobs are offshored not only to low-wage countries but also to other OECD countries, resulting in positive in-sourcing effects on OECD employment. This observation is all the more important in light of the predominant orientation of trade and foreign direct investment (FDI) of OECD countries towards other OECD countries.

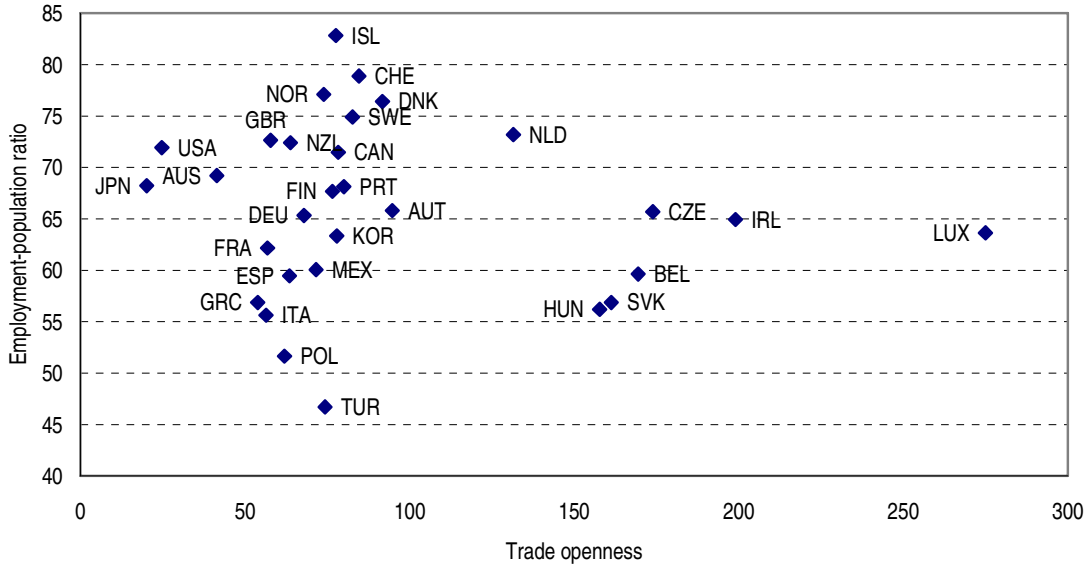
Longer-term effects on aggregate employment: composition instead of level

The studies described above focus on the short-term employment effects of globalisation and offshoring, *i.e.* the direct negative impact on the home country labour market due to increasing imports and relocations. These studies implicitly assume that there is a fixed amount of work available in the world and that offshoring reduces employment in the country affected. While negative, albeit relatively small, employment effects may occur in the short run, the empirical evidence shows that aggregate employment is not undermined by globalisation in the long run. This is in line with economic theory which predicts that globalisation should not affect the overall employment level as this is determined in the long term by macroeconomic variables and labour-market-related institutions in countries, rather than trade and FDI.

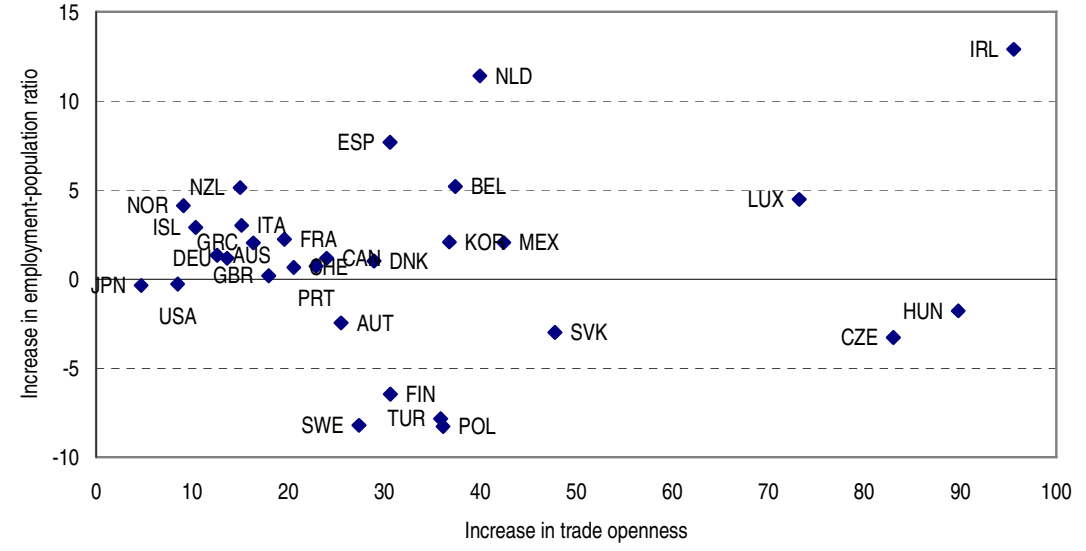
Recent empirical work (OECD 2005b) shows that aggregate employment performance in the long run is not worse in the OECD countries that are most open to trade or where trade openness has increased most rapidly. While there exists a substantial variation in employment-to-population ratios in OECD countries, these differences do not seem systematically related to cross-country differences in trade openness (Figure 3.2). Likewise, there is no obvious systematic association between cross-country differences in trade openness and unemployment rates. Other studies also have not found any systematic association between openness and aggregate employment (see for an overview Hoekman and Winters, 2005).

Figure 3.2. Aggregate employment performance and trade openness[1]

A. Trade openness and the employment-population ratio, 2002 (%)



B. 1990-2002 increases in trade openness and employment-population ratio [2,3] (%)



Notes: The correlation coefficients shown in this chart are not statistically significant.

1. Trade openness defined as the sum of exports and imports as a percentage of GDP.

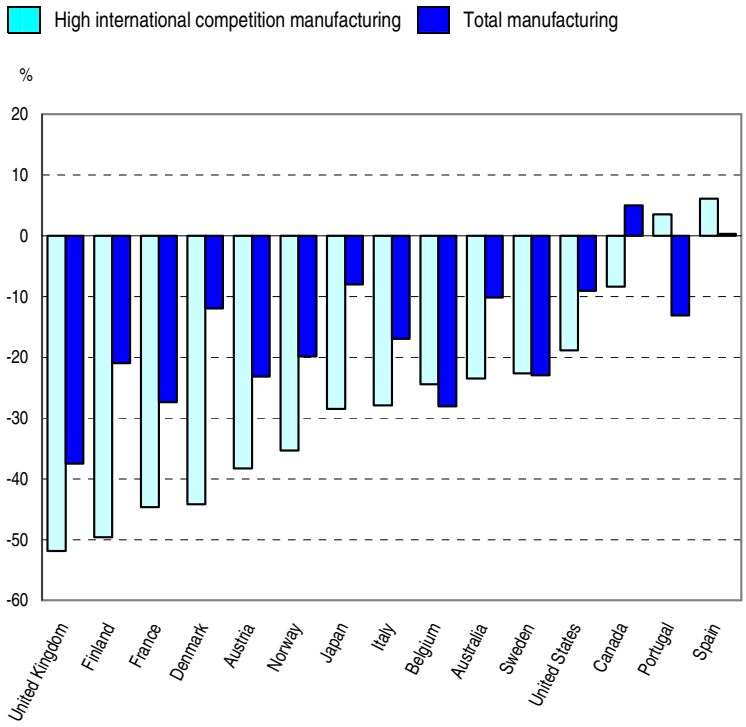
2. Data for the increase in trade openness for the Czech Republic and the Slovak Republic cover the period 1993-2002, and for Hungary 1991-2002.

3. The starting point used to calculate the increase in the employment-population ratio is as follows: Austria 1994, Czech Republic 1993, Hungary 1992, Iceland 1991, Mexico 1991, Poland 1992, Slovak Republic 1994 and Switzerland 1991.

Source: OECD (2005b), *OECD Employment Outlook 2005*.

The long-term effect of globalisation seems to be more prominent in the composition than in the level of aggregate employment. Relating 1970-2000 employment growth in manufacturing industries to data on trade flows, OECD (2005b) showed that in 11 out of the 15 countries analysed employment fell more rapidly in the subset of industries that experienced the strongest growth in international competition (Figure 3.3). The average employment decline across these 15 countries was 27% in industries with high international competition, compared to 16% for total manufacturing. This association suggests that rising international import competition may have been a not insignificant factor in employment losses in certain OECD manufacturing industries. However, the resulting impact on the aggregate labour market was muted by the fact that industries with high international competition (typically in manufacturing) accounted for less than 4% of total employment in 2000 in these 15 countries.

Figure 3.3. International competition[1] and employment growth (annual growth rate), 1980-2000)



1. High-international-competition industries are those manufacturing industries where the net imports ratio rose most strongly during 1980-2000 (see OECD, 2005b, Annex 1.A1.1 for further explanation).

Source: OECD STAN database and US Department of Labor, Bureau of Labor Statistics, Foreign Labor Statistics, November 2004 (ftp://ftp.bls.gov/pub/special.requests/ForeignLabour/ichccsuppt02.txt), except that wage data for India are estimates based on 2001 and 2003 data from Oxford Economic Forecasting (www.oef.com) in OECD (2005b), *OECD Employment Outlook 2005*.

Trade integration changes the international division of labour in a way that implies employment losses in certain industries (*e.g.* manufacturing) in most OECD countries through the exit and downsizing of less efficient firms and sectors. Individuals, sectors and classes of workers may lose out, *e.g.* those working in industries heavily exposed to international competition that have failed to adjust to this competition. In contrast, employment opportunities generally have improved sufficiently in other industries (*e.g.* services) to preclude adverse effects on aggregate employment. International trade is

found to be disruptive for workers and firms engaged in import-competing industries, but at the same time it provides lower prices and offers new opportunities for firms to expand in foreign markets.

There are short-term winners and losers in the labour market

Globalisation may have disproportionate impacts on certain types of workers, and small and concentrated groups are often hit hard. In particular, real wages of certain workforce groups are expected to fall after trade barriers are lowered: those whose skills are specialised in import-competing industries (as demonstrated by the Ricardo-Viner model) or low-skilled workers in a country in which high-skilled labour is relatively abundant (as demonstrated by the Stolper-Samuelson property of the Hecksher Ohlin model). Consequently, international economic integration through trade will have distributional effects that may affect equity or create opposition to trade liberalisation. But since free trade is Pareto-efficient under standard assumptions, the winners from trade liberalisation can afford to compensate the losers and still enjoy net gains. In reality, however, comprehensive compensation schemes are rarely implemented.

Empirical research has shown that despite the overall gains, trade integration typically results in short-term winners and losers on the labour market. Numerous studies have analysed how increased import competition has affected the position of low-skilled workers on the labour market of advanced countries. Globalisation and increased specialisation give rise to higher imports of low-skilled-intensive products from lower-wage countries, resulting in lower demand for low-skilled workers and hence, lower wages and/or fewer jobs. Most of this research has concluded that the overall labour market position of low-skilled workers has deteriorated (*i.e.* there is rising income inequality between high-skilled and low-skilled workers). However, trade is reported to make only a relatively modest contribution (for overviews see Freeman, 1995; Slaughter and Swagel, 1997; European Commission, 2005b), as the evidence points to skill-biased technological change as a more important factor. In spite of this empirical evidence, it clearly may be very difficult to disentangle the causal impacts of the different factors.

The integration of countries (including low-wage countries) into the world trading system induces a shift in the sectoral composition of employment and results in adjustment costs as workers are forced to move between industries and occupations. Overall, low-skilled workers are more likely to be affected by trade-related structural changes than high-skilled workers. This is partly because many of the workers in industries that have been most affected by trade (*e.g.* labour-intensive manufacturing industries) tend to be older and less educated and have long job tenures (OECD, 2005b). These workers are often more difficult to reintegrate in the labour market than other workers who experience job loss, also because their vocational skills are often highly specialised.

Another line of research has shown that the effects of trade on wages and employment depend heavily on domestic labour market institutions, the efficiency of capital markets and the mobility of factors across sectors (Hoekman and Winters, 2005). Standard trade theory models assume full employment of labour and capital. If relative factor prices and relative factor demands are able to adjust fully in the importing economy, and if labour markets are not segmented but flexible, then employment should return to its long-run sustainable level, with the relative price of factors used intensively in import-competing sectors lower than before. But if these conditions are not fulfilled, adjustment is likely to be reflected in a long-run reduction in factor demands, with a

smaller adjustment in relative factor prices. Increases in international competition create labour market adjustment costs that are reflected in increases in job displacement with (some) affected workers experiencing long spells of unemployment and/or large wage losses once re-employed.

This insight has been put forward as an explanation for the different labour market outcomes observed in Europe and the United States, as well as an explanation for the opposition to particular policy reforms that liberalise product market competition. Evidence for OECD countries suggests that displaced EU workers have a smaller probability of becoming re-employed than US workers, but face a smaller decline in their earnings when re-entering employment (OECD, 2005b). Large wage losses on post-displacement jobs are a particularly important source of post-displacement earnings in the United States. In Europe, by contrast, long-term unemployment and withdrawal from the labour force following displacement are the biggest sources of earnings losses. The labour market in the United States seems to adjust more quickly to changes in economic conditions because new jobs are created as existing jobs are lost; as a result those who lose jobs owing to economic changes such as globalisation can expect to find new work readily.

Is offshoring different from trade in terms of labour market effects?

New forms of international competition, through increased offshoring of intermediate inputs (and not only final goods) and especially the offshoring of services, have raised concerns that the impact on the labour market may be more damaging than past forms of competition. Feenstra and Hanson (2003) argue that trade in intermediates may have more widespread implications for labour markets, because intermediates may not only affect labour demand in the sectors in which imports occur but also in sectors that use imported intermediates to produce final goods and services.

Services outsourcing may also be expected to have wider impacts than outsourcing in manufacturing, because many service activities are intermediate inputs to the production of other goods and services. On the other hand, Markusen (2005) and Bhagwati *et al.* (2004) argue that international sourcing of services is likely to have qualitatively similar impacts since offshoring is fundamentally a trade phenomenon. The only difference is that imported goods arrive by traditional means of transport, while offshored services are often delivered using telephones or the Internet (2004 US Economic Report to the President in Mankiw et Swagel, 2006). Tradable services should be analysed then in the same manner as traded (final and intermediate) goods.

In contrast, Grossman and Rossi-Hansberg (2006) and Baldwin (2006) argue that the current offshoring is different as it increasingly implies the trade of individual tasks instead of the trade of whole products. In the past, rapidly falling transport costs enabled the unbundling of production and consumption, resulting in growing trade of goods ("the first unbundling"). Until recently production was generally undertaken at one place in line with countries' comparative advantages, but the strong decline in communication and co-ordination costs has facilitated the spatial unpacking of firms ("the second unbundling"). Within the resulting global value chains and international production networks, not only are (intermediate and final) goods/services traded but, increasingly, individual tasks. This development not only affects firms' choice of location (there is a weaker link between specialisation and geographic concentration), but also has important effects on the labour market. Jobs that were generally considered to be unaffected by globalisation are increasingly offshored; likewise more skilled people now find themselves competing with

workers in India for example since offshoring now extends to service tasks. Education and skills no longer seem to be the main factor in offshoring; rather it is the international tradeability and routine character of tasks.

Most research to date has been devoted to offshoring of goods; research on the labour market effects of international sourcing of service jobs is just beginning. There is evidence for OECD countries that international outsourcing of goods has a positive association with the relative demand for and/or wages of skilled workers. Estimates indicate that, in most cases, international outsourcing accounts for between one-quarter and one-half of the observed skill upgrading. While the evidence generally suggests that international sourcing of intermediate goods has effects qualitatively similar to those observed for trade in final goods, it may have a particularly strong impact on the skill composition of the demand for labour (Feenstra and Hanson, 1999; Hijzen *et al.,* 2004; Görg and Hanley, 2004). By relocating the unskilled-intensive parts of the production process from relatively skill-abundant countries to unskilled-abundant countries, offshoring increases the relative demand for skilled labour in the skill-abundant country and hence increases the skill premium.

Analysing the offshoring of services, Amiti and Wei (2005) show that the international sourcing of services affects both imports and exports, indicating important offshoring and in-sourcing effects. Using data on trade in computer and information services and other business services, they identified the United States, Germany, Japan, the Netherlands, Italy, France and the United Kingdom as the top outsourcing countries. The top recipients of global outsourcing in services are the United States, the United Kingdom, Germany, France and the Netherlands, together with India and China. Taking both effects into account, the overall net effect of services offshoring on the labour market is rather small. In specific analyses for the United Kingdom and the United States, they found no relationship between job growth and services offshoring in the United Kingdom, while for the United States a small negative effect exists only when using a very disaggregated sector classification.

There is evidence that within sectors, typically lower-paid jobs are being offshored while more skilled jobs are being kept at home. In examining the effects of offshoring in the IT service sector in the United States, Mann (2003) suggests that jobs leaving the US market tend to be at the lower end of the wage and skill ladder. In a 2005 study she found that from 1999 to 2003 the United States lost 125 000 programming jobs but added 425 000 jobs for higher-skilled software engineers and analysts. Jensen and Kletzer (2005) use the US Displaced Workers Survey to examine the characteristics of displaced workers in service activities relative to those in manufacturing. In general, displaced workers in tradable services are found to have higher educational attainment, higher skills and earnings than those in manufacturing. In this context, trade displacement in services is similar to that for goods, with comparatively low-skilled workers being affected in both tradable services and in manufacturing, although the average skill level of workers in tradable services is higher than in the overall manufacturing sector. These findings are consistent with the hypothesis that globalisation and offshoring are leading the US economy to specialise in higher-value-added activities.

Employment effects of multinational firms

Positive effects on employment arising from the globalisation process are potentially due to the creation of new jobs by foreign affiliates. A study for the United States (Slaughter, 2004) focuses on this so-called in-sourcing. Over the years US subsidiaries of

foreign firms have deepened their engagement in the US economy by expanding their activities and setting up new firms. The study found that foreign affiliates operating in the United States accounted for more than 5.4 million US workers in 2002, or about 5% of total private-sector employment and for about 6% of total compensation in the private sector. At the same time, it showed that the importance of foreign affiliates is not restricted to the labour market but extends to different domains. As such, foreign affiliates were found to be responsible for 10% of capital investments in the United States, 14% of total R&D investments and 20% of exports.

OECD data provide evidence for several other OECD countries (Figure 3.4). It shows that employment in foreign affiliates has risen in most countries from 1995, in both manufacturing and services. In manufacturing, Germany is the only exception among the countries covered; in services, Belgium is the only exception. Considering the sizeable share of employment in foreign affiliates in some OECD countries (close to 50% of manufacturing employment in Ireland), it therefore seems important to account for the role of foreign affiliates in estimates of the employment impacts of globalisation. The data do not allow for distinguishing between greenfield investment and mergers and acquisitions when analysing the sources of the growth in foreign employment. Employment growth through mergers and acquisitions is often considered fictitious and only greenfield investments are considered to create additional jobs. However, one should evaluate mergers and acquisitions against the hypothetical alternative of what would happen to employment if the target firm had not been acquired. Employment would not necessarily be maintained as many acquired firms face difficulties that cannot easily be overcome without the help of new owners. Furthermore, mergers and acquisitions often also have additional benefits in terms of investments in physical capital and R&D (Slaughter, 2004).

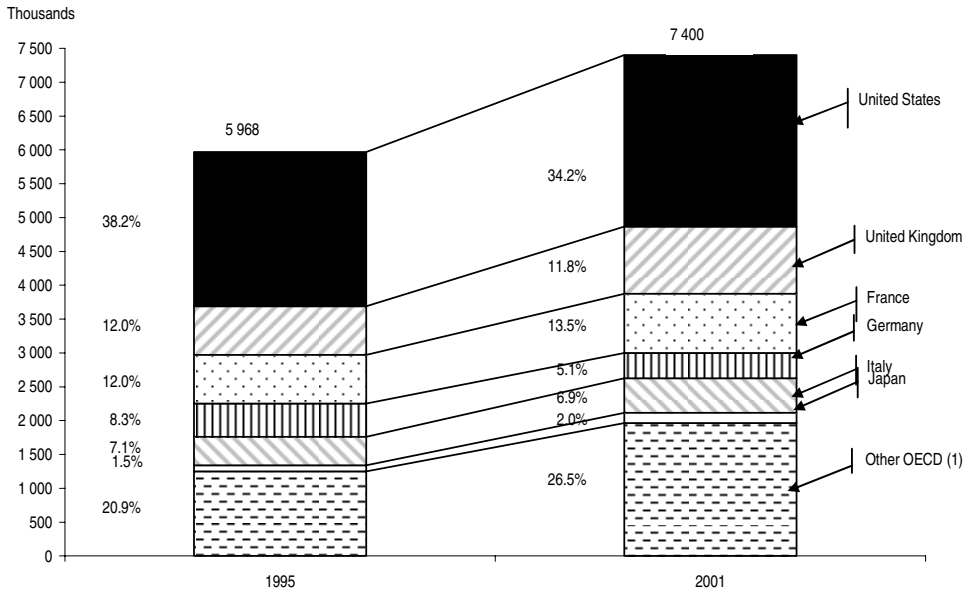
Apart from these direct effects, foreign affiliates may also have more indirect impacts on the labour market in host countries. Several studies have analysed the effect of foreign affiliates on relative wages of skilled persons and on employment creation in domestic firms. The results generally indicate that FDI is unlikely to be the main explanation for the increasing relative demand for skilled labour; trade seems to play a more important role. The effect of FDI on domestic firms' employment is mixed: while there may be technological spillovers from foreign firms to domestic firms, resulting in an expansion of local domestic activities, a competition effect may also be induced by the foreign entry which may crowd out investment and employment by local firms. This last effect is found to dominate in a couple of studies, especially those focusing on developing countries.

Next to the effects of FDI on host countries, the employment effects of foreign affiliates on the home country have also attracted attention in recent years. For example, employment in parent firms located in the United States decreased while employment in foreign affiliates abroad increased, especially in low-wage countries. As it is often argued that MNEs are footloose, greater integration may have negative effects on home country employment if MNEs relocate activities to other countries. Besides some anecdotal evidence on individual firms, there is however no information available that allows a distinction to be made between expansion abroad that substitutes for home country employment and activities that complement job gains in the home country. The creation of extra jobs abroad might, for example, allow a parent firm to expand its employment at home, or a parent firm might be forced to reduce employment if offshoring is not possible. Further, the impacts of foreign affiliates on home country employment may be more indirect. A firm that offshores some of its activities to a foreign affiliate abroad may have to export to this affiliate inputs that are produced in the home country. Such exports

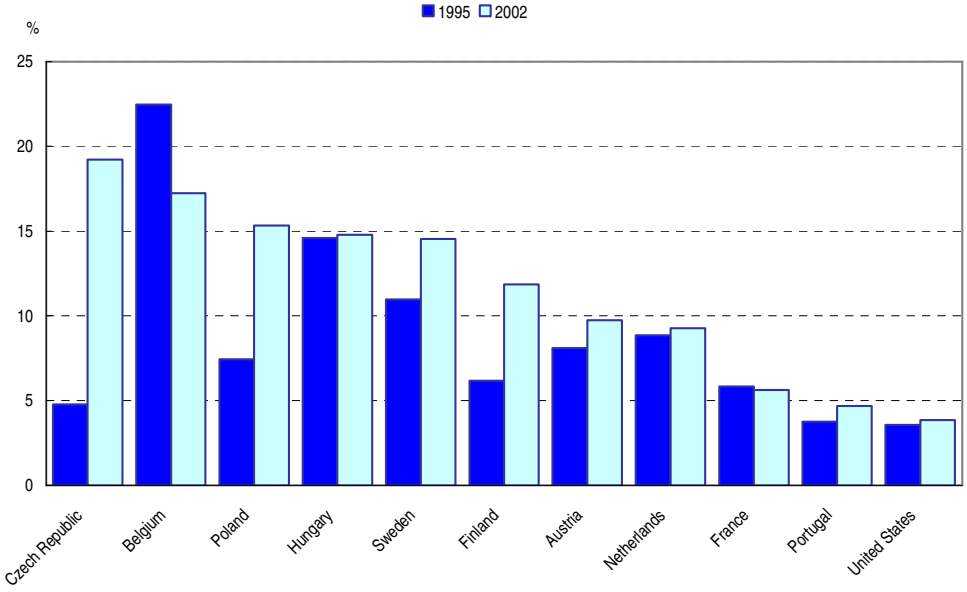
will obviously involve jobs. Growth in a firm's foreign presence may therefore involve job creation in the home economy.

Figure 3.4. Trends in employment of foreign affiliates in selected OECD member countries, 1995-2002

a) Manufacturing, in thousands of persons



b) Services, % of total employment[3]



1. Covers the Czech Republic, Hungary, Finland, Ireland, Luxembourg, the Netherlands, Norway, Poland, Portugal, Sweden and Turkey.

2. US data for foreign affiliates are broken down by industry of sales to be comparable with national totals.

3. 1995-2001 for Austria, Finland and France; 1996-2002 for Belgium and Portugal; 1997-2002 for the United States; 1998-2002 for Hungary and Poland; 1997-2001 for the Netherlands; 1997-2000 for Sweden.

Source: OECD (2005a), *Economic Globalisation Indicators*, OECD, Paris.

The analytical evidence is at best mixed. For the United States, Desai *et al.* (2005) and Hanson *et al.* (2005) both find that the increasing presence abroad of US multinationals has a significant positive association with employment growth in the parent firms at home. In contrast, Brainard and Riker (1997, 2001) obtain evidence of substitution between labour in the parent firms of US manufacturing MNEs and in their affiliates, although the effects are generally small. Harrison and McMillan (2006) find differential effects depending on the host country of US affiliates: they report that US affiliates' employment in low-income countries substitutes for US parent employment, while US employment and affiliates' employment in high-income countries are complementary. However, they point to the important effects of technological development and imports (from low-wage countries) on US employment in parent firms.

Results for Swedish MNEs contrast with the US results: Braconier and Ekholm (2000) report that labour substitution between Swedish parent firms and their affiliates is more likely to occur with affiliates in higher-income countries than with affiliates in lower-income countries, suggesting that FDI in low-cost locations does not come at the expense of employment in Sweden. This is to some extent supported by other studies on European multinationals (Konings and Murphy, 2003; Becker *et al.,* 2005) which report that substitution between parent firm and affiliate employment is significantly higher for affiliates located in the EU15 than it is for affiliates located in central and eastern Europe. On balance, the studies suggest that there is evidence of employment substitution, though for some countries the effects are small. A 10% reduction in labour costs in central and eastern European affiliates is found to be associated with a 0.3% reduction in parent employment in Belgium and a 0.2% reduction in France (European Commission, 2005b).

Productivity effects

Effects of openness on aggregate productivity

The theoretical literature on the economics of international trade has long argued for aggregate gains from openness. Standard static gains from trade typically arise from the exploitation of comparative advantage and economies of scale. Instead of producing a particular good or service, a country can obtain more of it, indirectly, by exporting goods and services in which it has a comparative advantage. Trade opens foreign markets for goods and services that can be most efficiently produced in the home country, because of technological advantages (Ricardian trade models) or factor abundance (Hecksher-Ohlin models). Furthermore, wider markets due to trade may enable firms to take advantage of economies of scale that are not available when sales are limited to the domestic market, thereby lowering costs (trade models of imperfect competition).

At the same time, trade generally results in lower prices for imported (final and intermediate) goods and services and increases product variety and quality in the home country. Larger markets through trade allow the deeper division of labour across borders and can accommodate a wider range of specialised firms. Access to better, cheaper and more varied inputs improves the productivity of firms that incorporate these inputs in their products.

Gains from trade depend then on the speed and the extent to which resources are reallocated to industries and activities for which countries have a comparative advantage. The reallocation of resources to industries that are comparatively more efficient will drive economies to develop new innovative and high-value (and thus more productive) activities that lead to continued economic growth. As firms reallocate resources towards higher-value activities and move lower-value activities abroad, a country will experience

aggregate productivity growth. This reallocation of resources means that new jobs are created but also that existing jobs may be destroyed. Increased competition through trade induces the most productive firms to expand while the least productive exit the market, increasing the average productivity level.

Apart from these standard static gains to trade, globalisation also results in dynamic gains, *i.e.* effects not only on the level but also on the long-term growth of productivity. These dynamic gains typically materialise over a longer time period and are typically hard to measure; nevertheless simulations by the European Commission show that these may be far more important than the static gains from trade (European Commission, 2006). A recent OECD study by Nordas *et al.* (2006) discusses the different channels through which these dynamic gains may positively affect productivity and economic growth in countries, *e.g.* through deepening specialisation, higher returns to investment (capital and R&D), and technology/knowledge diffusion and spillovers.

First, firms improve productivity by specialising in a narrow set of core activities while sourcing a broad range of inputs from other firms locally and abroad. The outsourcing and offshoring of less efficient or costly activities to other, more efficient and low-cost producers increases the efficiency and productivity of firms, industries and economies. Some empirical studies have shown the significant relation between productivity and the diversity of intermediate inputs in manufacturing industries that produce differentiated products.

Second, trade can raise returns on investment through more efficient allocation of resources and capital deepening because of scale economies, competition and lower costs of investment goods. Investment in R&D may also be affected by globalisation as larger markets can make R&D activities of firms more profitable. Moreover, operating in a globally competitive market forces firms to increase productivity/efficiency and engage in innovative activities. Such pressure may arise from engaging in exporting activities, from being in a market with significant imports, or from being exposed to activities of foreign affiliates of multinational firms. For example, an OECD study based on firm-level evidence found that firms exposed to international competition through trade or FDI were more likely to adopt ICTs than firms operating in a more sheltered environment.

Globalisation is also a conduit for foreign technology via trade of capital and intermediate goods/services that embody significant innovations. FDI is a second important channel through which technology and knowledge may spill over borders. It is reported that foreign technology accounts for the majority of domestic productivity growth in most countries, the more so the smaller the country, since the bulk of innovation and technological change in small countries is based on R&D performed abroad (Nordas *et al.*, 2006; Guellec and Van Pottelsberghe, 2001). Offshoring enhances productivity by facilitating reductions in the cost of technology and other inputs that improve the efficiency of business processes. For example, some economists have argued that offshoring of IT services reduces the costs of these services, making IT-enabled products and services more affordable and leading to increased diffusion of productivity-enhancing technology throughout many industries (US Government Accountability Office, 2005; Mann, 2005).

The impact of offshoring of services may be greater than offshoring of manufacturing since services are intermediate inputs in the production of goods and services. The size of the positive effects is directly related to the increasing importance of the services sector in GDP in many advanced countries. Mann (2005) computed the productivity increases due to offshoring of IT services for the United States and found an annual increase in

productivity of 0.3% for the period 1995-2002 which translates into a cumulative USD 230 billion in additional GDP. The offshoring of IT services resulted in lower prices for customised software and services, and, because of the high price elasticity of demand, these lower prices led to greater use of IT in most industries and aggregate productivity growth.

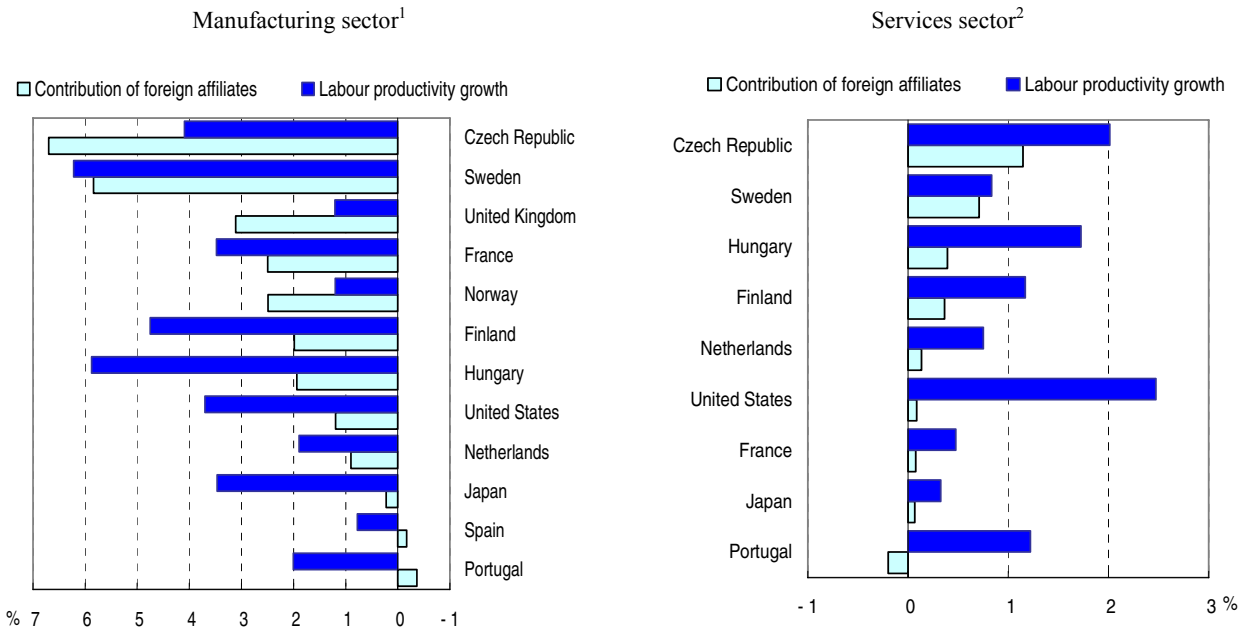
Although the gains from trade are difficult to measure precisely, the empirical evidence has supported theoretical insights and has largely shown that openness raises incomes and wages without undermining the aggregate employment base. At the economy level, the OECD Growth Study estimated that an increase in openness by 10 percentage points translates over time into an increase of 4% in per capita income in the OECD area. A number of studies provide evidence that more open countries typically grow faster than less open ones and have higher income levels at any given period of time (Dollar, 1992; Sachs and Warner, 1995; Harrison, 1996; Edwards, 1998; Frankel and Romer, 1999). In the 1990s, countries that were more open to trade and investment experienced average annual growth rates twice those of less open countries. In a panel study of 21 OECD countries, Bassanini and Scarpetta (2001) found that an increase in trade openness of 10 percentage points resulted in an increase in output per working-age person of 4%. A study of trade in 63 countries associated a rise of 1 percentage point in the ratio of trade to GDP with an increase in per capita income of between 0.5 and 2% (Frankel and Romer, 1999).

The direct contribution of multinational firms to aggregate productivity

MNEs are key players in the current phase of globalisation and may generate additional positive effects on host countries' economies because of their typically superior performance. Since labour productivity in foreign affiliates is on average higher than that of the average domestic firm (see also below), the level of aggregate productivity in host countries is positively influenced by the presence of subsidiaries of foreign MNEs. This higher productivity of foreign affiliates is not due to their typically greater presence in more productive industries but is directly related to their possession of proprietary knowledge-based assets. MNEs generally possess a higher level of technology than domestic firms, and thus have the potential to generate considerable technological spillovers. The better performance of foreign affiliates is related to their more advanced production methods using frontier technology, their network of international suppliers, customers and contracting firms, and the intangible assets that are the source of their value creation (*e.g.* management and marketing know-how).

Foreign affiliates are also found to make much more important contributions to labour productivity growth in host countries than indigenous firms (Figure 3.5). A comparative analysis of productivity growth across OECD countries shows that the contribution of foreign affiliates is largest in the Czech Republic and Sweden and smallest in Japan and Portugal (Criscuolo, 2005). In the manufacturing sector, the average contribution of foreign affiliates to annual productivity growth is significant, ranging from 6.7% in the Czech Republic to -0.4% in Portugal. In the services sector, the contribution of foreign affiliates is much smaller, ranging from 1.2% in the Czech Republic to -0.2% in Portugal. Remarkably, however, in the Czech Republic, the United Kingdom and Norway, the contribution of foreign affiliates is larger than labour productivity growth in the total manufacturing sector, pointing to domestic firms' negative contribution to aggregate productivity growth.

Figure 3.5. Average contribution of foreign affiliates to annual productivity growth,-1995-2001



1. Or nearest available year: Czech Republic 1997-2002; United Kingdom 1995-1999; Finland 1995-2002; Hungary 1996-2002; Spain 1999-2001 and Portugal 1996-2002.

2. Or nearest available year: Czech Republic 1995-2002; Sweden 1997-2000; Hungary 1998-2002; Netherlands 1997-2001; Japan 1997-2000 and Portugal 1996-2002.

Source: OECD, AFA, FATS and STAN databases, June 2005 in Criscuolo (2005).

The disproportionately large contribution of foreign affiliates to aggregate productivity growth is largely driven by a reallocation process in which highly productive affiliates become more important (see Box 3.2). They increase their market share at the expense of less efficient (domestic and foreign) firms in most industries. Next to this so-called "between effect", there also exists a significant "within effect" which shows productivity growth realised within firms. Foreign affiliates seem to be more successful than domestic firms in increasing their level of (labour) productivity, through additional investments (in capital and R&D), but in some cases also through downsizing of their activities in the host country.

Indirect effects of multinational firms on aggregate productivity

The presence of MNEs also affects the productivity of host countries in more indirect ways. As it increases import competition, the inflow of FDI may also spur domestic competition, resulting eventually in higher productivity, lower prices and more efficient resource allocation in host countries. Several studies have shown that the presence of foreign affiliates puts pressure on domestic firms to enhance their performance, thus improving productivity growth in domestic firms.

Box 3.2. Calculating the contribution of foreign affiliates to productivity growth

To measure the contribution of foreign affiliates to productivity growth, the OECD has put together a database with information from the AFA, FATS and STAN databases, containing information on the growth of labour productivity, measured as deflated value added over employment of affiliates and non-affiliates for the manufacturing sector of 12 OECD countries and for the service sector of nine OECD countries.

Total annualised labour productivity growth is defined as the weighted sum of domestic firms' productivity growth and foreign affiliates' productivity growth, where the weights used are the shares of domestic and foreign affiliates in total employment, as shown in the formula below:

$$\frac{1}{k} * \frac{\Delta LP_t}{LP_{t-k}} = \sum_{i=DOM,FOR} \frac{\frac{EMP_{it}}{EMP_t} LP_{i_t} - \frac{EMP_{it-k}}{EMP_{t-k}} LP_{i_{t-k}}}{LP_{t-k}} * \frac{1}{k}$$

where LP is labour productivity calculated as the ratio of real value added to labour input (EMP), Δ indicates change; k indicates the number of years between observations, so that the left-hand side is aggregate annualised labour productivity growth.

For each sector therefore the contribution to labour productivity growth of foreign affiliates can be calculated as:

$$1/k * \left(\left(\frac{EMP_{FOR,t}}{EMP_t} * LP_{FOR,t} - \frac{EMP_{FOR,t-k}}{EMP_{t-k}} * LP_{FOR,t-k} \right) \Big/ LP_{t-k} \right) = \underbrace{\frac{1}{k} * \frac{\Delta LP_{FOR,t}}{LP_{t-k}} * \overline{w}_{FOR}}_{within} + \underbrace{\Delta w_{FOR,t} * \frac{1}{k} * \frac{\overline{LP}_{FOR}}{LP_{t-k}}}_{between}.$$

The contribution to productivity growth by foreign affiliates derives from switches in labour resources between domestic and more productive foreign affiliates, the "between effect" (second term on the right hand), and how much is due to the labour productivity growth within the group of foreign affiliates, the "within effect" (first term). Thus, for example, the contribution of foreign affiliates to labour productivity growth might increase if there is an increase in its rate of productivity growth or its average employment share is higher (from the first term); and also if the employment share increases or if its labour productivity level is higher relative to the domestic average (from the second term)..

The economic literature identifies technology transfer as perhaps the most important channel through which foreign corporate presence may produce positive externalities on aggregate productivity in host countries. Technology and knowledge may spill over from foreign affiliates to domestic firms in host countries owing to the many interactions between them. Table 3.2 gives an overview of the different (potential) interactions between domestic and foreign firms. The literature usually distinguishes between backward linkages (with domestic suppliers), forward linkages (with customer firms and firms down the production chain) and horizontal linkages (with competing firms). However, whether and to what extent MNEs facilitate such spillovers varies according to context and industries.

Several studies have analysed empirically the extent of spillovers from foreign affiliates to domestic firms (for an overview, see Görg and Strobl, 2001), but most report sometimes contradictory results, as the impact on domestic firms of the entry of foreign firms is twofold. On the one hand, domestic firms can expect productivity gains through technological spillovers. On the other, the increased competition from foreign firms

diminishes the production of domestic firms and increases their average costs (market-stealing effect). As a consequence, the net impact of FDI on productivity may be either positive or negative and market structure matters. Furthermore, in a recent paper Liu (2006) discusses the possibility that domestic firms may have to devote scarce resources to learning and capacity building before spillovers can take place. These investments may lower their short-term productivity but raise the long-term rate of productivity growth of domestic firms. The evidence on FDI and technology diffusion is mixed but points overall to potential positive spillovers for domestic firms.

Table 3.2. A typology of interactions between domestic and foreign firms with potential technological spillovers for the host economy

Type of interaction	Backward (with suppliers)	Forward (with clients)	Horizontal (with competitors
Direct transfer of knowledge	Technology transfer contracts with suppliers Training programmes for suppliers Assistance to reach the standard set by the MNE	Training in the use of inputs produced by the MNE Licensing and technology transfer contracts to use the technology of the MNE Externality from the inputs produced by the MNE	Imitation, reverse engineering, demonstration effects
Incentives for local firms to increase their productivity	Competition among suppliers to sell products and services to the MNE Incentives from the MNE to improve quality, lower prices or reduce time to produce	Competition among domestic firms to become a client of the MNE More advanced technologies required to use the inputs produced by the MNE and requiring a technological upgrade	Increased competition with foreign firms
Indirect transfer of knowledge	Labour turnover between the MNE and its suppliers Former employees of the MNE creating own company as supplier	Higher productivity through better inputs and services produced by the MNE (embodied technologies) Labour turnover and former employees of the MNE creating a client firm	Labour turnover and former employees of the MNE creating a competing firm
Scale effects	Scale economies among suppliers from the increased demand for inputs with the entry of the MNE	Productivity gains through cheaper inputs produced by the MNE (scale economies of the MNE transmitted to domestic producers)	Scale economies through new export markets where domestic firms can sell following the example of the MNE

Source: Nordas *et al.* (2006), *Dynamic Gains from Trade*.

The evidence of positive spillovers is strongest and most consistent in the case of vertical linkages, in particular as concerns backward linkages with local suppliers. Multinational firms are found to provide technical assistance, training and other information to raise the quality of the suppliers' products. For example, MNEs may assist local suppliers in purchasing raw materials and intermediate goods and in modernising and upgrading production facilities. Empirical evidence on horizontal spillovers is more complex, because the entry of MNEs affects the industrial structure in the host country with potential negative effects. As such, studies on the horizontal dimension of spillovers have found mixed results. One reason may be the efforts by foreign affiliates to avoid spillovers of know-how to immediate competitors. Some recent evidence appears to indicate that horizontal spillovers are more important between firms operating in unrelated industries.

For technology transfer to generate externalities, the technologies need to be relevant to the host country business sector beyond the firm that receives them first. The

technological level of the host country business sector is of great importance, as domestic firms need to possess sufficient absorptive capacity. Evidence suggests that for FDI to have a more positive impact than domestic investment on productivity, the "technology gap" between domestic firms and foreign investors must be relatively small. Where differences are important or where the absolute technological level in the host country is low, domestic firms are unlikely to be able to absorb foreign technologies transferred via MNEs. Domestic R&D, *i.e.* business, government and university research, is key to tapping into foreign knowledge; countries that invest in their own R&D benefit most from foreign R&D (Guellec and Van Pottelsberghe, 2001).

Another mechanism through which MNEs may positively affect productivity in host countries is enhancement of human capital. The human capital of individuals employed by foreign affiliates may be improved by training and on-the-job-learning. Empirical and anecdotal evidence indicates that while considerable national and sectoral discrepancies exist, MNEs tend to provide more training and other upgrading of human capital than domestic firms. Subsidiaries of MNEs may also have a positive influence on human capital enhancement in other (domestic) firms with which they develop links, including suppliers. This enhancement can then have further effects when workers move to other firms and as some employees become entrepreneurs.

In recent years, increasing attention has been paid not only to the productivity effects of inward FDI, but also to the effects of outward FDI on productivity in home countries. More and more countries have emerged as important outward investors and outward investment increasingly includes important R&D investments abroad (see below). Concerns abound in home countries that MNEs may be giving away competitive advantages by investing in and transferring technology to other countries. The empirical literature on this important question is emerging but results are rather mixed.

Van Pottelsberghe and Lichtenberg (2001) is among the few studies to find a positive influence on domestic productivity of R&D spillovers owing to outward FDI. However, most studies report that the overseas activities of MNEs, particularly in R&D, benefit the competitiveness of the parent firms, but do not necessarily provide broader spillovers to the home country. UNCTAD (2005) suggests that the scope for positive effects on productivity in the home country is large when foreign affiliates undertake "innovative" R&D that tap into advanced knowledge centres abroad. The lack of empirical evidence on spillovers may be the result of the still high share of more adaptive R&D facilities in total R&D investments of R&D abroad.

Firm productivity effects of globalisation

Globalisation of activities and the global engagement of firms are generally thought to be positively related to their productivity performance. Numerous studies have documented that firms that export or import and/or have affiliates abroad have positive performance characteristics (for an overview, see Bernard *et al.*, 2005). Most empirical studies report that, in terms of productivity, multinational firms are the most productive, followed by exporting firms and then local firms. Exporting plants are found to be more productive, have a larger size and greater capital intensity, while MNEs are reported to pay higher wages and to be more innovative.

It is increasingly recognised that both exports and direct investment abroad may provide feedback to firms which can help to improve their productivity, although selection effects may also explain this empirical regularity (*i.e.* typically, it is more productive firms that start to export and/or invest abroad). In the former case, these

competitiveness gains have been called "learning by exporting", where firms learn to improve their products and processes through contact with more advanced foreign competitors in global export markets. Alternatively, consumers abroad might be more demanding, managerial techniques or other business practices more sophisticated or the regulatory environment more favourable. Exporting firms also have stronger incentives to be at the technological frontier and to sell cutting-edge products. "Learning by investing" arises not only from contacts with advanced foreign competitors and consumers, but also from acquiring additional competences through outward direct investment. This asset-seeking motive has become more important in recent FDI, including in R&D investments abroad by MNEs (see below).

Offshoring of activities is one specific form of global engagement and is likewise expected to have positive effects on firm productivity. Moreover, the sourcing of intermediate goods and services may also result in technological spillovers across borders. Recent empirical evidence generally supports the theoretical insight that productivity benefits from offshoring, especially from offshoring of services. This may be explained by the fact that material outsourcing is generally of a much larger magnitude than services outsourcing, and gains to such activities may therefore already be close to their optimum level. Offshore outsourcing of services, on the other hand, is growing from a much smaller level.

Plant-level estimates for Ireland (Görg and Hanley, 2003) and to some extent the United Kingdom (Girma and Görg, 2004) show little evidence of a productivity impact from material inputs offshore outsourcing in the electronics manufacturing industries. In contrast, Görzig and Stephan (2002), Görg and Hanley (2004) and Criscuolo and Leaver (2005) all provide evidence of a positive productivity impact of services outsourcing at the plant level. Amiti and Wei (2006) find also that service offshoring has a positive impact on productivity in the United States, accounting for around 11% of labour productivity growth; the positive effects of materials offshoring are found to be less supportive.

Furthermore, while the positive effects appear to be shaped by the global engagement of firms, the results appear mixed and seem to contradict each other to some extent. For the United Kingdom, Criscuolo and Leaver (2005) find that offshoring has a larger impact on the productivity of firms that are only engaged in global transactions through offshoring than for firms that are already globally engaged through exporting or multinational links. Girma and Görg (2004) find however that foreign ownership reinforces the effects of outsourcing (of materials and services combined) on productivity. Similarly, Görg and Hanley (2004) find that the magnitude of the productivity effects of material offshore outsourcing are similarly positive regardless of whether the plant is foreign or domestically owned (as long as it is an exporting firm) but that there is no productivity impact if the plant only operates domestically. From this, it seems that being active on the global scene when offshore activities are initiated is important for enhancing productivity with respect to material sourcing but does not appear to be the case with respect to services. In fact, the opposite is true and may indicate much stronger diminishing returns to offshoring with respect to services compared to materials.

Egger and Egger (2005) study the effects of international outsourcing of material inputs for different groups of workers and find that it has a negative effect on the productivity of low-skilled workers in the short run but a positive effect in the long run. They found that international outsourcing contributed to 3.3% of real value added per

low-skilled workers in the EU from 1993 to 1997. They attribute the negative short-run effect to imperfections in the EU labour and goods markets.

In a comparative study on services offshoring in three OECD countries (Ireland, Sweden and the United Kingdom), Criscuolo *et al.* (2006) report a positive albeit small impact on firm productivity. Distinguishing between manufacturing and services industries, the positive impact of services offshoring is found to be largest in manufacturing industries. The results for the United Kingdom show that only services offshoring to developed economies has a positive impact on firm productivity; offshoring to developing economies seems not to have a positive productivity impact (relative to domestic services). In addition, in all three countries larger and more productive firms are offshoring services, with multinational firms being most likely to engage in services offshoring.

References

Amiti, M. and S. Wei (2005), "Fear of Service Outsourcing: Is it Justified?", *Economic Policy*, April, CEPR, London.

Amiti, M. and S. Wei (2006), "Service Offshoring and Productivity: Evidence from the United States", NBER Working Paper, No. 11926.

Aubert, P. and P. Sillard (2005), "Offshoring and Job Losses in French Industry", Working Paper G 2005/03, INSEE, Paris.

Baily M.N. and D. Farrel (2004), "Exploding the Myth about Offshoring", McKinsey Global Institute, San Francisco.

Baldwin, R. (2006), "Globalisation: the Great Unbundling(s)", paper contributed to the project "Globalisation Challenges for Europe and Finland" of the Economic Council of Finland.

Banister, J. (2005), "Manufacturing Employment in China", *Monthly Labor Review*, July, pp. 11-29, Bureau of Labor Statistics, Washington, DC.

Bardhan, A.D. and C.A. Kroll (2003), "The New Wave of Outsourcing", Fisher Center for Real Estate and Urban Economics, University of California.

Bassanini, A. and S. Scarpetta (2001), "The Driving Forces of Economic Growth: Panel Data Evidence for the OECD Countries", *OECD Economic Studies*, No. 33, OECD, Paris.

Becker, S. O., K. Ekholm, R. Jaeckle and M.A. Muendler (2005), "Location Choice and Employment Decisions: A Comparison of German and Swedish Multinationals", CESIfo Working Paper No.1374.

Bhagwati, J., A. Panagariya and T.N. Srinivisian (2004), "The Muddles over Outsourcing", *Journal of Economic Perspectives*, Vol. 18, No. 4.

Blinder, A.S. (2006), "Offshoring: The Next Industrial Revolution?", *Foreign Affairs*, March/April.

Braconier, H. and K. Ekholm (2000), "Swedish Multinationals and Competition from High and Low Wage Locations", *Review of International Economics*, Vol. l.

Brainard, S.L. and D. Riker (1997), "US Multinationals and Competition from Low Wage Countries", NBER Working Paper, No. 5959.

Brainard, S.L. and D. Riker (2001), "Are US Multinationals Exporting US Jobs?", in *Globalisation and Labour Markets*, D. Greenaway and D.R. Nelson (eds.), Northhampton, Massachusetts.

Brown, S. and J. Spletzer (2005), "Labour Market Dynamics Associated with the Movement of Work Overseas", paper presented at OECD workshop on globalisation, Bureau of Labor Statistics, Washington, DC.

Criscuolo, C. (2005), "The Contribution of Foreign Affiliates to Productivity Growth: Evidence from OECD Countries", STI Working Paper 2005-8, OECD, Paris.

Criscuolo, C. and M. Leaver (2005), "Offshore Outsourcing and Productivity", paper presented at OECD workshop on globalisation, November 2005, OECD/ONS.

Criscuolo, C., A. Hanley, E. Hagsten and P. Karpaty (2006), "A Cross-Country Analysis of Services Offshoring Firms: Evidence from Ireland, Sweden and the U.K", internal OECD working document, OECD, Paris.

Deardorff A.V. (2005), "Gains from Trade and Fragmentation", Research Seminar in International Economics, The University of Michigan, Ann Arbor, Muchigan.

Desai, M.A., C.F. Fritz Foley and J.R. Hines Jr. (2005), "Foreign Direct Investment and Domestic Economic Activity", NBER Working Paper, No. 11717.

Dollar, D. (1992), "Outward-Oriented Developing Economies Really Do Grow More Rapidly: Evidence from 95 LDCs, 1976-1985", *Economic Development and Cultural Change*.

Edwards, S. (1998), "Openness, Productivity and Growth: What do we Really Know?", *Economic Journal*, Vol. 108.

Egger, H. and P. Egger (2001b), "International Outsourcing and the Productivity of Low-skilled Labour in the EU", WIFO Working Paper, No. 152.

European Commission (2005b), *The EU Economy 2005 Review, Rising International Economic Integration: Opportunities and Challenges*, Brussels.

European Commission (2006), *European Economy, Globalisation: Trends, Issues and Macro Implications for the EU*, Brussels.

Feenstra, R.C. and G.H. Hanson (1999), "The Impact of Outsourcing and High-Technology Capital on Wages: Estimates for the United States, 1979-1990", *Quarterly Journal of Economics*, Vol. 114, Issue 3.

Feenstra, R.C. and G.H. Hanson (2003), "Global Production and Inequality: A Survey of Trade and Wages" in *Handbook of International Trade*, K. Choi and J. Harrigan (eds.), Oxford.

Forrester Research – J.C. McCarthy (2004a), "Near-Term Growth of Offshoring Accelerating", Cambridge, Massachusetts.

Forrester Research – A. Parker (2004b), "Two-Speed Europe: Why 1 Million Jobs Will Move Offshore", Cambridge, Massachusetts.

Frankel, J.A. and D. Romer (1999), "Does Trade Cause Growth?", *American Economic Review*, Vol. 89, No. 3.

Freeman, M. (1995), "Are Your Wages Set in Bejing?", *Journal of Economic Perspectives*, Vol. 9.

Friedman, Th. (2005), *The World is Flat: A Brief History of the Twenty-first Century*, Farrar, Straus and Giroux, New York.

Garner C.A. (2004), "Offshoring in the Service Sector: Economic Impact and Policy Issues", *Economic Review*, Federal Reserve Bank of Kansas City, Third Quarter.

Girma, S. and H. Görg (2004), "Outsourcing, Foreign Ownership, and Productivity: Evidence from UK Establishment-level Data", *Review of International Economics*, Vol. 12, Issue 15.

Goldman Sachs Global Economic Research (2003), *Offshoring: Where Have all the Jobs Gone?*, New York.

Görg, H. and E. Strobl (2001), "Multinational Companies and Productivity Spillovers: A Meta-analysis", *Economic Journal*, Vol. 111, No. 475.

Görg, H. and A. Hanley (2003), "Does Outsourcing Increase Profitability", Working Paper No. 1, Nottingham University Business School.

Görg H. and A. Hanley (2004), "International Outsourcing and Productivity: Evidence from Plant Level Data", Leverhulme Centre for Research on Globalisation and Economic Policy, Nottingham.

Grossman, G. and E. Rossi-Hansberg (2006), "The Rise of Offshoring: It's Not Wine for Cloth Anymore", paper presented at the Federal Reserve Bank of Kansas City.

Guellec, D. and B. Van Pottelsberghe de la Potterie (2001), "R&D and Productivity Growth: A Panel Analysis of 16 OECD Countries", STI Working Paper No. 2001-3, OECD, Paris.

Hanson, G.H., R.J. Mataloni Jr. and M.J. Slaughter (2005), "Expansion Abroad and the Domestic Operations of U.S. Multinational Firms", Working Paper, Tuck Business School, Dartmouth College.

Harrison, A. (1996), "Openness and Growth: A Time-Series, Cross-Country Analysis for Developing Countries", *Journal of Development Economics*, Vol. 48.

Harrison, A.E. and M. McMillan (2006), "Outsourcing Jobs? Multinationals and US Employment", NBER Working Paper, No. 12372.

Hillberry, R. and D. Hummels (2005), "Trade Responses to Geographic Frictions: A Decomposition Using MicroData", unpublished paper, Purdue University.

Hijzen, A., G. Holger and R.C. Hine (2004), "International Outsourcing and the Skill Structure of Labour Demand in the United Kingdom", IZA Discussion Paper No. 1249, Bonn.

Hoekman, B. and L.A. Winters (2005), "Trade and Employment: Stylized Facts and Research Findings", Working Paper Series, The World Bank, Washington, DC.

Jensen, J.B. and L.G. Kletzer (2005), "Tradable Services: Understanding the Scope and Impact of Services Outsourcing", Institute for International Economics, Working Paper Series, WP 05-9. Washington, DC.

Kirkegaard, J.F. (2004), "Outsourcing – Stains on the White Collar?", Institute for International Economics, Working Paper Series WP 04-3, Washington, DC.

Kirkegaard, J.F. (2005), "Outsourcing and Offshoring: Pushing the European Model over the Hill, Rather than Off the Cliff!?", Institute for International Economics, Working Paper Series WP 05-1, Washington, DC.

Konings, J. and A.P. Murphy (2003), "Do Multinational Enterprises Relocate Employment to Low Wage Regions? Evidence from European Multinationals", Centre for Transition Economics University of Leuven Discussion Paper No. 13103.

Levy, F. and R. Murnane (2004), *The New Division of Labour,* Princeton University Press, Princeton, NJ.

Liu, Z. (2006), "Foreign Direct Investment and Technology Spillovers: Theory and Evidence", *Journal of Development Economics*, forthcoming.

Mankiw, N.G. and P. Swagel (2006), "The Politics and Economics of Offshore Outsourcing", NBER Working Paper Series, WP 12398, Cambridge, Massachusetts.

Mann, C. (2003), "Globalisation of IT Services and White Collar Jobs: The Next Wave of Productivity Growth", International Economics Policy Brief 03-11, Institute for International Economics, Washington, DC.

Mann, C. (2005), "Globalisation, Information Technology and U.S. Economic Performance", paper presented at the conference on "Globalisation: Prospects and Problems", University of Florida, January.

Markusen, J.R. (2005), "Modeling the Offshoring of Whit- Collar Services: From Comparative Advantage to the New Theories of Trade and FDI", paper prepared for the Brookings Forum "Offshoring White-collar Work: The Issues and Implications".

McKinsey Global Institute (2003), "Offshoring: Is it a Win-Win Game?", San Francisco, California

McKinsey Global Institute (2005), "The Emerging Global Labour Market", San Francisco, California.

National Academy of Public Administration for the U.S. Congress and the Bureau of Economic Analysis (2006), *Offshoring: An Elusive Phenomenon*, Washington, DC.

Nordas, H., S. Miroudot and P. Kowalski (2006), "Dynamic Gains From Trade", TD/TC/WP(2006)34/FINAL, OECD, Paris.

OECD (2005a), *OECD Economic Globalisation Indicators*, OECD, Paris.

OECD (2005b), *OECD Employment Outlook 2005*, OECD, Paris.

Pilat, D., A. Cimper, K. Olsen and C. Webb (2006), "The Changing Nature of Manufacturing in OECD Countries", STI Working Paper 2006-9, OECD, Paris.

Sachs, J. and A. Warner (1995), "Economic Reform and the Process of Global Integration", Brookings Papers on Economic Activity, No. 1, Washington, DC.

Schultze, C.L. (2004), "Offshoring, Import Competition and the Jobless Recovery", The Brookings Institution Policy Brief No. 136.

Slaughter, M. (2004), "Insourcing Jobs: Making the Global Economy Work for America", Dartmouth College, Organization for International Investment.

Slaughter, M.J. and P. Swagel (1997), "The Effect of Globalisation on Wages in the Advanced Economies", IMF Staff Studies for the *World Economic Outlook*.

UNCTAD (2004), *World Investment Report 2004*, *The Shift Towards* Services, New York.

UNCTAD (2005), *World Investment Report 2005, Transnational Corporations and the Internationalisation of R*&D, New York.

United States Government Accountability Office (US GAO) (2004), "International Trade: Current Government Data Provide Limited Insight into Offshoring of Services", GAO-04-932.

United States Government Accountability Office (2005a), "International Trade: U.S. and India Data on Offshoring Show Significant Differences", GAO-06-116.

United States Government Accountability Office (2005b), "Offshoring of Services: An Overview of the Issues", GAO-06-05.

Van Pottelsberghe de la Potterie, B. and F. Lichtenberg (2001), "Does Investment Transfer Technology Across Borders?", *Review of Economics and Statistics*, Vol. 83, Issue 3.

Van Welsum, D. and G. Vickery (2005), "The Share of Employment Potentially Affected by Offshoring – An Empirical Investigation", DSTI/ICCP/IE(2005)8/FINAL, OECD, Paris.

Van Welsum, D. and G. Vickery (2006), "Potential Impacts of International Sourcing on Different Occupations", available at: www.oecd.org/document/31/0,2340,en_2649_33757_36928671_1_1_1_1,00.html.

Chapter 4

Towards a Knowledge Economy: A Challenge for All Countries

This chapter discusses the impact of globalisation on the competitiveness of OECD countries by analysing the evolution of comparative advantages of individual countries as well as on de-industrialisation in developed countries. Empirical evidence is used to assess how rapidly OECD countries are moving up the value chain and shift to more knowledge-intensive activities. But this structural process seems to be taking place not only in OECD countries, as China is also moving up the value chain. The extent of the upgrading of the Chinese economy is examined, together with China's importance in the increasing internationalisation of R&D.

Structural change towards a knowledge economy

The process of globalisation strongly affects countries' industrial structure and dynamics and leads to widespread changes in the allocation of production. The integration of new players in the global economy challenges existing comparative advantages and competitiveness, forcing countries to search for new activities that will allow them to deal with the increased competition. In general terms, countries and regions become more specialised while firms and industries become geographically more dispersed. While these developments are not in themselves new, the fragmentation of global value chains, the international sharing of production, and the rapid growth of China and India have accelerated and deepened the process.

Patterns of comparative advantage change over time on the basis of various factors that allow countries to specialise in certain activities. As more less developed countries participate in the global economy and their economic development increases, more sophisticated ways of producing and competing become necessary. Countries move up the value chain and become more specialised in more knowledge-intensive, higher-value-added activities. Specialisation in traditional cost-based industries and activities is no longer a viable option for most developed countries. The presence of natural resources in OECD countries such as Australia and Canada may however soften pressures to evolve towards a more knowledge-intensive economy, although in fact these countries use technology in their resource industries.

Several theoretical models describe the stages of economic development and the resulting changes in industrial competitiveness (Porter, 1990). In a contribution for the World Economic Forum's *Global Competitiveness Report* (2004), Sala-I-Martin distinguishes three broad stages of development and defines countries' competitiveness in terms of the set of institutions, policies and factors that determine their level of productivity. As the level of productivity sets the sustainable level of prosperity that can be earned by an economy, more competitive economies tend to be able to produce higher levels of incomes.

In the most basic stage of this model, *i.e.* the factor-driven stage, economic growth is mainly due to higher use of the factors of production. Countries take advantage of their cheap production factors (land, labour), and their firms mainly produce commodities and standardised products and compete primarily on price. To be competitive in this stage, an economy must fulfil some basic conditions, such as good institutions, sufficient infrastructure, a large pool of basic human capital, macroeconomic stability and overall personal security.

In the second stage of the efficiency-driven stage, efficient production becomes the main source of competitiveness and economic growth. The quality (not only the price) of an economy's products and especially the efficiency of the production processes determine firms' productivity. This higher efficiency is based on more efficient and competitive goods markets, labour markets and financial markets. Overall efficiency is also enhanced by better and more abundant human capital and access to the best technologies. International exposure is especially important in this respect.

In the third stage, *i.e.* the innovation-driven stage, successful economies can no longer compete on price because of the high cost of the factors of production, but efficiency possibilities are also exhausted as they approach the technological frontiers. Countries and firms compete through product differentiation, quality and innovation. Business sophistication and innovation become the important factors in a country's competitiveness, and institutions and incentives that support innovation and knowledge creation become crucial factors.

These new ways of competing ensure that overall gains arise from trade and that all countries (but not necessarily all workers, as discussed above) may benefit from globalisation. However, there are widespread concerns that the emergence of large countries such as China and India may render more developed countries uncompetitive in most industrial activities, including more knowledge-intensive industries, as these new players have important cost advantages and much skilled labour. The rise of these countries not only in manufacturing but recently also in services offshoring has reinforced these concerns. Both countries seem to have moved rapidly up the value chain: China in the production of information and communication technology (ICT) goods and India in information technology (IT)-enabled services.

These concerns now seem to be shared by some economists who argue that the integration of these large economies may lead to negative outcomes for developed countries (Gomory and Baumol, 2000; Samuelson, 2004). The large availability of skilled workers combined with the technology transfer from developed countries, often through multinational enterprises (MNEs) will enable these low-cost economies to compete in the sectors in which developed countries have a comparative advantage. Competition from these low-cost countries may lead to a decrease in skilled wages (via a deterioration of the terms of trade) and overall losses from globalisation in developed countries. In a theoretical model, Samuelson (2004) shows that technical progress in developing countries has the potential to reduce welfare in developed countries, as changes in productivity and skill levels can eventually erode the overall gains in higher-wage economies.

Other economists have quickly refuted these claims, arguing that this may be a theoretical outcome but that in reality things will not be so negative. Dixit and Grosmann (2005) report that US terms of trade have improved since 1990, thus contradicting Samuelson's theoretical predictions. More detailed analyses of the activities of both countries seem to indicate that India and China are still relatively specialised in lower-value-added activities and are very dependent on imported technology from abroad (see below). Moreover, countries are likely to develop new comparative advantages through new products, processes and activities because of the different endowments and technologies of developed and less developed countries (Bhagwati *et al.*, 2004). Even if endowment differences become smaller, gains from trade may increasingly stem from intra-industry trade.

The future of manufacturing industries in particular is increasingly discussed in developed countries in light of the economic integration of emerging low-cost countries. Globalisation is often seen as the culprit behind the de-industrialisation of OECD countries since increasing offshoring and relocation of activities are considered to contribute greatly to the decreasing importance of manufacturing in total employment. However, while this process is to some extent related to globalisation, de-industrialisation is mainly the "natural" outcome of countries' continued (economic) development and is due to rapid changes in productivity in the manufacturing sector and a shift in demand to

services. Like globalisation, de-industrialisation results in major structural changes in the economy and raises important new challenges.

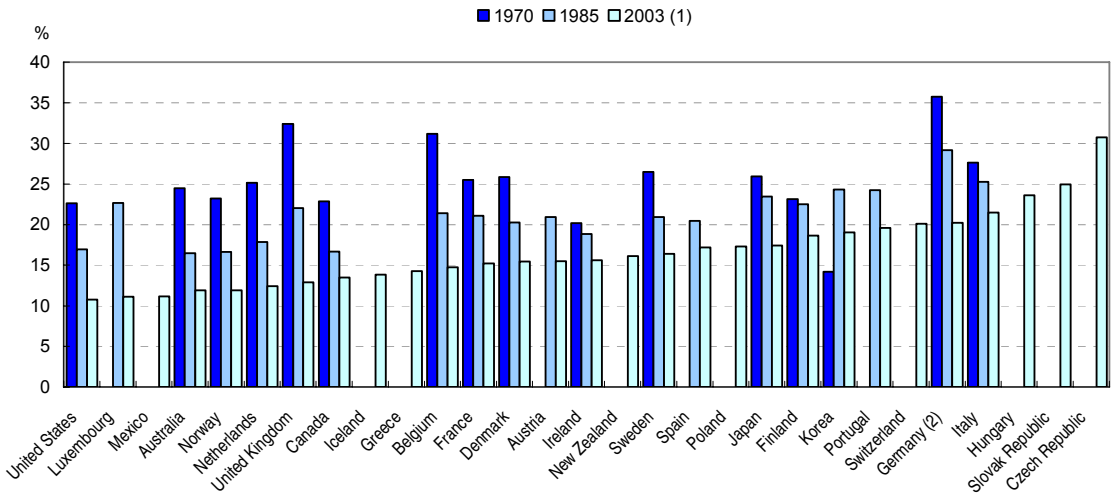
The next section discusses in more detail the process of de-industrialisation and its relation to globalisation. Developed countries face new challenges in order to accommodate and benefit from a structural process that completely changes their industrial structure. The following section describes how OECD countries have responded to this changing environment and examines, more specifically, whether and how the knowledge economy is emerging in the OECD area as well as in new players such as China and India. This shift is then discussed in greater detail and the globalisation of value chains is identified as a driving force behind this evolution in China. A final section discusses the internationalisation of R&D, as this recent phenomenon seems to endanger the competitiveness of developed countries, even in higher-technology activities.

De-industrialisation

Most OECD countries have experienced de-industrialisation

Cross-country evidence on manufacturing employment shows that since the 1970s most OECD countries have experienced a steady decline in the share of manufacturing in total employment. Between 1985 and 2003, the process of de-industrialisation was especially apparent in Germany, the United Kingdom and Luxembourg. The absolute share of manufacturing in employment has declined the least over the past two decades in Canada, Ireland, Italy and Spain (Figure 4.1). Underlying the declining employment share of manufacturing are two factors: an absolute decline in the number of manufacturing workers in virtually all OECD countries, with the exceptions of Canada, Ireland, Mexico, New Zealand and Spain, as well as rapid employment growth in the services sector (Wölfl, 2005).

Figure 4.1. Share of manufacturing in total employment, 1970, 1985 and 2003[1]



1. Or latest available year.

2. Germany before 1991 refers to West Germany.

Source: OECD STAN Indicators Database in Pilat *et al.* (2006), "The Changing Nature of Manufacturing in OECD Countries".

De-industrialisation results not only in a declining share of employment in manufacturing but also in a slowly declining share of manufacturing in value added at current prices owing to price effects (Wölfl, 2005; OECD 2005a). Since much of the manufacturing sector is characterised by high productivity growth, prices of manufacturing products tend to increase little over time and may even fall. This contrasts with the experience of many parts of the services sector, where productivity growth has been slower and prices tend to rise more strongly over time. As a result of the gradual process of de-industrialisation, services account for the largest share of value added created in OECD economies. Some are relatively more oriented towards services (*e.g.* the United States), while others still have a large manufacturing sector (*e.g.* Ireland and Korea) or a significant agricultural sector (Turkey). By 2002, services (public sector included) accounted for about 72% of OECD value added; while manufactures accounted for only about 17%.

Basically, de-industrialisation is part of a larger, gradual long-term process of structural change. In the initial stages of economic development, agriculture typically accounts for the bulk of GDP and employment, as is still the case in many developing countries. In later stages, its share in total value added and employment declines and the manufacturing sector grows as economies industrialise. In later stages of economic development, services become more important at the expense of the manufacturing sector. De-industrialisation does not mean, however, that manufacturing production and value added have been falling in absolute terms, as is clearly shown by the continuing rise of manufacturing production and value added in constant prices. The available data point to strong growth in manufacturing production and value added, in particular in certain key OECD countries, such as Canada and the United States (Figure 4.2). In European countries, in particular in Germany, Italy and the United Kingdom, manufacturing value added has grown little in recent years, and this is also the case for Japan since the early 1990s. Outside the G7 countries, manufacturing value added in OECD countries increased particularly rapidly in recent years in Finland, Hungary, Korea, Mexico, Poland and Sweden.

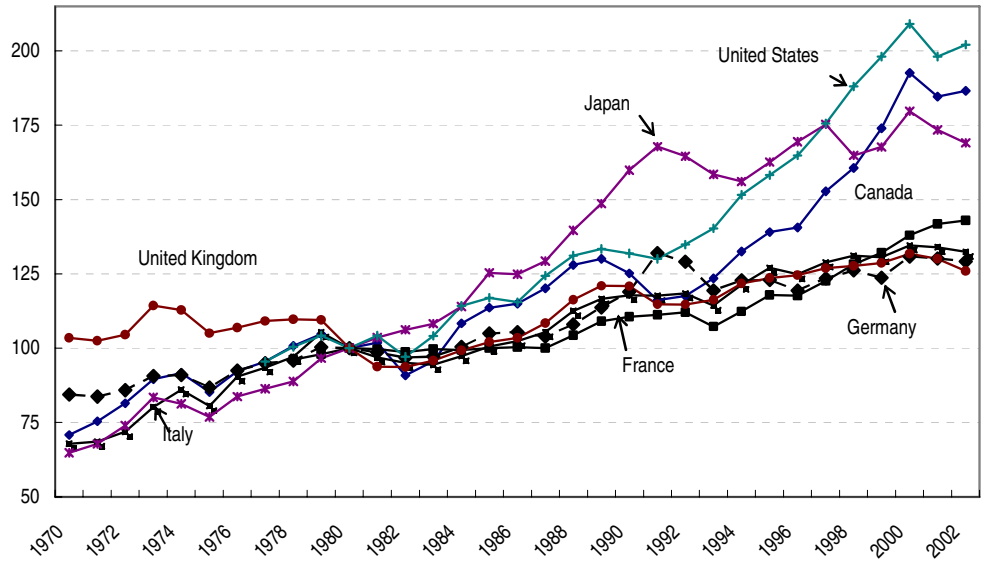
Is globalisation leading to de-industrialisation?

In recent years globalisation and offshoring specifically have often been associated with the observed trend towards de-industrialisation, as declining employment in manufacturing coincides with accelerated international competition and offshoring. If manufacturing employment has fallen in OECD countries, it may be asked what has happened in non-OECD economies. Have jobs in fact been shipped offshore? Although the available data are not readily comparable, the limited evidence on trends in manufacturing employment in non-OECD countries suggests that the decline in manufacturing employment in OECD countries has not been accompanied by an increase in non-OECD economies. ILO (International Labour Organisation) and UNIDO (United Nations Industrial Development Organisation) employment estimates for key non-OECD countries such as Brazil, China and Russia show that manufacturing employment has also declined in these countries, very substantially in some of them. For example, a recent study (Conference Board, 2004) cites a net job loss of more than 4 million jobs between 1995 and 2002 in China's manufacturing sector, while a recent US Bureau of Labor Statistics report shows that manufacturing employment in China fell from 98 million workers in 1995 to 83 million in 2002 (Banister, 2005). At the same time, manufacturing employment has remained relatively stable in other large countries such as India and Indonesia. The key factor responsible for the decline in manufacturing employment in

countries such as China and Russia is rapid productivity growth, since economic restructuring has been accompanied by the closing of many inefficient state-owned plants (Conference Board, 2004).

Figure 4.2. Index of manufacturing value added, G7 countries, 1970-2002

Volume index (based on constant prices), 1980=100[1]



1. In the OECD STAN database data on value added are available for more countries than data for production. For countries where both indicators are available, the trends are fairly similar.

Source: OECD STAN database in Pilat *et al*. (2006), "The Changing Nature of Manufacturing in OECD Countries".

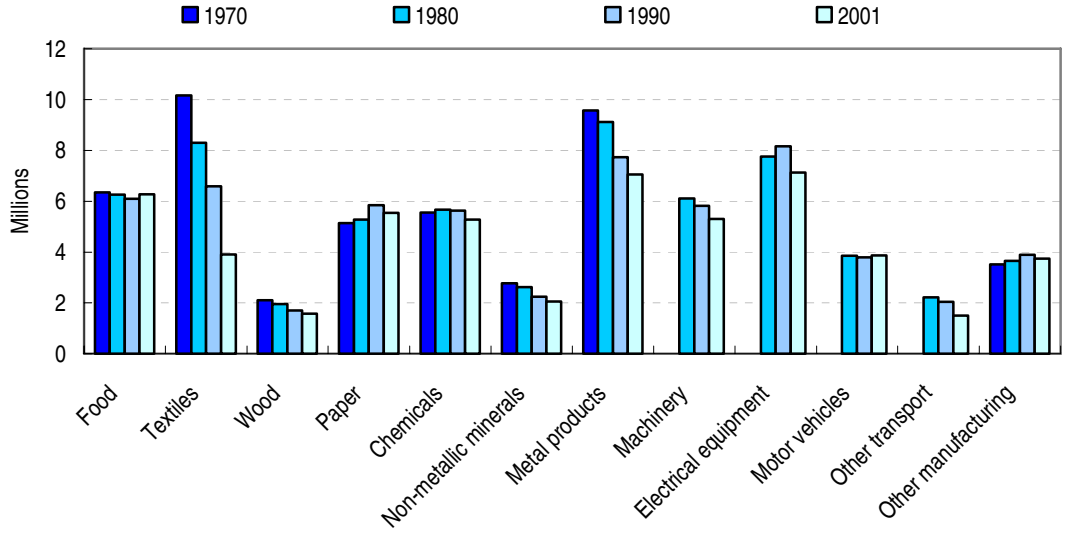
The decline in manufacturing employment in OECD countries is thus due not only to a shift of production from OECD to non-OECD countries, although this has certainly played a role for some countries and some industries. Globalisation has increased competition, thereby stimulating technological improvements and productivity growth, while at the same time it has rendered certain (labour-intensive) activities unprofitable in developed countries. For the 1970-94 period, Rowthorn *et al.* (1998, 2004) estimate that less than 20% of the de-industrialisation in the United States and the EU can be explained by increasing openness; post-1994 they find that the contribution of globalisation has increased. In line with this, Bolhoul and Fontagné (2006) estimate that the contribution of trade with low-wage countries explains on average one-fifth of the observed decline in the share of manufacturing employment for 16 OECD countries. The authors also calculated what manufacturing employment in 2002 would be if countries had maintained their trade ratios with low-wage countries at the 1970 level. For the United States, Japan and France, for example, trade with developing countries is estimated to have led to the displacement of around 3.3 million, 1.4 million and 350 000 manufacturing jobs, respectively. While these absolute numbers seem large, they have to be viewed relative to the total churning of the labour market.

While overall manufacturing employment has declined, not all sectors have fared equally. Figure 4.3 shows manufacturing employment for key manufacturing sectors for the G7 countries, which account for approximately 70% of manufacturing employment in OECD countries. The graph shows that most of the decline in manufacturing employment

over the past three decades has occurred in only two activities, textiles and metal products. In these industries, international competition from low-cost countries has played an important role in reducing manufacturing employment in OECD countries and will likely become even more important with the recent change in the trade regime for the textiles sector (Pilat *et al.*, 2006).

In several activities, notably food products, paper products, chemicals, motor vehicles and other manufacturing, manufacturing employment in the G7 countries has been relatively stable (Figure 4.3). In others, such as wood products and machinery, it has only declined a little. OECD countries maintain a comparative advantage in certain sectors of manufacturing activity and have been faced with strong demand for products of certain manufacturing sectors, *e.g.* pharmaceuticals and motor vehicles. In other industries, such as food products, manufacturing production is often located close to the market, and international competition is typically not an important source of job loss. Indeed, some industry analysts suggest that offshoring of production in such industries may make little sense, since the benefits of having a short, responsive local supply chain may outweigh the costs of higher wages (Ritter and Sternfels, 2004).

Figure 4.3. Manufacturing employment by key activity, G7 countries, 1970-2001, million workers



Source: OECD STAN Database in Pilat *et al.* (2006), "The Changing Nature of Manufacturing in OECD Countries".

De-industrialisation largely remains a "domestic" phenomenon

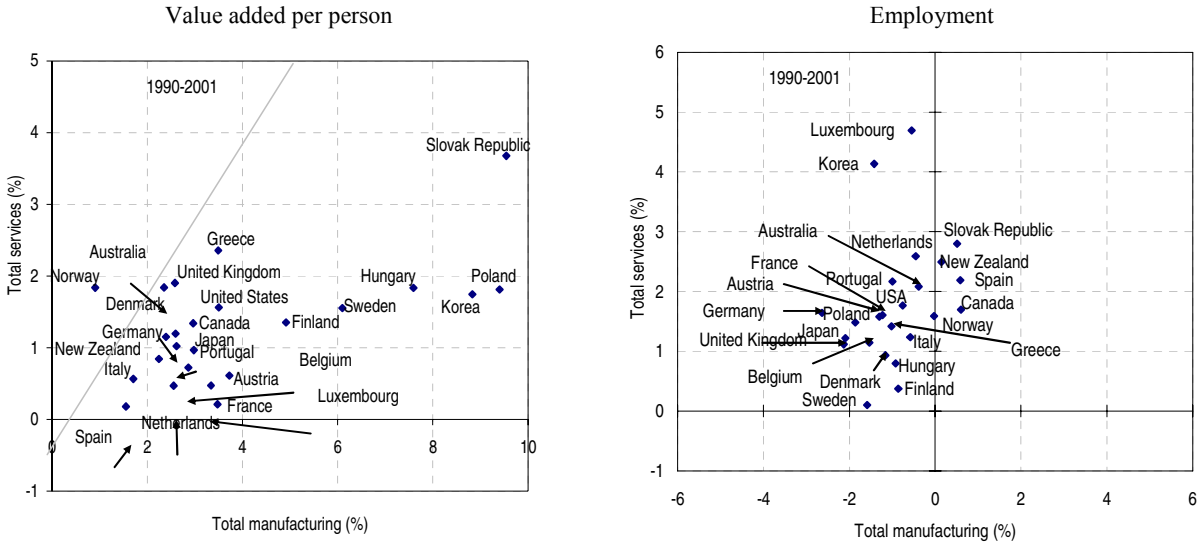
While international factors are responsible for a part, albeit relatively small, of the decline in manufacturing employment, de-industrialisation largely remains a domestic issue. The key factor driving the decline in manufacturing employment is the difference in productivity growth between manufacturing and services (Baumol, 1967). Technological progress and scale economies allow for larger productivity increases in the manufacturing sector than in the services sector. The increase in wage levels, which are typically strongly correlated between manufacturing and services, results in substantial productivity growth, employment losses and limited price increases (and in some industries even price decreases) in manufacturing. In contrast, the lesser (international)

competition and the limited opportunities for productivity enhancement accommodate much more easily price increases and employment growth in service industries.

Figure 4.4 provides an aggregate perspective on the unbalanced productivity growth between the manufacturing and the services sector in OECD economies (left panel). Equal productivity growth in manufacturing and services sectors would imply that all country points are on or close to the 45° line in the graph. Most countries are located to the right of the line, however, indicating that productivity growth is higher in manufacturing than in services in almost all OECD countries. The figure also illustrates that, at the aggregate level, the differential in productivity growth between the manufacturing and the services sector coincides with a reallocation of labour resources towards the services sector (right panel). Most country points are located in the top left quarter of the figure, *i.e.* in most countries employment growth is positive in services, but negative in manufacturing.

Figure 4.4. Growth in value added per person employed and employment growth in manufacturing and services[1]

Annual average percentage growth rates, 1990-2001[2]



1. The services sector covers ISIC classes 50-99.

2. Or latest available year, Germany: 1992-2001

Source: OECD STAN Indicators Database in Wölfl (2005), "The Service Economy in OECD Countries".

Apart from productivity differences between manufacturing and services, factors relating to the demand for services also (partly) explain de-industrialisation. First, the demand for services is perceived to be income-elastic so that an increase in incomes leads to more than proportionate increases in demand. This is typically the case for services such as leisure activities, high-quality health and care services, higher education or other services, such as travel, that may contribute to better quality of life. Second, demographic changes are also likely to affect demand patterns as declining birth rates and longer life expectancy in industrialised countries are resulting in a rapidly ageing population. This is turn causes demand for certain goods and services (*e.g.* primary schooling) to decline and

demand for others (*e.g.* health and personal services) to rise. Third, demand for some services, notably education and health services, is closely linked to the size of welfare states in OECD countries. Previous empirical work has reported that the size of the welfare state has a significant positive effect on the share of services in total employment (OECD, 2000).

The interaction between services and manufacturing is increasing

The discussion of de-industrialisation becomes more complex as the distinction between manufacturing and services blurs and interaction between services and manufacturing increases. The manufacturing sector is taking on characteristics of the services sector, with a growing share of services occupations and more revenues being derived from services. For their part, services are becoming more like manufacturing as they are increasingly tradable and have growing impacts on other sectors of the economy.

Interactions between manufacturing and services are increasingly complex and comprise several forms of interaction, including outsourcing of services activities from manufacturing firms to services firms as well as the use of intermediate inputs from independent service providers that were not previously integrated in the firm or industry producing the final good. Input-output (I-O) tables demonstrate that services make important contributions to manufacturing production, both through their direct contribution to total output and final demand and through their indirect contribution via deliveries of intermediate inputs. The amount of services sector value added that is embodied in manufacturing goods has risen slowly over time and amounted to up to 25-30% of total output in some countries in the mid-1990s.

Even though services now contribute as providers of intermediate inputs to the performance of other industries, their role remains more limited than that of the manufacturing sector. The services sector is more independent from other industries than the manufacturing sector as most of the inputs necessary to produce demand for services derive from the services sector itself. Manufacturing industries interact much more strongly with other industries, both as providers and as users of intermediate inputs (Pilat and Wölfl, 2005).

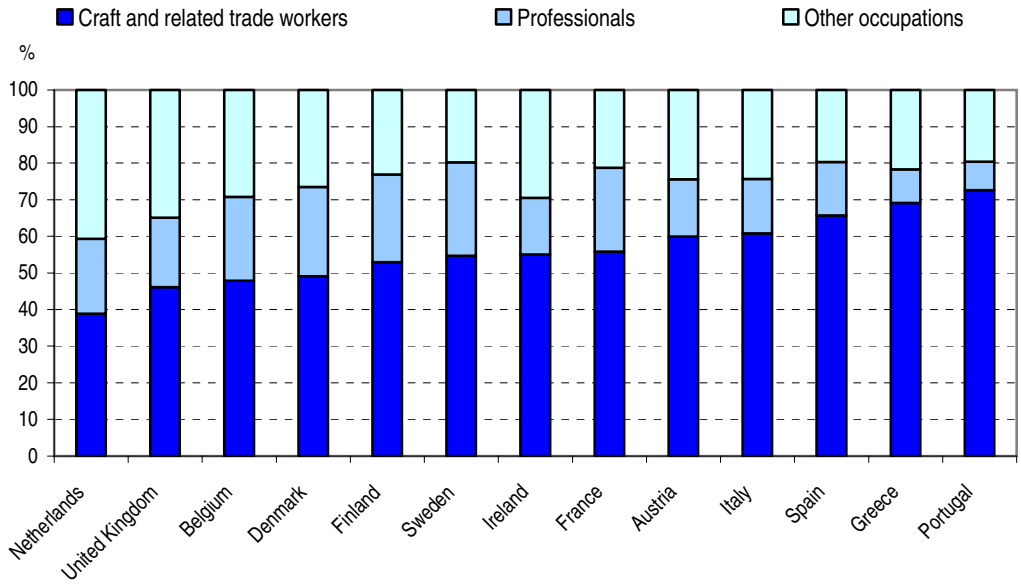
Several service jobs are undertaken within the manufacturing sector, as only about 60% of all manufacturing workers can still be considered "production" workers. In 2002 an average of about 40% of all persons employed in the manufacturing sector was estimated to be employed in occupations that can be broadly considered as service-related, *e.g.* management, business, finance and legal professionals. The share of service-related occupations is particularly high in the Netherlands and the United Kingdom but remains relatively low in Portugal and Greece (Figure 4.5). Notwithstanding the increasing outsourcing of certain service activities by manufacturing firms, the growing share of workers in the manufacturing sector engaged in services-related occupations may reflect the increasing trend towards vertical integration of functions, but also towards the bundling of products and services in a package, *e.g.* combining car sales with a financial package, and the changing nature of manufacturing products more generally.

All this suggests that manufacturing industries in developed economies are increasingly composed of higher-value-added activities, including in more traditional industries. Innovation, coupled with high productivity, is necessary if developed economies are to stay competitive in rapidly globalising manufacturing industries. Services sectors have become more important in OECD economies, not only as the result

of changing consumer demand, but also because of the outsourcing of activities by manufacturing firms.

Figure 4.5. Share of production and services workers in the manufacturing sector

As a percentage of total employment of manufacturing, 2002



Source: EULFS, 2002 in Pilat *et al*. (2006), "The Changing Nature of Manufacturing in OECD Countries".

Moving up the value chain in OECD countries

The importance of knowledge in OECD-area industries is growing

Increasing global competition requires developed economies to move up the value chain in order stay competitive, and investment in knowledge is a crucial factor for sustained economic growth, job creation and improved living standards in OECD countries. Calculated as the sum of expenditure on research and development (R&D), higher education and software, investment in knowledge amounted in 2001 to 5.2% of gross domestic product (GDP) in the OECD area, a share that has increased over time. If expenditure for all levels of education is included in the definition, investment in knowledge is in excess of 9% of GDP for the OECD area as a whole.

The ratio of investment in knowledge to GDP varied from 2.2% to 7.2% across OECD countries, with the lowest shares in southern European countries and the highest in the Nordic countries, Korea and the United States (Figures 4.6 and 4.7). For all reported countries, except Ireland, the ratio of investment in knowledge to GDP in 2002 was higher than in 1994. For the majority of countries, increases in software expenditure were the major source of increased investment in knowledge. Notable exceptions are Finland (R&D expenditure was the main source of increase) and Spain (higher education was the main source of increase).

Figure 4.6. Investment in knowledge

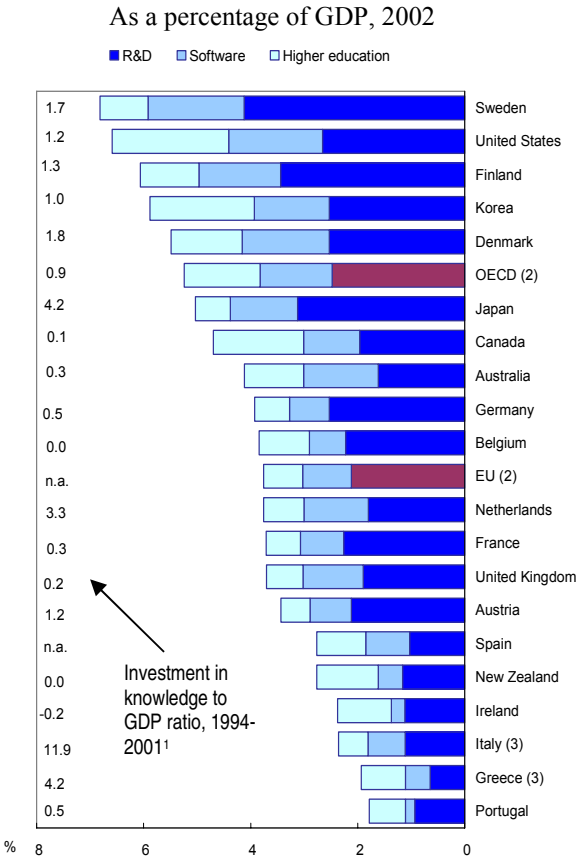
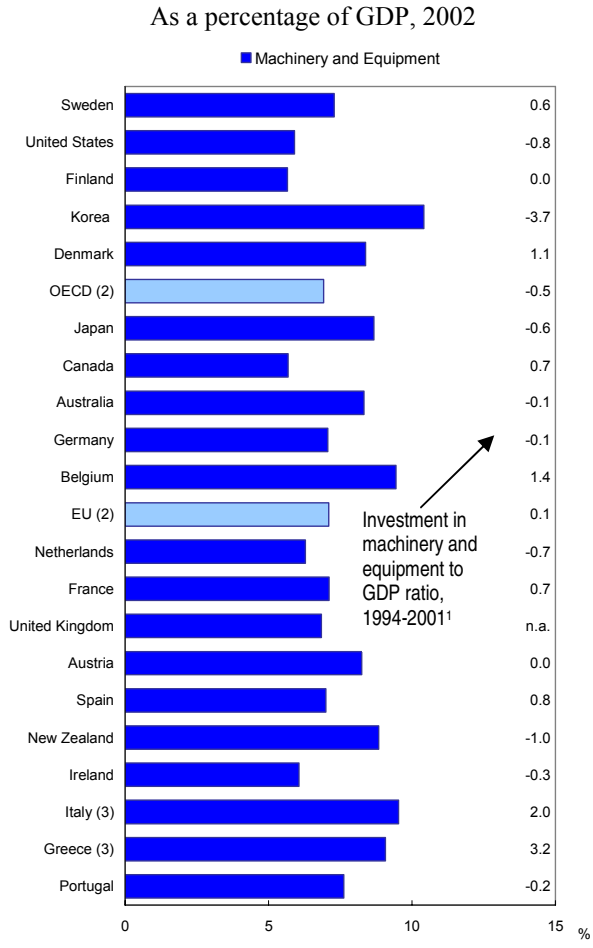


Figure 4.7. Investment in machinery and equipment



1. 1994-2001 for Greece and Italy. 1995-2002 for Korea.

2. EU figure excludes Belgium, Greece and Italy. OECD figure excludes Belgium, Greece, Italy and New Zealand.

3. 2001 data.

3. 2001 data.

Source: OECD (2005b), *OECD Science, Technology and Industry Scoreboard*.

In order to reap the benefits of globalisation, OECD countries move to higher–value-added activities, as illustrated by the growing share of higher-technology-intensive industries in value added. All industries generate and/or exploit new technology and knowledge to some extent, but some are more technology- and/or knowledge-intensive than others (see Box 4.1). In 2002, high- and medium-high-technology manufacturing accounted for about 7.5% of total OECD value added, a figure that has risen slightly in recent decades (Figure 4.6). High- and medium-high-technology manufacturing have been a significant driver of economic growth (with the emphasis moving from ICT goods to health-related products), especially in Ireland. They now account for about 21% of total value added, significantly above the OECD average.

Box 4.1. Measuring technology- and knowledge-intensive industries

A technology classification of manufacturing industries is based on ISIC Rev. 3 R&D intensities of 12 OECD countries in the 1990s. The division of manufacturing industries into high-technology, medium-high-technology, medium-low-technology and low-technology groups was made after ranking the industries according to their 1991-99 average against aggregate OECD R&D intensities. Industries classified in higher categories have a higher average intensity for both indicators than industries in lower categories (see Annex A).

Capturing "knowledge-intensive" services sectors has proved more challenging and efforts continue as more detailed data on the services sector become available in OECD countries. Based on previous analysis of users of embodied technology (based on input-output tables), recently available (though limited) R&D intensities for services sectors and a preliminary evaluation of the composition of workforce skills by activity, the following ISIC Rev. 3 "market" service activities are considered knowledge-intensive ("Real estate activities" (over 10% of total OECD area value added) are excluded, as a significant proportion consists of "Imputed rent of owner-occupied dwellings"):

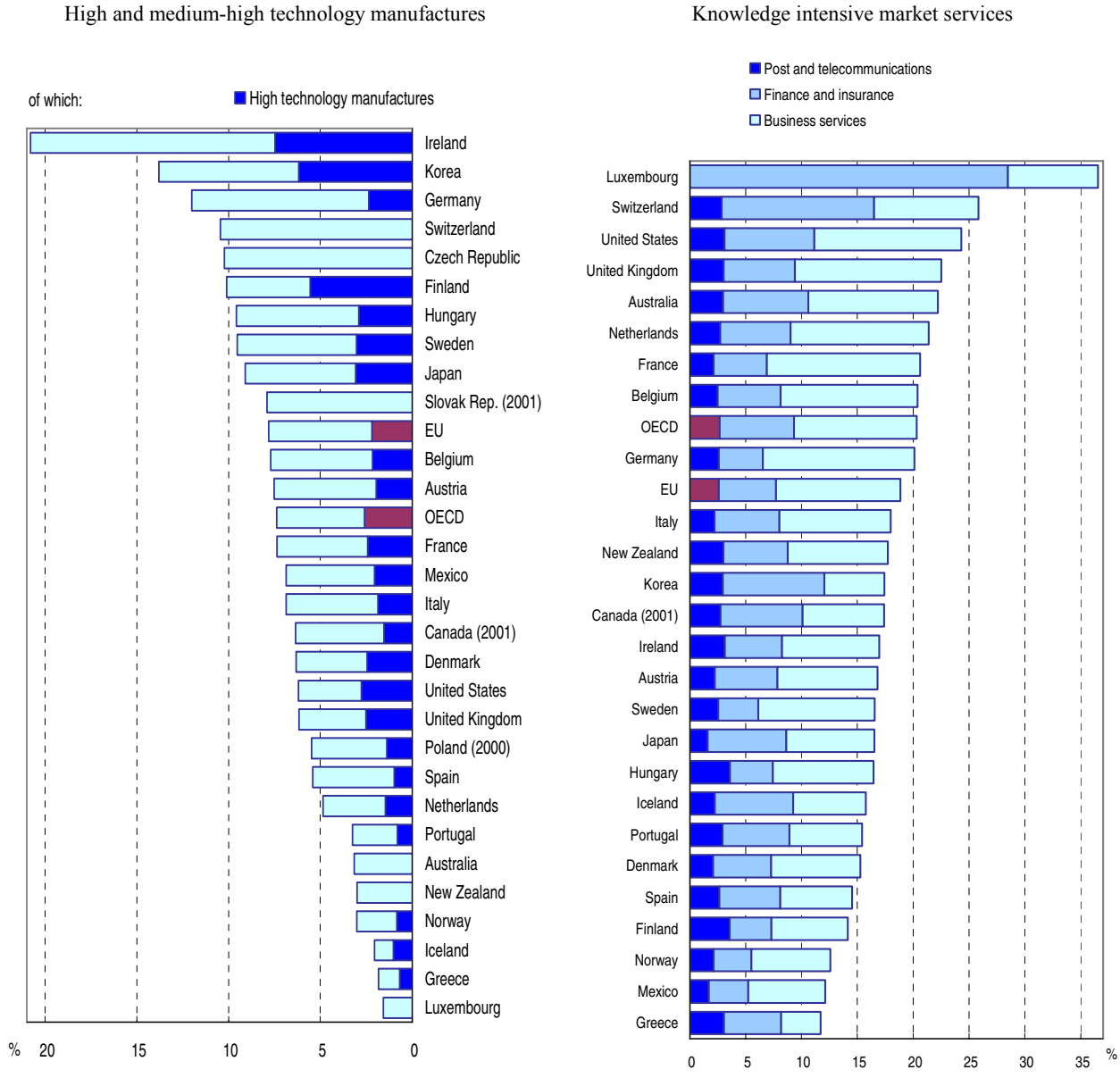
- Division 64: Post and telecommunications (these cannot be separated out for most countries).
- Divisions 65-67: Finance and insurance.
- Divisions 71-74: Business activities (excluding real estate).

Meanwhile, the share of knowledge-based "market" services continues to rise and now accounts for over 20% of OECD-area value added. Different factors have contributed to the growth of these services: the outsourcing of business services to specialised firms as (manufacturing and services) firms increasingly focus on their core strengths; the need for specialist knowledge also in more supporting activities of the value chain; the increasing innovativeness of these services, driven by investments in R&D and physical capital; and deregulation and liberalisation in some of these markets leading to increasing (international) competition.

Throughout the 1990s most OECD countries experienced steady growth in knowledge-based services. Among the largest OECD countries, the United States experienced particularly strong growth, while Japan's development of knowledge-based services continues to trail. Switzerland and Luxembourg's high shares of knowledge-intensive services (over 25% of total value added) are due to their strong financial sectors. In most other countries, business services account for the largest proportion of knowledge-intensive services.

The focus on industries classified as high- and medium-high technology draws attention away from the changes that are appearing in less technology-intensive industries. Yet the shift towards more technology and knowledge activities and investments is also taking place within lower technology industries, as shown by some indirect measures. Value added in these sectors has grown more strongly than employment (in some industries it is even accompanied by negative employment growth), indicating that productivity has increased sharply (Figure 4.8). This is (partly) explained by the relocation and offshoring of the most labour-intensive stages in the value chain towards low-cost countries. Activities that remain in more developed countries are typically higher-value-added activities, for which knowledge and technology, including design, are more important. This is confirmed by the increasing R&D intensity of low-technology industries which has grown much more strongly than in other industries.

Figure 4.8. Share of total gross value added, 2002



Source: OECD (2005b), *OECD Science, Technology and Industry Scoreboard*.

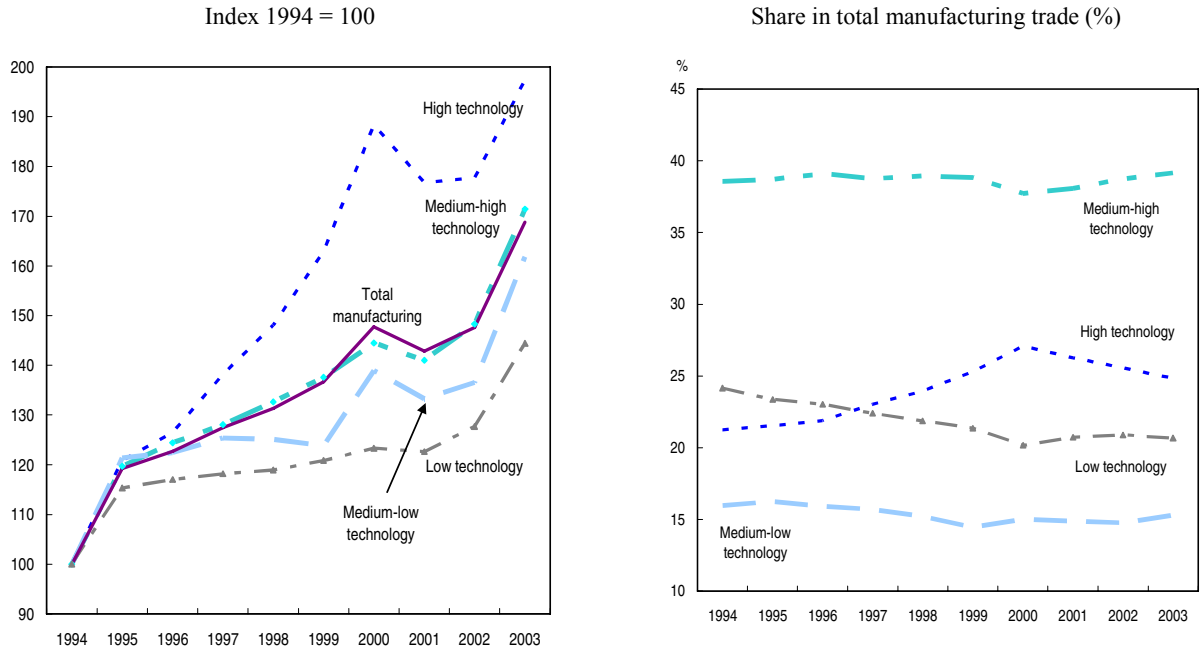
Moving up the value chain changes countries' comparative advantage

The shift towards a more knowledge-based economy is clearly reflected in trade data, with trade in high- and medium-high-technology industries growing faster than total manufacturing trade. Japan is the only country for which total manufacturing exports grew faster than high-technology exports over the period 1994-2003. The industries with the highest growth rate in OECD manufacturing trade between 1994 and 2003 are high-technology industries such as pharmaceuticals, scientific instruments, aircraft and

spacecraft, and electronic equipment. While high-technology industries are the most dynamic manufacturing industries, they represent about one-quarter of total OECD trade. Together with medium-high technology industries (especially motor vehicles, chemicals, and machinery and equipment), these industries account for the bulk of OECD manufacturing trade (Figure 4.9).

Differences among countries are substantial: the share of high- and medium-high-technology industries ranges from over 80% in Japan and Ireland to less than 10% in Iceland. High-technology industries accounted for over 50% of all manufacturing exports in Ireland, and for over 30% of exports in Switzerland, Korea, the United States, the United Kingdom, Hungary and the Netherlands. In Japan and Germany, medium-high technology industries such as machinery and equipment, motor vehicles and chemicals accounted for the bulk of total exports.

Figure 4.9. Growth and structure of OECD manufacturing trade by technological intensity



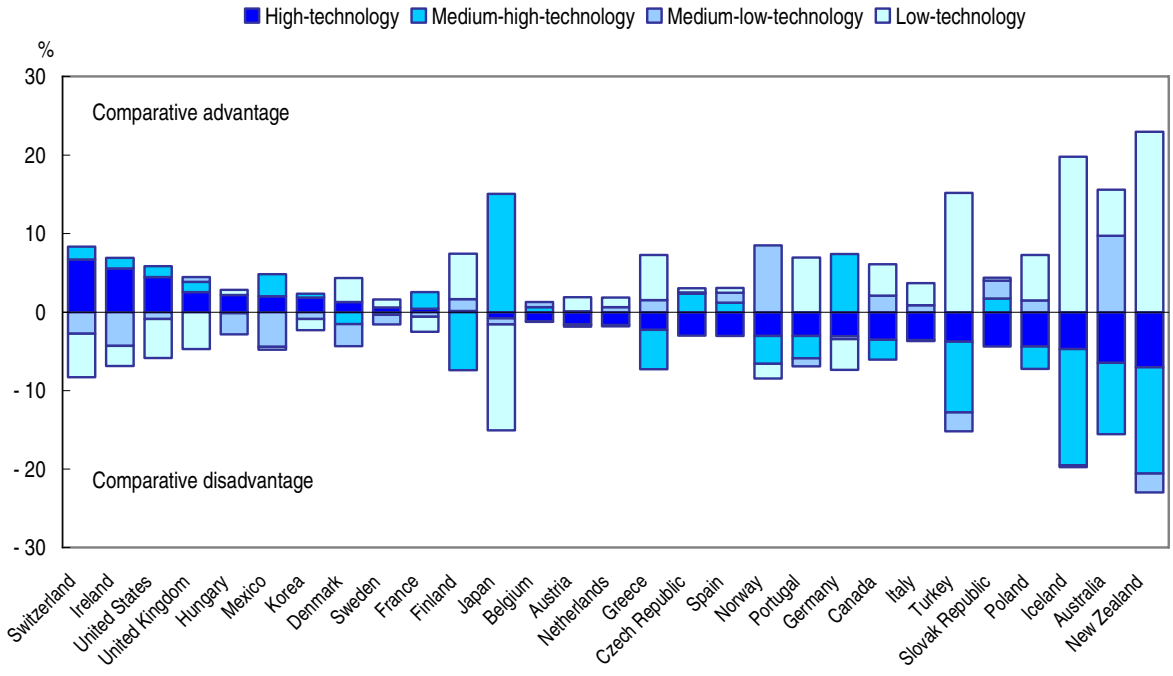
Source: OECD (2005b), *OECD Science, Technology and Industry Scoreboard*.

An assessment of countries' strengths and weaknesses must not focus solely on exports but must also gauge the role of imports. Owing to the increasing importance of global value chains, exports may depend heavily on imports in the same industry. Indicators of revealed comparative advantage, which reflect the contribution of different industries to countries' trade balances, show that only a few OECD countries are specialised in high-technology manufacturing. In 2003, the trade surplus in this industry represented more than 6.5% of total manufacturing trade for Switzerland, 5.5% for Ireland and around 4.5% for the United States. The trade surplus in medium-high technology industries represented more than 15% of total manufacturing trade in Japan and over 7% in Germany. A considerable number of OECD countries still have a strong comparative advantage in medium-low-technology and low-technology industries. The

structural surplus in these industries accounted for around 20% of total manufacturing trade in New Zealand and Iceland and for more than 10% in Turkey (Figure 4.10).

Figure 4.10. Contribution to the manufacturing trade balance, 2003

As % of total manufacturing trade



Note: The "contribution to the trade balance" is the difference between:

$$(X_i - M_i) - (X - M)\frac{(X_i + M_i)}{(X + M)}$$

where $(X_i - M_i)$ = observed industry trade balance,

and $(X - M)\frac{(X_i + M_i)}{(X + M)}$ = theoretical trade balance.

If there were no comparative advantage or disadvantage for any industry *i*, a country's total trade balance (surplus or deficit) should be distributed across industries according to their share in total trade. A positive value for an industry indicates a structural surplus and a negative one a structural deficit.

Source: OECD (2005b), *OECD Science, Technology and Industry Scoreboard*.

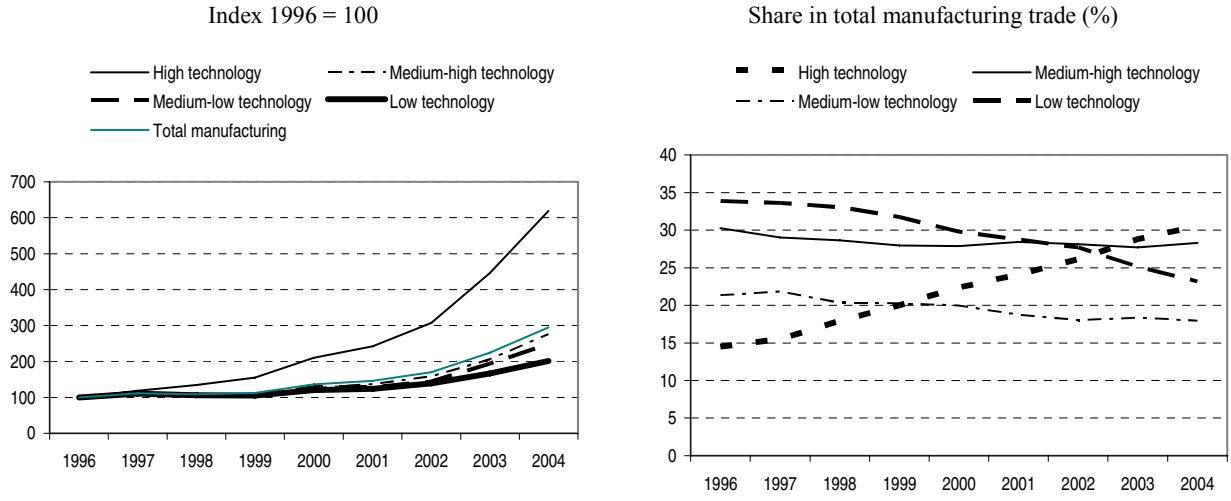
For most OECD countries, these specialisation patterns have changed only gradually over the past decade. There are exceptions, however. For the high-technology industries, there have been large shifts for Finland, Hungary and Japan, with the first two strengthening their position in these industries, while Japan lost some of its edge in this part of the market. Comparative disadvantages in the Czech Republic, Finland, Hungary, Poland, Turkey and New Zealand shrank notably. In medium-high-technology industries, Greece, the Czech Republic, Hungary, the Slovak Republic, Ireland, Korea, Portugal and Turkey have all reduced their comparative disadvantage in this part of the global market.

The challenge from non-OECD countries

Moving up the value chain?

Trade data indicate that the BRICs (Brazil, Russia, India and China) have also become more active in higher-technology industries. From a low base, their trade in high- and medium-high-technology industries has risen faster than their trade in total manufacturing. In 2004 average imports and exports in these higher-technology industries made up almost 60% of total trade of the BRICs (Figure 4.11). China is almost exclusively responsible for this trade performance in higher-technology industries, as Brazil, India and Russia are smaller exporters in these categories. More than 50% of the export structure of China is made up of high- and medium-high-technology industries (computer and electronics), in addition to lower-technology industries (notably textiles). The other countries are mainly specialised in medium-low-technology industries (coke/petroleum and basic metals for Russia) and low-technology activities (textiles for India and food for Brazil).

Figure 4.11. Growth and structure of the BRICs' manufacturing trade by technological intensity



Source: OECD, Bilateral Trade Database.

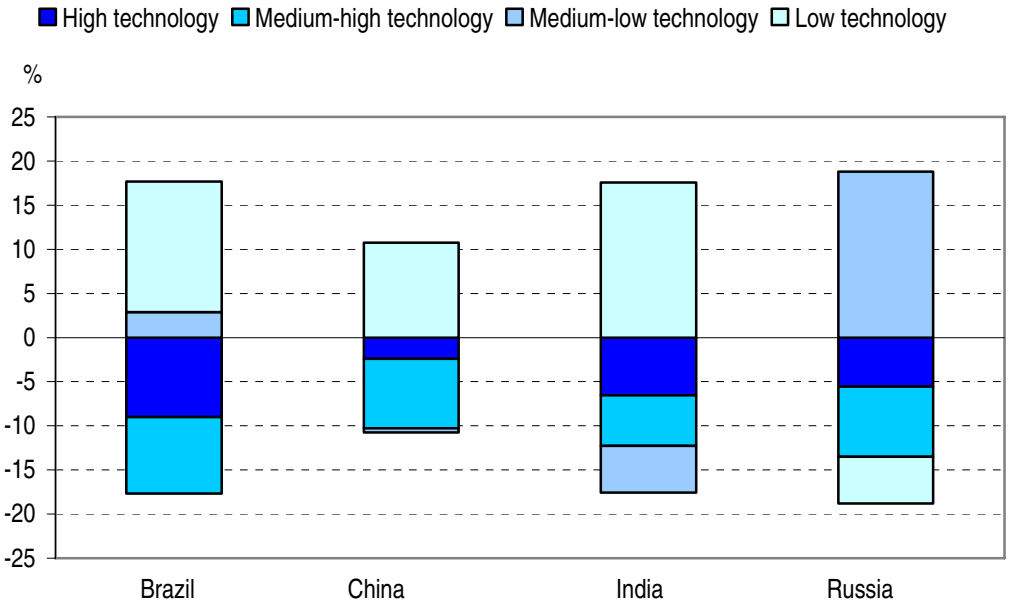
China is a producer and exporter of essentially low-cost, low-technology manufactures on the one hand and increasingly competes with OECD countries in sophisticated, technology-embedded products on the other. A large portion of China's exports is in low-skilled, labour-intensive manufactures such as toys, textiles and footwear, but China has increasingly diversified its exports over the past 15 years, and while exports are still largely labour-intensive, the growth of more sophisticated electronics, furniture and transport goods grew from 17.3% of total exports in 1990 to 41.7% in 2004. Exports of high-technology goods to OECD countries have grown more strongly than any other category of goods over the past decade, by 47% a year from 1992 to 2003. Rodrik (2006) calculated that China's export bundle resembles that of a country with an income-per-capita level three times that of China's, showing that China has managed to produce and export advanced, high-productivity products that one would not normally expect from a low-income labour-abundant country.

Most of these high-technology exports are in the ICT sectors. China has become one of the most important global locations for the production and assembly of ICT goods. China's share of world trade in ICT goods was worth less than USD 35 billion in 1996 but had reached almost USD 329 billion by 2004, for growth of almost 38% a year. As of 2004, China became the largest exporter of ICT goods, surpassing Japan and the EU in 2003 and taking the lead from the United States in 2004. Since 2002, China is a net exporter of high-technology goods to OECD countries. Half of China's high-technology exports consist of radio, TV and communications equipment and more than one-third of computers and office machinery (OECD, 2006a).

Intra-industry trade has become very important in China's manufactures trade, and its large and growing exports in higher-technology-intensive industries are matched by large imports. When intra-industry trade is strong, export shares do not reveal countries' strengths and weaknesses properly; the contribution of different industries to the trade balance identifies more appropriately countries' comparative advantage. Figure 4.12 shows that the comparative advantage of the BRICs, including China, is still concentrated in low-technology industries. In spite of China's high export figures and its trade surplus in high-technology industries, the structural contribution to the trade surplus is still due to low-technology industries.

Figure 4.12. Contribution to the manufacturing trade balance, 2004

As % of total manufacturing trade



Source: OECD, Bilateral Trade Database.

China's trade performance: growing imports of high-technology intermediates by foreign firms

The shift in China's trade pattern towards higher-technology-intensive sectors is largely driven by international production sharing within the Asian region through cross-border production and trade networks. Guillaume *et al.* (2005) clearly shows the strong relationship between China's trade in high-technology goods and its position in the

international fragmentation of firms' value chains. Trade liberalisation has facilitated China's greater participation in international production networks and its deeper integration with trading partners, especially in Asia. Firms located in East Asia have substantially reorganised their activities across countries, with China taking a central role in the Asian region's international production networks. In high-technology industries, China's comparative advantage clearly lies in the downstream stages of production (*i.e.* final goods) and not in upstream activities (intermediates, parts and components).

As a result, China has received large inflows of foreign direct investment (FDI) and has experienced a huge rise in manufacturing exports which has contributed to its economic growth. Firms from Hong Kong (China), Japan, Korea, Chinese Taipei and other Asian economies have relocated their labour-intensive industries to the mainland, while firms from the United States and Europe operating in Asia's newly industrialised economies (NIEs) have moved operations to China. In contrast to Asian firms, which are largely motivated by cost considerations, European and US firms seem to be driven more by market expansion strategies.

The imported technology embodied in FDI has structurally changed China's trade over the last decade as the commodity composition has been diversified from traditional industries into higher-technology-intensive industries. The increase in ICT exports, for example, can mostly be traced to the transfer to China of foreign firms' labour-intensive and often low-value-added assembly and production activities for televisions, computers, handsets and DVD players (OECD, 2006a). Developed Asian economies increasingly use China as an assembly platform for parts and components that are exported from their home bases. More than half of China's high-technology imports are parts and components, of which the largest share is incorporated in processed exports of final goods and intermediates. More than 60% of these processing imports originate in Asian economies, mainly Japan, Hong Kong (China), Korea, Chinese Taipei and Singapore. The assembled final products and intermediates are then exported from China towards these economies, as Asian firms reimport a growing part of the production they relocate in the mainland, but also to other developed countries/regions such as Europe and the United States.

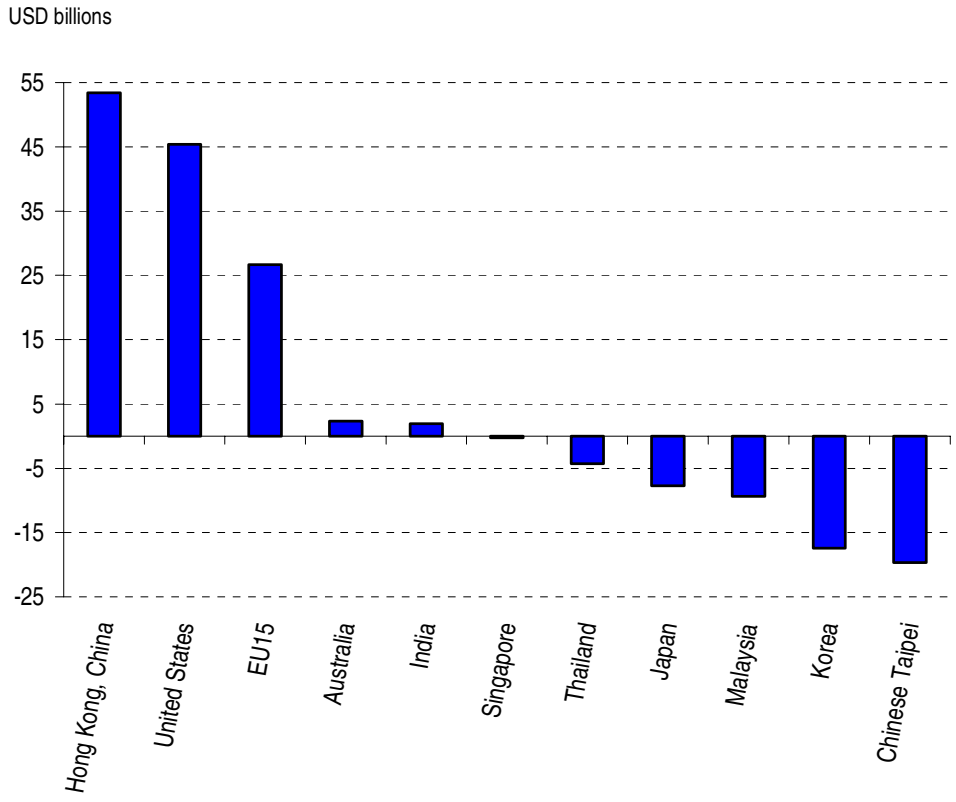
Owing to this triangular pattern of trade, China's exports to the EU and the United States have risen sharply and have displaced exports from Japan and Asian NIEs. This process has helped the more developed Asian economies to move further up in the value chain and to specialise in higher-value-added activities. China's trade balances in ICT illustrate this triangular pattern very well: it reports trade surpluses with the United States and the EU15 and has trade deficits with most Asian countries (Figure 4.13).

China's processing activities are responsible for most of China's trade surplus.[5] Aggregate Chinese export figures for January to December 2005 show that 55% of total exports relate to processing and assembly-related trade (China's Monthly Customs Statistics). If processing trade is excluded, China's trade with the EU records a deficit and

5 . See Guillaume *et al.* (2005) on this point. China's inward processing trade is commonly called "processing trade". According to China Customs' definitions, two types of inward processing trade exist under the customs bonded system and enjoy exemption from duties. "Contractual inward processing trade" is the term used for export and import transactions, in which the imported inputs remain the property of the foreign supplier. For the "other inward processing", ownership of the imported goods as input is transferred to the Chinese producers, which are mostly foreign-invested enterprises.

is almost balanced with the United States. OECD (2006a) argues that there is an integrated asymmetry in China's trade with the EU and the United States because of China's integration in Asian production networks. The US and EU trade deficits are correlated with the activities of foreign firms – often their own MNEs – which derive large profits and strong competitiveness from China's low production costs.

Figure 4.13. China's trade balance in ICT goods, 2004



Source: OECD (2006a), *OECD Information Technology Outlook*.

An important question is whether China is merely assembling component parts or whether there are indications that it has increased value added in higher-value-added ICT goods. Growth in high-technology imports for example largely lags growth in high-technology exports, suggesting that exports in high-technology goods include domestic value added and are not merely re-exports that have undergone slight improvements or assembly. An OECD study found that China's ICT firms are not merely assembling and re-exporting to OECD countries, but are also increasingly competing in aspects of the production process that use skilled labour and demand higher-technology inputs (OECD, 2006a). ICT-related foreign affiliates are reported to evolve from simple assembly and manufacturing to more complex original design and production (US-China Economic and Security Review Commission, 2005) and to fulfil more important roles in global innovation networks. They also are increasingly found to cater to the rapidly growing Chinese market.

Others like Branstetter and Lardy (2006) doubt that China is moving up the value chain; they point out that most ICT exports to the United States are high-volume

commodity products sold primarily by mass merchandisers of electronic products (DVD players, notebook computers and mobile telephones). The China-based affiliates of global ICT firms or third-party electronic manufacturing services (EMS) firms, which manufacture for leading global ICT firms, import intermediate products and produce mainly finished ICT goods that are exported (pure processing and assembly-related trade). For this process, high-value-added components such as central processors and memory chips are generally imported. Furthermore, domestic value added would only account for 15% of the value of exported electronic and information technology products. According to this view, China provides mainly low-wage assembly services in accordance with its comparative advantage in labour-intensive activities.

Is China moving towards a knowledge economy?

The question is how long this specialisation in labour-intensive activities will last and whether China will develop its own technological capabilities. Traditionally, China has acquired technology principally by importing intermediates and goods and less by importing disembodied technology. Foreign technological know-how has typically been brought into China by encouraging foreign investment in higher-technology-intensive sectors. Recently, however, foreign affiliates in China are undertaking not only production activities but also, increasingly, R&D investments (see below). On the other hand, given that over 100 million low-skilled agricultural workers are estimated to need to move into the manufacturing sector over the coming decades, China's comparative advantage appears likely to remain in labour-intensive activities/products for many years.

Overall, China (still) appears to have an industrial structure characterised by a small domestic manufacturing base, high dependence on foreign-controlled firms, a high import content in exports, and rather limited backward linkages with local component suppliers. Foreign firms account for a large proportion of China's exports and imports; their imports reached USD 388 billion in 2005, accounting for 58.8% of total imports, and their exports climbed to USD 444 billion, accounting for 58.2% of China's exports.[6] The percentage of exports is significantly higher than for other Asian NIEs at a similar point in development. In the mid-1970s, 20% of manufactured exports in Chinese Taipei were from foreign firms while from 1974 to 1978 in Korea foreign firms made up 25%. When examining China's advanced industrial goods exports, the dominance of foreign firms is even more pronounced, ranging from 70 to 90%.

The foreign technology embodied in high-technology imports seems to have resulted in limited knowledge spillovers and benefits to the local Chinese economy. Foreign firms tend to protect their technology from Chinese competitors (Lardy, 2005), although some policies (*e.g.* concerning joint ventures, domestic market protection, weak enforcement of intellectual protection) ensure that technology transfer does take place. Important differences continue to exist between foreign affiliates and domestic firms. Whalley and Xin (2006) report that foreign firms in China employ only 24 million workers out of a total workforce of 752 million, that their labour productivity is around nine times that of workers in domestic firms, and that they are responsible for over 30% of China's industrial output.

6. See OECD (2006a), Annex Table 9.

In order to lower this high dependence on foreign capital and technology, China has implemented a new policy which emphasises the development of domestic innovative capacity. For example, Chinese firms are seeking to gain international technology and skills transfer. Furthermore, Chinese high-technology firms are focusing their efforts on developing new standards for application in the China market and globally (Walsh, 2006). In China's 11th Five-Year Plan for 2006-10, the government urges large firms to set up R&D institutes and encourages firms to share the state's R&D tasks. The Chinese government has also recently begun to encourage Chinese firms to invest overseas (including mergers and acquisitions and conducting R&D abroad) to gain technology, brands and distribution channels. Nevertheless, it is explicitly acknowledged that FDI and foreign technology may also help China to catch up as foreign firms in China tend to increase their R&D investments locally (see below).

Indicators of technological development clearly show that the gap with industrialised countries remains huge today, despite China's strong progress in recent years (Schaapers, 2004). The amount of money spent on R&D has increased as has the researcher base. Owing to uncertainty about the proper conversion rate to apply, it is rather difficult to compare the absolute level of R&D expenditure with that of other economies, although China already ranks in the top five worldwide. In relative terms, however, China is still far behind developed economies, in spite of its rapidly increasing R&D intensity, which reached 1.3% of GDP in 2005 (MSTI, 2006/2).

On the output side of the innovation process, China's progress is much weaker. Although China has registered strong growth since 1995, its share in US Patent & Trademark Office (USPTO) and European Patent Office (EPO) patents is still small, accounting for around 0.2% and 0.3%, respectively, of patent grants/applications, whereas the United States, Japan and the EU together account for around 90%. The level of international co-operation in science and technology is higher for China than for the US, Japanese and EU economies.

In order to control for "home" advantage bias in patenting (*i.e.* proportionate to their inventive activity, domestic applicants tend to file more patents in their home country than foreign applicants), the OECD has developed a set of indicators based on patent families (defined as a set of patents taken in various countries/at different patent offices to protect a single invention). Inventors usually take a patent first in their home country and may later file patents abroad. The result for patent families is the same as for EPO and USPTO patents: in 2002 China accounts for 0.3% of the world total, while the United States, the EU and Japan together account for more than 90% of the world total.

Human resources are crucial for developing an increasingly knowledge-based economy and this provides China an essential element for developing and upgrading its economy. While only a very small part of the population in China has a tertiary education degree, this constitutes a substantial number because of the enormous population. The absolute number of enrolments in, and graduates from, tertiary education in China matches the numbers in the United States and the EU and ensures a continuous inflow of skilled people to the labour market. At the highest level, *i.e.* enrolments in and graduation from advanced research programmes such as PhDs, China's level is still low compared to other economies.

A substantial number of Chinese students enrol in OECD countries, half of them in the United States. Furthermore, a quarter of the doctorates in science and engineering in the United States awarded to non-US citizens went to Chinese citizens. If at some point in their lives, these students and PhD holders return to China, they have the potential to

provide a great impetus to research in China. Even without return migration, there has been a huge expansion in the number of researchers in China since 1999. China now counts more researchers than Japan, and is on its way to overtake the EU as well.[7]

The internationalisation of R&D

R&D is increasingly internationalised

After the offshoring of manufacturing and more recently of services, high-skilled functions like R&D also no longer seem immune to outsourcing and offshoring. In countries that are net sources of foreign R&D investment there are concerns that the internationalisation of R&D may threaten the future of their domestic knowledge base. Given that R&D is a crucial input for new products and processes, such countries' competitiveness may be directly affected. This has to be balanced against the benefits of increased internationalisation of R&D, which can promote faster technological change and broader diffusion of technological advances worldwide.

Until recently, production, marketing and other functions of MNEs' value chains have moved abroad more quickly, and R&D was one of the least internationalised segments. R&D was considered to be among the least "fragmentable" of economic activities because it typically involves knowledge that is strategic to firms, and because it often has a tacit, non-transferable character. Cross-border R&D was traditionally the corollary of FDI and was largely directed to adapting technologies for sale in host countries.

Between 1995 and 2003, R&D expenditure of foreign-controlled affiliates in OECD countries rose by USD 36.5 billion in purchasing power parity dollars (Figure 4.14). The largest cross-border flows of R&D still take place within the OECD area, mainly between the United States, the European Union (EU15) and Japan. In 2002 US MNEs placed over 61% of their foreign R&D investment in the European Union (USD 12.9 billion) and 7% in Japan (USD 1.5 billion) while the European Union invested USD 17.5 billion in the United States and USD 2.2 billion in Japan. Japan invested only USD 1.4 billion in the United States and USD 0.7 billion in the EU.

These cross-borders flows are also geographically concentrated within the OECD itself. Although its share decreased slightly over the period 1995-2003, the United States continues to attract the largest share of R&D expenditures by foreign affiliates in the OECD area (41.9%). Other countries that attract important R&D investments of foreign MNEs are Germany, the United Kingdom, and, to a lesser extent, Japan, France and Canada (Figure 4.14). The three largest EU R&D performers (Germany, the United Kingdom and France) together attract 37.4% of foreign R&D investments in the OECD area.

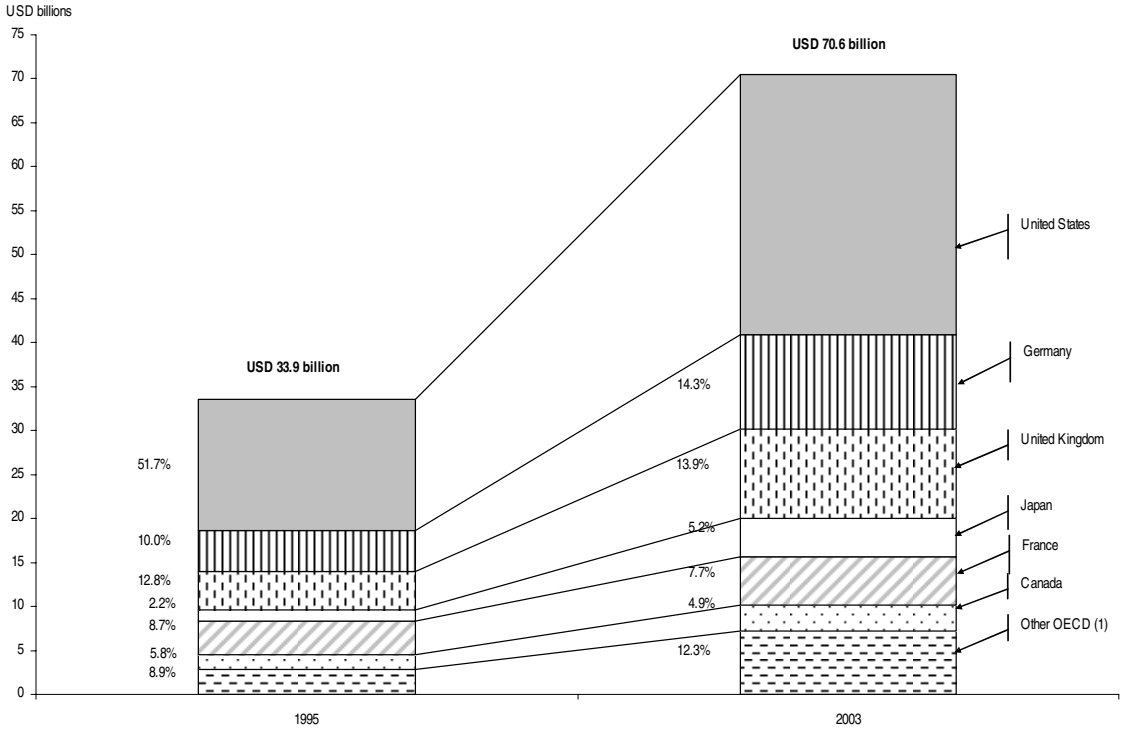
While these data may not identify the most recent trends, the internationalisation of R&D is confirmed by some recent surveys. A survey undertaken by UNCTAD from November 2004 to March 2005 of the largest R&D investors suggests that the pace of internationalisation of R&D may be accelerating (UNCTAD, 2005): as many as 69% of the responding firms stated that their share of foreign R&D is set to increase (only 2% indicated the opposite and the remaining 29% expected the level of internationalisation to

7. The forthcoming *OECD Review of the Chinese Innovation System* (2007) will elaborate further on these issues.

remain unchanged). The momentum appears to be particularly strong among firms in Japan and Korea, which have so far been less aggressive in this respect: nine out of ten Japanese firms in the sample and about 80% of the Korean firms planned to increase their foreign R&D; 61% of the European firms indicated similar intentions. The average firm in the UNCTAD survey spent 28% of its R&D budget abroad in 2003, including in-house expenditure by foreign affiliates and extramural spending on R&D contracted to other countries. Japanese and Korean MNEs displayed the lowest share of foreign R&D (15% and 2% respectively).

Figure 4.14. Trends in the share of R&D expenditure under foreign control in the business sector in selected OECD countries between 1995 and 2003

USD billions in purchasing power parity (PPP)



1. The Czech Republic, Finland, Hungary, Ireland, Poland, the Netherlands and Sweden.

Source: OECD, AFA database and OECD estimates in OECD (2006b), *OECD Science, Technology and Industry Outlook*.

The innovative strategies of MNEs are changing

Until recently, the home market was the preferred location for performing R&D activities. Economies of scale and agglomeration effects, as well as the need for co-ordination and control of expensive and risky investments were also reasons for keeping R&D and the initial stages of production in the home location. To exploit these intangible assets beyond the home market, firms preferred to set up or acquire affiliates in host markets through FDI rather than sell technology internationally through licensing. As firms increasingly located production closer to their customers and suppliers they needed R&D laboratories to adapt the technologies and products developed at home to local conditions. This adaptive research is typically closely related to production and is

determined by the size of the host market. Reasons for decentralisation of R&D were primarily demand-oriented and related to market proximity to be close to "lead users" and to adapt products and processes to local conditions.

The global business environment has, however, changed dramatically. Because of intensified global competition, firms have been forced to innovate more quickly and develop commercially viable products and services more rapidly. Relevant knowledge has become increasingly multidisciplinary and global in scope, making innovation more expensive and risky. At the same time, some barriers to the dispersion of R&D have become less important following rapid developments in ICTs.

These tendencies imply changes in the governance of innovations in multinational firms, with important implications for the role of subsidiaries in recognising the potential for innovations and exploiting them. Innovation strategies increasingly require more global sourcing: it is necessary to sense new market and technology trends worldwide and respond to them adequately by generating new ideas which are then implemented on a global scale. This involves building networks of distributed R&D globally in order to tap into local knowledge and to provide further sources of new technology. Following the greater fragmentation of the value chain and the corresponding internationalisation of manufacturing, MNEs increasingly establish R&D facilities away from their headquarters at many locations worldwide.

Reflecting this change in innovative strategies, other location factors have become important in MNEs' location decisions. The shift towards subsidiaries that are active in R&D, not simply in incremental, adaptive innovations but also in radical innovations, links supply-related location factors to the presence of scientific and technological skills. Such location decisions are based on the technological infrastructure of the host country and also on the presence of other firms and institutions, which may create spillover benefits that investing firms can absorb. The R&D undertaken in these affiliates is more innovative and/or technology-monitoring, and is largely determined by the quality of the individual components of the regional/national innovation systems. The precise features of a host country that are needed to attract innovative R&D depend on the industry and activity involved.

R&D offshoring to developing countries

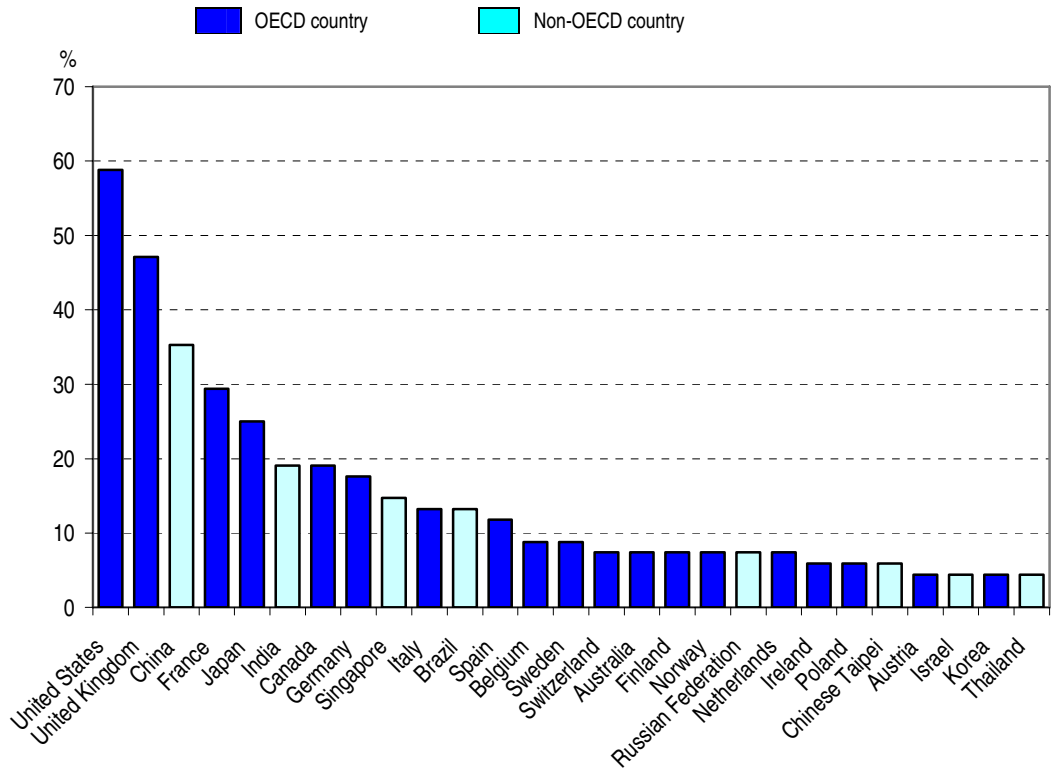
While most internationalisation of R&D still takes place within the OECD area, developing countries increasingly attract R&D centres, although this remains relatively limited in terms of global R&D investments. Large increases in foreign R&D investment in developing Asia, in particular in China and India, have attracted much attention in recent years. According to official statistics for China, some 750 foreign R&D centres had been established in China by the end of 2004, most of them after 2001. Over 100 MNEs had established R&D facilities in India by 2004.

These emerging geographic patterns are confirmed by recent surveys on the location of R&D centres undertaken by various international organisations. In the above-mentioned UNCTAD survey of the largest R&D spenders worldwide, China (in third place) and India (in sixth) already occupied top rankings as current locations for R&D (Figure 4.15). Other developing countries also appeared in this ranking, including Singapore, Brazil and some eastern European countries. Likewise, recent information on new greenfield and expansion FDI projects involving R&D over the period 2002-04 reveals that of the 1 773 projects identified, 1 095 were undertaken in developing countries, eastern Europe and the Commonwealth of Independent States (CIS) (LOCO-

monitor of OCO-consulting, cited in UNCTAD, 2005). More than 90% of these projects were undertaken by MNEs from developed countries, with the United States the top source country followed by the EU15 and Japan.

Figure 4.15. Current foreign R&D

Percent of responses to UNCTAD survey



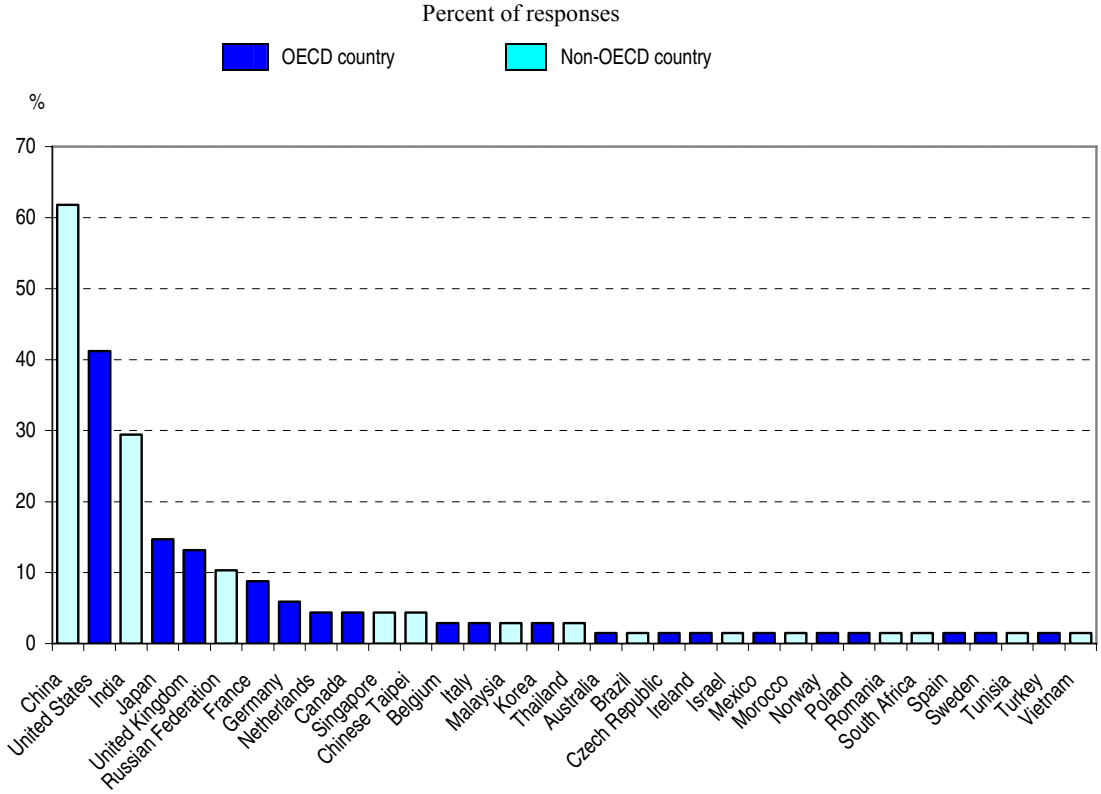
Source: UNCTAD (2005).

It can be expected that this shift towards emerging countries will continue to some extent, as demonstrated by the results on future R&D investments in the same UNCTAD survey (Figure 4.16). China was the R&D location mentioned most often, followed by the United States. India was in third place, and the Russian Federation was also among the top ten target locations. Other named emerging economies were Singapore, Chinese Taipei and Thailand.

UNCTAD (2005) points to cost coupled with a large availability of researchers as a new set of drivers for the internationalisation of R&D. Intense global competition and rising R&D investments urge MNEs to innovate quickly and efficiently in order to bring new products/services/processes more rapidly to market. Just as the internationalisation of manufacturing had important cost advantages, the internationalisation of R&D is also motivated to some extent by cost-cutting, resulting in outsourcing of activities and location of R&D in countries with low costs. However, it seems to be less lower wages *per se* than the large availability of skilled scientists and engineers. This is confirmed by Schwaag (2006) who identifies the large presence of an increasingly strong and

competitively priced human capital base next to markets and production facilities as the most important location factors for R&D in China.

Figure 4.16. Most attractive foreign R&D locations



Source: UNCTAD (2005).

Some emerging countries seem to offer the combination of low wages and a good education system with a large mass of well-trained researchers. As mentioned, China has only a small proportion of the population with a tertiary degree, but a very large absolute number, but enrolments and graduations from advanced research programmes are still low compared to other countries (Schaapers, 2004). Farrel and Grant (2005) have recently produced evidence regarding the suitability of new graduates from China and India for work in internationally active MNEs. Based on interviews with human resource managers, they conclude that on average only 13% of the potential talent supply in low-wage countries is suitable to work for multinational firms.

References

Banister, J. (2005), "Manufacturing Employment in China", *Monthly Labor Review*, July, pp. 11-29, Bureau of Labor Statistics, Washington, DC.

Baumol, W.J. (1967), "Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis", *American Economic Review*, Vol. 57, Issue 3.

Bhagwati, J., A. Panagariya and T.N. Srinivisian (2004), "The Muddles over Outsourcing", *Journal of Economic Perspectives*, Vol. 18, No. 4.

Bolhoul, H. and L. Fontagné (2006), "De-industrialisation and the Fear of Relocations in the Industry", CEPII Working Paper, No. 2006-07, Paris.

Branstetter, L. and N. Lardy (2006), "China's Embrace of Globalisation", NBER Working Paper, No. 12373.

Conference Board (2004), "China's Experience with Productivity and Jobs", Research Report R-1352-04-RR, New York.

Dixit, A. and G. Grosmsman (2005), "The Limits of Free Trade", comment in *Journal of Economic Perspectives*, Vol. 19.

Farrel, D. and A. Grant (2005), "Addressing China's Looming Talent Shortage", McKinsey Global Institute, San Francisco.

Gomory, R. and W. Baumol (2000), *Trade and Conflicting National Interests*, MIT Press, Cambridge, Massachusetts.

Guillame, G., F. Lemoine and D. Unal-Kesenci (2005), "China's Integration in East-Asia : Production Sharing, FDI & High-Tech Trade", CEPII Working Paper, No. 2005-09.

Lardy, N. (2005), "China: The Great New Economic Challenge in The United States and the World Economy", Institute for International Economics.

OECD (2000), *OECD Employment Outlook 2000*, OECD, Paris.

OECD (2005c), *OECD Science, Technology and Industry Scoreboard*, OECD, Paris.

OECD (2006e), *OECD Information Technology Outlook*, OECD, Paris.

OECD (2006f), *OECD Science, Technology and Industry Outlook*, OECD, Paris.

OECD (forthcoming), *OECD Review of the Chinese Innovation System*, OECD, Paris.

Porter, M. (1990), *The Competitive Advantage of Nations*, New York. Free Press, New York.

Ritter, R.C. and R.A. Sternfels (2004), "When Offshore Manufacturing Doesn't Make Sense", *The McKinsey Quarterly*, No. 4.

Rodrik, D. (2004), "Industrial Policy for the Twenty-First Century", paper prepared for UNIDO.

Rodrik D. (2006), "What's so Special about China's Exports?", NBER Working Paper Series, WP 11947, Cambridge, Massachusetts.

Rowthorn, R.E. and K. Coutts (2004), "De-industrialisation and the Balance of Payments in Advanced Countries", *Cambridge Journal of Economics*, Vol. 28, No 5, pp. 767-790.

Rowthorn, R.E. and Ramaswamy (1997), "De-industrialisation – Its Causes and Implications", *IMF Economic Issues*, No. 10.

Samuelson, P.A. (2004), "Where Ricardo and Mill Rebut and Confirm Arguments of Mainstream Economists Supporting Globalisation", *Journal of Economic Perspectives*, Vol. 18, No. 3.

Schaapers, M. (2004), "An Emerging Knowledge-Based Economy in China? Indicators from OECD Databases", STI Working Paper 2004/4,

Schwaag Serger (2006), "China: From Shop Floor to Knowledge Factory?" in *The Internationalisation of Corporate R&D*, M. Karlsson (ed.), Swedish Institute For Growth Policy Studies, Sweden.

UNCTAD (2005), *World Investment Report 2005, Transnational Corporations and the Internationalisation of R&*D, New York.

Walsh, K. (2006), "Foreign High-Tech R&D in China: Risk, Rewards and Implications for U.S.-China Relations", The Henry L. Stimson Center.

Whalley, J. and X. Xin (2006), "China's FDI and Non-FDI Economies and the Sustainability of Future High Chinese Growth", NBER Working Paper Series, WP 12249, Cambridge, Massachusetts.

Wölfl, A. (2005), "The Service Economy in OECD Countries", STI Working Paper 2005-3, OECD, Paris.

Chapter 5

Policy Implications of Globalisation

This chapter identifies the most important policy challenges for OECD countries in today's global economy. It discusses the need for a powerful innovation strategy in order to move up the value chain, as well as the accompanying measures that can soften the inevitable adjustment costs of globalisation.

Adjusting to globalisation

The globalisation of value chains raises major policy challenges for OECD countries, as globalisation confronts OECD economies with new opportunities and challenges. Globalisation and other factors such as technological and demographic changes affect the economic environment and pressure OECD countries to adjust. This report analyses the impact of global value chains on the industrial structure and competitiveness of OECD countries by discussing globalisation from a science, technology and industry perspective. The policy discussion will focus specifically on how OECD countries can adjust to this structural change in order to benefit optimally from globalisation.

It is clear that globalisation implies a broad structural process that affects OECD countries in different domains: trade, capital flows, migration, social cohesion and equity, environment, etc. Other challenges of globalisation are being addressed in OECD bodies dealing with economics, environment, trade, financial markets, labour, etc. The policy implications of that work are not discussed in detail in this volume but are important for the broader challenge of adjustment. Two recent OECD reports (OECD, 2005a, 2005b), for example, have set out a range of policies supporting such structural change, including policies to improve the functioning of labour and products markets.

A balanced perspective on the costs and benefits of globalisation

As shown in Chapter 1, public perceptions of globalisation are not always positive, and this may be due to the short-term job losses that may occur in specific regions and industries and often particularly affect low-skilled workers. A difficult but key challenge for policy makers is to avoid a political backlash against globalisation. The challenge is that although globalisation benefits economies as a whole, the gains are unevenly distributed and the costs in terms of employment loss and wage decline are often more visible than the wider benefits to consumers generally.

Despite the short-term losses of employment, most economic analysis shows that there are considerable long-term benefits to globalisation and further economic integration between countries. These benefits include higher standards of living for a growing share of the global community, greater product diversity, lower prices and higher productivity. Economic integration has changed the world and has created rising prosperity for a growing number of countries. Empirical evidence across countries demonstrates a positive relation between openness and income levels; an increase in openness of 10 percentage points is estimated to increase gross domestic product (GDP) per capita by 4% in the OECD area.

Specialisation is an important driving force. Openness allows for more specialisation and specialisation drives productivity gains because of economies of scale and scope, and it allows the development of specialised knowledge and experience (Adam Smith's insights on the division of labour). Specialisation has become more internationalised owing to the gradual decrease in communication and transport costs and the growing tradability of services. Globalisation results in increasing integration of countries and more efficient reallocation of resources worldwide. Openness allows countries to

specialise in activities in which they are better and more productive, while giving up activities in which other countries are more productive.

Providing a balanced perspective on the benefits and costs of globalisation can help. However, the problem is that globalisation may generate highly visible costs for a clearly identifiable group of people, while some benefits may come later and these are widely diffused across society. A promising avenue may be to address more directly the costs of globalisation, by compensating in some form those whose well-being may suffer in the process.

Accommodating structural change: spreading the benefits of globalisation

Globalisation and technical change both lead to structural changes which require countries to address adjustment costs, while benefiting from innovation, productivity growth and the creation of new jobs. If countries are to realise the potential gains from openness, productive factors (including labour) must shift from economic activities in which they are relatively less efficiently used towards activities in which the economy enjoys a comparative advantage. The extent and speed of this structural change directly determines how much countries benefit from globalisation. However, it can be hard for individuals to move between jobs, industries and regions, and workers losing jobs in firms in import-competing industries sometimes bear large adjustment costs. Hence the need for complementary structural policies aimed at helping workers reallocate from lagging to more advanced industries and for policies aimed at compensating potential short-term losers from globalisation.

As globalisation increases the need for mobility, employment regulations should be reformed in cases where they inhibit change, wages should adapt to the new economic patterns, and geographic mobility should be stimulated to avoid the concentration of adjustment difficulties in particular areas. In order to compensate job losers adequately, some countries have succeeded in providing generous welfare benefits while promoting at the same time a more rapid return to employment through strong job-search obligations. Ensuring that all workers have adequate skills is also key to reducing adjustment costs.

It is necessary to spread the benefits of globalisation within OECD countries but also worldwide between (developed and developing) countries. Concerns arise that some world regions, notably Africa, are in particular danger of being left behind in the globalisation process; other concerns related to globalisation are linked to the potential environmental impacts of globalisation in developing countries. Further trade liberalisation in sectors in which poorer countries have a comparative advantage (especially agriculture), complemented by capacity-building and development policies, may help to spread the benefits of globalisation to a wider range of countries, including those most at risk of being excluded. Addressing other global concerns, notably global environmental challenges such as climate change, are also key to making globalisation appear as an opportunity rather than a threat.

Avoiding policies that distort the process of structural change

The short-term employment losses that have emerged in some countries, and their possible link to globalisation, have led to demands for protection from competition in some OECD countries. These demands are varied and have resulted in a wide range of policy proposals. Some proposals are primarily aimed at insulating countries from the impacts of globalisation (and its benefits) through import barriers, some seek to penalise

firms that engage in offshoring, and some seem primarily aimed at slowing exposure to international competition.

Two examples may serve to illustrate these types of policies. First, several policy proposals in OECD countries discriminate between firms that offshore/relocate some of their activity (however measured) and firms that remain more firmly anchored in domestic production. It has been proposed, for example, to withdraw public support for firms that outsource, or otherwise use public policies to make it unattractive for firms to outsource. Such policies ignore the fact that firms often engage in outsourcing to survive, expand and become more efficient. Firms that offshore labour-intensive jobs to low-cost countries may end up saving domestic jobs since the alternative might be that all jobs (low- and high-skilled) eventually leave the home country.

The costs of protectionist measures have been evoked in many studies. Protectionist measures are likely to raise costs for firms and reduce their efficiency. This will have a detrimental impact on the consumers who buy products from these firms and will possibly also make the countries undertaking such policies a less attractive place to do business. Protectionist measures also have detrimental effects on other, often poorer, countries that may now be able to participate in the global economy, denying them the chance to trade and increase their living standards. A recent study by the European Commission (2006) shows that if EU countries implement protectionist policies, their GDP per capita could be 5% lower by 2050. In contrast, fully accommodating the integration of emerging countries in the world economy could result in an 8% increase in GDP per capita.

Proposals have also been made to lower wage or non-wage labour costs in OECD countries. The rationale for such policies is that the costs of production in OECD countries may be increased by high non-wage labour costs and other costs that may fall heavily on production. In certain cases, reform of labour market, tax and social policies might indeed allow a reduction in such costs, for example, if labour market policies are successful in reducing unemployment and thus lower social charges linked to unemployment and other benefit schemes. In this case, such changes in costs are a result of reforms in other areas and are the result of balanced and well-informed policy debates in these areas. However, policies that aim at reducing such costs simply to address the challenge of globalisation ignore the fact that the main challenge is not to reduce costs, but to improve productivity and to keep costs aligned with productivity. Policies to reduce wage and non-wage labour costs are also unlikely to lead to a long-term solution, since the scope of such cost reductions will be limited. Moreover, they may contribute to a "race to the bottom".

Moving up the value chain: developing a strategy for innovation

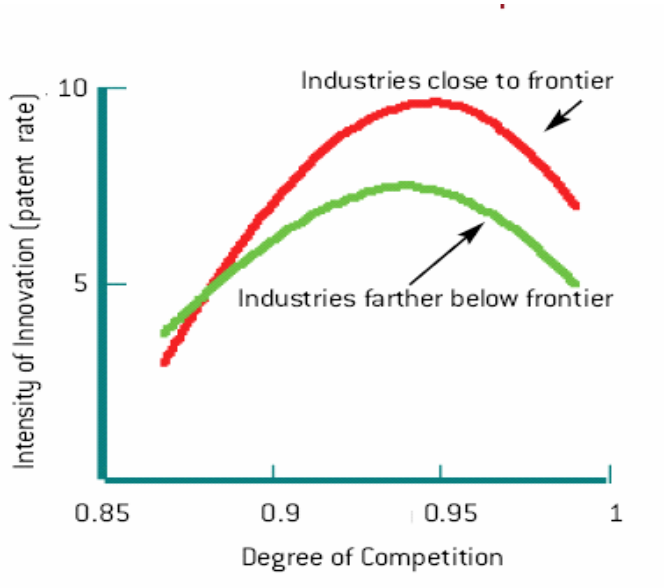
Another important challenge for OECD countries is to continue moving economic activity further up the value chain to ensure that OECD economies continue to compete and prosper in the global environment. It is evident that certain areas of activity, *e.g.* low-technology manufacturing, will decline in importance as low-income economies such as China and India increasingly become effective competitors in such activities. Moreover, some of these activities are characterised by rapid productivity growth and slow growth in demand, which will reduce prospects for employment growth in these industries. In addition, certain components of the value chain in high-technology industries and in services may also increasingly be sourced at the global level. Well-functioning markets are key to the upgrading process, as this will help move resources from firms and

industries that are no longer able to compete in the global market to firms that are successful.

Moving up the value chain implies a continuous process of change, innovation and productivity growth. Products and services that are currently regarded as among the most innovative and experimental ultimately end up as commodities that can be produced anywhere and by many producers. Developed economies can only grow by inventing new technology, by innovating in products and processes, and by designing new management methods. As countries develop, innovation gradually becomes the most important source of economic growth since the growth potential of other sources, such as capital accumulation and technological imitation, become exhausted. In a recent paper analysing the performance of the European Union, Aghion (2006) demonstrates the need for developed countries to innovate, as the cost of not innovating is greater as countries move closer to the world technological frontier.

A first way to foster innovation is to invest in R&D and innovation. Such investment becomes crucial when countries (and industries) move closer to the world technological frontier. For example, R&D intensity is found to increase in all industries when economies develop and come closer to that frontier (Aghion, 2006). The survival and growth of industries and firms in high-cost and high-productive economies depends directly on their capacity to innovate and move into new areas of activity. Without continuously renewing their products/services and processes, developed countries will become uncompetitive in a globalising world.

Figure 5.1. Beneficial effects of competition on innovation



Source: Aghion (2006).

The success of innovation-based growth, however, depends not only on investment in R&D and innovation, but also on favourable microeconomic and macroeconomic conditions. Aghion (2006) suggests that the impact of structural policies, such as those relating to competition and education, differs depending on countries' stage of

development. The typical inverted-U-shaped relation between competition and innovation – too little competition creates limited incentives for firms to innovate, too much competition discourages innovation as firms are unable to reap the benefits of innovation – is found to be more pronounced in industries/countries close to the world technological frontier (Figure 5.1). The link between product market competition (including potential entry) and innovation is stronger in developed economies since firms that are close to the world technological frontier know they can and have to "escape" competition by innovating. In industries and countries further away from the world technological frontier, innovation and catch-up may be diminished by very intense competition.

To foster and support the innovation process, several policy areas may be considered:

1. ***Science, technology and innovation policies*** can help increase the level of knowledge and technology embodied in production and exports, which would make competition from low-income (low-cost and low-productivity) countries less likely in the relevant markets. Policies aimed at strengthening creativity in business, or at developing intangible assets as sources of value creation, are closely related to these policies. A range of OECD reports provide insight into some of the best practices in this area. Policies in this area are considered of growing importance in both OECD and non-OECD countries, but best practices still need to be diffused more widely and much scope for learning remains.

2. ***Policies to upgrade the human resource base of the economy.*** A more innovative and productive economic sector may require more highly skilled workers or a different mix of skills. Standard production tasks can increasingly be carried out outside the OECD area where labour costs are often considerably lower. Upgrading the workforce can encourage a shift of economic activity towards more high-value-added areas that may remain in OECD countries. At the same time, some areas of low-skilled work, *e.g.* retail trade, will continue to be carried out in OECD countries, as they require proximity. Better understanding these new demands and responding to them may require further analysis. The continuing internationalisation of many parts of the economy also implies that a growing range of industries, individuals and skill categories are potentially affected by offshoring. Indeed, internationalisation, combined with rapid innovation and technological change, may imply that fewer and fewer jobs are permanent. Addressing this through education and training policy requires a growing focus on lifelong learning.

3. ***Policies to foster entrepreneurship and new areas of economic activity.*** Policies may also aim at creating new areas of economic activity, by stimulating new firm creation and entrepreneurship, or by stimulating innovation and technology in new areas, *e.g.* through public procurement. Reducing barriers to business start-ups and growth improves the economy's capacity to seize new opportunities arising from globalisation and helps re-employ displaced resources to those sectors and firms where they can contribute most. New firms are of great importance to innovation, particularly in areas where radical changes to existing markets and production processes are feasible. Giving room to new firms while building on countries' existing strengths can help create a business environment that is sufficiently dynamic to move into new areas. Recent work by Acs *et al.* (2005) has once more confirmed the importance of entrepreneurship as a way to allow new research findings to be commercialised.

4. ***Cluster policies and efforts at the local/regional level.*** Local and regional strengths are an important asset for economic policy. International and local firms may be attracted

to very specific activities and skills that only exist in some regions and locations. These may be linked to scientific or educational institutions, historical traditions, natural resources, geographical location and so on. Policies aimed at the development of clusters, poles of excellence as well as regional policies may help capitalise on these strengths.

5. ***Policies to enhance attractiveness***. Making a country an attractive location for economic activities can help attract foreign direct investment and foster new areas of economic activities. Various empirical studies have looked at factors that determine attractiveness. Depending on the type of activity considered, they may include the quality of infrastructure and communications networks, the quality of the knowledge base, including the education, science and innovation system, the skills available in the workforce, the regulatory and tax climate, the size and quality of the domestic market, as well as social factors, which are often an important factor in attracting highly skilled workers and managers from abroad. Understanding what determines national attractiveness, building on national strengths and addressing weaknesses to the extent possible can help draw greater benefits from the globalisation process.

6. ***Policies related to intellectual property rights (IPR).*** IPR-related policies may prove to be an important complement to the other policies mentioned above. In view of the changing environment for innovation, it is important to consider whether the current system of IPR rules and practices continues to stimulate innovation and provide access to knowledge, or if in certain cases the abuse of control with which IPR owners are sometimes endowed may hamper competition, fair use and the diffusion of technology. Complementing the IPR rules with practices, tools and networks that provide increased access to knowledge and enable more open forms of innovation may offer a way forward. Striking an appropriate balance between diffusion of technology and providing incentives to innovation remains an important consideration in this context. Moreover, more can be done to generate value from IPR, *e.g.* through licensing.

7. ***Trade and investment policies.*** The competitive process that underpins the upgrading process may be distorted in the presence of barriers to trade and investment. Trade and investment policies can help to establish a level playing field for all countries in global production and trade.

New approaches to moving up the value chain?

In recent years, based on the success of some countries in strengthening their comparative advantage, the discussion has returned to the need and desirability of more government action. Based on insights from the recent literature of "institutional innovation", some economists, such as Rodrik (2004) have argued for new approaches to industrial policy. Policies to improve the functioning of labour, product and financial markets are necessary but may no longer be sufficient for successfully moving up the value chain, since market failures and externalities exist, especially in new activities that are risky and require large-scale investments.

In contrast to "older" industrial policies, where government intervention was often heavy-handed, the "new" industrial policies stress strategic and flexible co-operation between the government and the private sector. While private entrepreneurship and market forces are still considered the main engines of growth, governments are considered to have a strategic and co-ordinating role that goes beyond ensuring property rights, contract enforcement and the basic functions of a modern government. The

partnership between the public and private sector is aimed at eliciting and understanding business opportunities and constraints, and identifying areas in which policy intervention may be required.

While these arguments may be theoretically appealing, the success of this approach largely depends on its practical implementation. Experience in several countries with old-style industrial policy has not been positive. The current policy debate in several OECD countries is seeking to move beyond these types of policies, underscoring the need for well-functioning and competitive markets, but looking for actions that the government can undertake to strengthen the capacity of firms to compete in the global market. Such actions can be found in policy areas such as innovation and entrepreneurship policy which have become the industrial policy for the 21st century.

References

Acs Z.J., D.B. Audretsch, P. Braunerhjelm and B. Carlsson (2005), "The Knowledge Spillover Theory of Entrepreneurship", CEPR Discussion Paper Series, No. 5326, London.

Aghion, Ph. (2006), *A Primer on Innovation and Growth*, Bruegel Policy Brief, Brussels.

European Commission (2006), *European Economy, Globalisation: Trends, Issues and Macro Implications for the EU*, Brussels.

OECD (2005a), *OECD Employment Outlook 2005*, OECD, Paris.

OECD (2005b), *Enhancing the Performance of the Services Sector*, OECD, Paris.

Rodrik, D. (2004), "Industrial Policy for the Twenty-First Century", paper prepared for UNIDO.

Annex A. R&D Intensity[1] for Aggregate of 12 OECD Countries, 1991-99

	ISIC Rev.3	1991	1992	1993	1994	1995	1996	1997	1998	1999	Mean intensity 1991-99
Aircraft and spacecraft	353	13.9	13.9	13.5	13.9	16.2	14.8	12.8	10.7	10.3	13.3
Pharmaceuticals	2423	9.4	10.1	10.8	10.9	10.6	10.3	11.0	11.1	10.5	10.5
Office, accounting and computing machinery	30	10.9	10.4	9.3	8.8	7.5	9.1	10.4	8.9	7.2	9.2
Radio, TV and communciations equipment	32	7.9	8.3	7.9	7.8	7.7	8.2	8.0	8.6	7.4	8.0
Medical, precision and optical instruments	33	6.6	6.8	7.1	7.7	7.7	7.4	8.0	8.0	9.7	7.7
Electrical machinery and apparatus, n.e.c.	31	4.2	4.0	4.0	3.8	4.0	3.9	3.9	4.0	3.6	3.9
Motor vehicles, trailers and semi-trailers	34	3.7	3.4	3.5	3.4	3.5	3.7	3.5	3.3	3.5	3.5
Chemicals excluding pharmaceuticals	24 excl. 2423	3.4	3.3	3.4	3.1	2.8	3.1	2.7	3.1	2.9	3.1
Railroad equipment and transport equipment, n.e.c.	352 + 359	2.9	2.4	2.4	2.7	2.6	3.2	3.5	3.0	3.1	2.9
Machinery and equipment, n.e.c.	29	1.9	2.0	2.0	2.1	2.0	2.1	2.1	2.1	2.2	2.1
Building and repairing of ships and boats	351	0.9	1.0	1.0	0.9	0.9	1.0	0.8	1.0	1.0	1.0
Rubber and plastics products	25	1.0	1.0	0.9	1.0	0.8	0.9	0.9	0.9	1.0	0.9
Coke, refined petroleum products and nuclear fuel	23	1.2	1.2	1.1	1.0	0.9	0.8	0.7	0.9	0.4	0.9
Other non-metallic mineral products	26	1.0	0.9	0.9	0.9	0.8	0.9	0.9	0.9	0.8	0.9
Basic metals and fabricated metal products	27-28	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.6	0.6	0.6
Manufacturing, n.e.c.; Recycling	36-37	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.6	0.5	0.5
Wood, pulp, paper, paper products, printing and publishing	20-22	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.3
Food products, beverages and tobacco	15-16	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3
Textiles, textile products, leather and footwear	17-19	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total manufacturing	**15-37**	**2.5**	**2.5**	**2.5**	**2.4**	**2.4**	**2.6**	**2.6**	**2.6**	**2.6**	**2.5**
High-technology industries		**9.4**	**9.5**	**9.3**	**9.3**	**9.2**	**9.3**	**9.5**	**9.3**	**8.7**	**9.3**
Medium-high-technology industries		**3.1**	**3.0**	**3.1**	**3.0**	**2.9**	**3.1**	**2.9**	**3.0**	**3.0**	**3.0**
Medium-low-technology industries		**0.9**	**0.9**	**0.9**	**0.8**	**0.8**	**0.8**	**0.8**	**0.8**	**0.7**	**0.8**
Low-technology industries		**0.3**	**0.3**	**0.3**	**0.3**	**0.3**	**0.4**	**0.4**	**0.4**	**0.4**	**0.3**

1. R&D intensity defined as direct R&D expenditures as a percentage of production (gross output), calculated after converting countries' R&D expenditures and production using GDP PPPs

Source: OECD: ANBERD and STAN databases in *OECD Science, Technology and Industry Scoreboard, 2005*.

OECD PUBLICATIONS, 2, rue André-Pascal, 75775 PARIS CEDEX 16
PRINTED IN FRANCE
(92 2007 05 1 P) ISBN 978-92-64-03365-8 – No. 55647 2007

Staying Competitive in the Global Economy

MOVING UP THE VALUE CHAIN

Global value chains are radically altering how goods and services are produced – parts made in one country, for instance, are increasingly assembled in another and sold in a third. The globalisation of production has changed the industrial structure within OECD countries, and in some sectors blunted their competitiveness. Another major consequence has been fears of job losses, due to outsourcing and offshoring – not only in manufacturing but also in services. The rapid integration of China and India, with their large pool of educated people, further reinforces these concerns. How should OECD countries respond?

This report brings together OECD data on the globalisation of value chains, including the rise of outsourcing/offshoring. It first examines how OECD countries are affected by the globalisation of production, on both the macroeconomic and sector-specific levels. The costs and benefits of globalisation are then discussed, with an emphasis on employment and productivity. Finally, this report analyses how globalisation impacts the competitiveness of OECD countries, highlighting the need for an effective innovation strategy. The report discusses not only the moving up the value chain that takes place in OECD countries but also in China, as R&D is increasingly going to emerging countries.

OECD*publishing*
www.oecd.org/publishing

ISBN 978-92-64-03365-8
92 2007 05 1 P